CLINICAL COMPARATIVE STUDY OF ERCP COMBINED WITH GALLBLADDER-PROTECTED LITHOTOMY AND TRADITIONAL LITHOTOMY IN THE TREATMENT OF CHOLEDOCHOLITHIASIS COMPLICATED WITH CHOLECYSTOLITHIASIS

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ABSTRACT

Objective*: To investigate the clinical comparison of endoscopic retrograde cholangiopancreatography (ERCP) combined with traditional and gallbladder-protected lithotomy in the treatment of choledocholithiasis complicated with cholecystolithiasis.*

Methods: *100 patients with choledocholithiasis complicated with cholecystolithiasis were treated in hepatobiliary surgery in our hospital from October 2018 to October 2019. The patients were then retrospectively analysed and divided into a control group (n=56) and an observation group (n=44) according to different therapeutic regimens. The patients in the control group were treated with traditional open cholecystectomy + choledocholithotomy + T-tube drainage. In contrast, the patients in the observation group were treated with ERCP combined with gallbladder-protected lithotomy. The operation time, residual stone rate, average operative blood loss and postoperative gastrointestinal function recovery time were recorded and compared between the two groups. The incidence of postoperative adverse reactions and the average hospitalisation time of the two groups were compared. The clinical comparison of ERCP combined with both traditional and gallbladder-protected lithotomy for the treatment of choledocholithiasis complicated with cholecystolithiasis was explored.*

Results: *There was no statistical difference in the conversion laparotomy rate between the two groups (P>0.05). The average operation time and blood loss in the observation group were significantly lower than those in the control group (P<0.05 or 0.01). The total adverse reaction rate of the observation group was 9.09%, which was significantly lower than that of the control group (16.07%), and the difference was statistically significant (P<0.05). The residual rate of stones and the recovery time of gastrointestinal function in the observation group were lower than those in the control group, and the difference was statistically significant (P<0.05). The average hospitalisation time and average hospitalisation cost of the patients in the observation group were lower than those in the control group, and the difference was statistically significant (P<0.05).*

Conclusion: *Compared with traditional lithotomy, ERCP combined with gallbladder-protected lithotomy in the treatment of choledocholithiasis complicated with cholecystolithiasis has the advantages of a shorter operation time, smaller blood loss, lower adverse reaction rate and faster recovery, which can be widely used in clinics.*

Keywords: *ERCP, combined treatment, gallbladder-protected lithotomy, traditional lithotomy, choledocholithiasis complicated with cholecystolithiasis, clinic.*

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Introduction

Choledocholithiasis is the most common disease in bile duct surgery in China, which refers to stones located in the common bile duct. Most of the choledocholithiasis are mixed stones, which are common in the lower end of the common bile duct[(1)]. According to the source of stones, it was divided into primary choledocholithiasis and secondary choledocholithiasis[(2)]. Secondary cholelithiasis is a kind of bile duct stone from the gallbladder, in which cholesterol stones are the most common, and it is the most common choledocholithiasis[(3)]. According to statistics, the incidence of cholecystolithiasis in adults in China is about 8.5%, and the incidence of choledocholithiasis combined with cholecystolith-

iasis is as high as 13%[4]. At present, laparoscopic cholecystectomy, laparoscopic common bile duct exploration and T-tube drainage are the traditional methods for the treatment of choledocholithiasis complicated with cholecystolithiasis. With the continuous progress of minimally invasive technology in China, endoscopic retrograde cholangiopancreatography (ERCP) was used to remove common bile duct stones, and laparoscopic gallbladder-protected lithotomy was used to treat cholecystolithiasis.

Not only were the patients' diseases treated but also adverse reactions from the operation and intraoperative drainage were reduced, and the curative effect was better[5, 6]. The clinical efficacy of ERCP combined with gallbladder-protected lithotomy and traditional lithotomy in the treatment of choledocholithiasis complicated with cholecystolithiasis was compared in this study in order to provide a reference for clinical treatment.

Data and methods

General information

100 patients with choledocholithiasis complicated with cholecystolithiasis treated in hepatobiliary surgery in our hospital from October 2018 to October 2019 were collected.

Inclusion criteria:

• All patients met the diagnostic criteria of choledocholithiasis complicated with cholecystolithiasis in the Guidelines for Clinical Diagnosis and Treatment - division of surgery[7];

• Laboratory examination revealed an inflammatory phase of bile duct obstruction;

• The total number of white blood cells and neutrophils in the patients were increased;

• The patients had different degrees of liver function damage;

• The patient did not undergo other surgical treatment before admission.

(All patients and their families were informed and signed informed consent.)

Exclusion criteria:

• Patients with arrhythmia, myocardial infarction and other serious heart disease;

• The patient's common bile duct stone is huge;

• The vital signs of the patients were unstable;

• The patients had atrophic cholecystitis, porcelain gallbladder and acute gangrenous cholecystitis.

• The patients had serious immune diseases such as autoimmune diseases;

• The patient developed a serious infection.

According to different therapeutic regimen, the subjects were divided into control group and observation group. There were 56 patients in the control group, including 32 males and 24 females, with an average age of (46.15±8.45) years old and an average BMI of (20.08±1.02) Kg/m^2.

In the control group, there were four cases of acute pancreatitis, three cases of hypertension, two cases of coronary heart disease and three cases of diabetes mellitus. There were 44 patients in the observation group, including 24 males and 20 females, with the mean age of (46.23±8.16) years old and the mean BMI was (20.11±0.98) kg/m^2. In the observation group, there were three cases of acute pancreatitis, four cases of hypertension, three cases of coronary heart disease and three cases of diabetes mellitus. There was no significant difference in age, sex and BMI between the two groups (P>0.05). The data are shown in table 1.

Groups	Age (years old)	Sex (cases)		BMI value (Kg/m^2)	Acute pancreatitis (cases)	Hypertension (cases)	Coronary heart disease (cases)	Diabetes mellitus (cases)
		Male	Female					
Observation (n=44)	46.23 ±8.16	24	20	20.11 ± 0.98	3	4	3	3
Control (n=56)	46.15 ±8.45	32	24	20.08 ± 1.02	4	3	4	3
t/χ^2	0.026	0.002		0.082	0.053	0.403	0.532	0.009
P	0.979	0.963		0.935	0.817	0.526	0.818	0.924

Table 1: Comparison of general data between the two groups of subjects ($\bar{x}\pm s$).

Methods

The patients in the control group were general anaesthetized and treated with traditional lithotomy, that is, open cholecystectomy + choledocholithotomy + T-tube drainage. The patients were regularly treated with antibiotics and other anti-infecting drugs, and a fluid diet was given after postoperative exhaust.

All the patients in the observation group were given ERCP first, and endoscopic retrograde cholangiography, sphincterotomy and mechanical lithotripsy if necessary were performed after choledocholithiasis was confirmed. The patients were regularly placed with nasobiliary drainage, fasting and water-deprivation 24 h after the operation.

The patients were treated regularly with antibiotics and other anti-infecting drugs. Laparoscopic rigid choledochoscope gallbladder-protected lithotomy was performed under general anaesthesia at 3 to 30 d after the operation. At the same time, bile leakage and bleeding were observed, and drainage tubes were placed under the liver. After postoperative exhaust, a fluid diet was given to observe whether the drainage tube had bile leakage or not. After 24 h in

good condition, the drainage tube was pulled out, and the patients were treated with traditional Chinese medicine as a choleretic action for three months.

Observation indexes

The operation time, conversion laparotomy rate and average operative blood loss were recorded.

The postoperative gastrointestinal function recovery time, residual stone rate, average hospitalisation expenses and average hospitalisation time were compared. Postoperative adverse reactions were observed, such as incisional infection, bile leakage, perforation of the digestive tract, abdominal cavity infection and diarrhoea.

Statistical method

The data of this study were analysed by SPSS20.0 software package. The measurement data of this study were expressed as ($\bar{x}\pm s$). A t-test was used to compare the data between two groups.

The counting data were expressed as a percentage, and the comparison among groups was carried out by a χ^2 test. A Ridit test was used to compare the grade data. P<0.05 indicated the difference was statistically significant.

Results

Comparison of average operation time, average operative blood loss and conversion laparotomy rate between the two groups

There was no statistical difference in the conversion laparotomy rate between the two groups (P>0.05). The average operation time and blood loss in the observation group were significantly lower than those in the control group (P<0.05 or 0.01). The results are shown in table 2.

Groups	Cases	Average operation time (min)	Average operative blood loss (ML)	Conversion laparotomy rate (%)
Observation	44	41.76±9.15	46.45±12.75	3 (5.36%)
Control	56	46.15±10.43	73.45±23.45	2 (4.55%)
t/χ^2		2.239	7.350	0.034
P		0.027	<0.001	0.853

Table 2: Comparison of average operation time, average operative blood loss and conversion laparotomy rate between the two groups ($\bar{x}\pm s$).

Comparison of the incidence of postoperative adverse reactions between the two groups

The total adverse reaction rate of the observation group was 9.09%, which was significantly lower than that of the control group (16.07%), and the difference was statistically significant (P<0.05). The results were shown in table 3.

Groups	Cases	Incisional infection	Bile leakage	Perforation of the digestive tract	Abdominal cavity infection	Diarrhoea	Total adverse reaction rate
Observation	44	1	1	0	2	0	4 (9.09%)
Control	56	3	2	2	1	1	9 (16.07%)
χ^2		0.303					1.062
P							

Table 3: Comparison of the incidence of postoperative adverse reactions between the two groups (cases %).

Comparison of postoperative gastrointestinal function recovery time and stone residual rate between the two groups

The residual rate of stones and the recovery time of gastrointestinal function in the observation group were lower than those in the control group, and the difference was statistically significant (P<0.05). The results were shown in table 4.

Groups	Cases	Postoperative gastrointestinal function recovery time (days)	Stone residual rate (%)
Observation	44	1.05±0.45	2
Control	56	3.45±1.25	5
t/χ^2		13.326	0.727
P		<0.001	0.394

Table 4: Comparison of postoperative gastrointestinal function recovery time and stone residual rate between the two groups ($\bar{x}\pm s$).

Comparison of average hospitalisation time and hospitalisation cost between the two groups

The average hospitalisation time and average hospitalisation cost of the patients in the observation group were lower than those in the control group, and the difference was statistically significant (P<0.05). The results were shown in table 5.

Groups	Cases	Average hospitalisation time (days)	Hospitalisation cost (yuan)
Observation	44	9.50±2.50	23180.45±1026.50
Control	56	15.50±3.00	3526.00±1568.50
t/χ^2		10.669	5.426
P		<0.001	<0.001

Table 5: Comparison of average hospitalisation time and hospitalisation cost between the two groups ($\bar{x}\pm s$).

Discussion

Cholecystolithiasis is a high-incidence disease in China. Obesity, pregnancy, diabetes, hyperlipidemia and gastric surgery can cause cholecystolithiasis and patients can have cholecystalgia, right

upper abdominal pain, gallbladder fluid accumulation, jaundice and other symptoms[8]. With the development of economy and the improvement of living standard, the incidence of cholecystolithiasis is increasing year by year, becoming the focus of clinical research in China. The traditional treatment method is open cholecystectomy + choledocholithotomy + T-tube drainage. The success rate of this method is high, and the curative effect is good. Still, the operation trauma is significant, the T tube placement time is longer, the residual stone rate after the operation is high, and the comfort level of the patients is not high[9]. With the development of endoscopic technology, many patients with choledocholithiasis complicated with cholecystolithiasis are treated by minimally invasive surgery, so ERCP combined with gallbladder-protected lithotomy is more common in the treatment of choledocholithiasis complicated with cholecystolithiasis. ERCP refers to the technique of inserting the duodenoscope into the descending part of the duodenum, finding the duodenal papilla, inserting the angiographic catheter into the nipple opening from the biopsy tube, and X-ray radiography after injection with a contrasting agent to show the pancreatic bile duct[10, 11].

ERCP can clearly show the bile duct, the location, shape and pathological changes of the bile duct. ERCP can be used in advance to determine the location of common bile duct stones, the length of the gallbladder duct and whether the gallbladder duct is abnormal, eliminate the inflammation and tumour at the lower end of the common bile duct, determine the method and location of entering the gallbladder segment, reduce the injury of the biliary tract, and then carry out minimally invasive gallbladder-protected lithotomy, which can reduce the pressure of the biliary tract and gallbladder and reduce the incidence of bile leakage[12].

Therefore, ERCP has become an important treatment for pancreatic and gallbladder diseases. In this study, it was indicated that there was no statistical difference in the conversion laparotomy rate between the two groups (P>0.05). The average operation time and blood loss in the observation group were significantly lower than those in the control group (P<0.05 or 0.01). The residual rate of stones and the recovery time of gastrointestinal function in the observation group were lower than those in the control group, and the difference was statistically significant (P<0.05). The average hospitalisation time and average hospitalisation cost of the patients in the observation group were lower than those in the control group, and the difference was statistically significant (P<0.05). It is suggested that ERCP combined with gallbladder-protected lithotomy has the advantages of less trauma and a faster recovery in the treatment of choledocholithiasis complicated with cholecystolithiasis.

Because there are many abnormalities in the common bile duct and the incidence of complications in bile duct surgery is high, common bile duct injury, common hepatic duct injury and right hepatic duct injury are more common in clinics, so that patients can repeatedly have angiocholitis. Moreover, when the gallbladder was resected in traditional surgery, the incidence of gastritis, dyspepsia, choledocholithiasis and reflux esophagitis and other gallbladder-related complications was higher, with severe cases leading to colon cancer[13]. ERCP combined with gallbladder-protected lithotomy can reduce the injury of the bile duct, decrease the occurrence of complications after gallbladder resection, and significantly improve the quality of life of patients[14].

Some studies have shown that ERCP combined with gallbladder-protected lithotomy in the treatment of choledocholithiasis complicated with cholecystolithiasis results in faster recovery and a higher life quality of patients. The total adverse reaction rate of the observation group was 9.09%, which was significantly lower than that of the control group (16.07%), and the difference was statistically significant (P<0.05). It is suggested that ERCP combined with gallbladder-protected lithotomy has less adverse reactions in the treatment of choledocholithiasis complicated with cholecystolithiasis, reduces the injury of bile duct and gallbladder, and improves the quality of life of the patients, which is the same as the research results of Tang houkuo et al.[15].

In conclusion, compared with traditional lithotomy, ERCP combined with gallbladder-protected lithotomy in the treatment of choledocholithiasis complicated with cholecystolithiasis can be widely used in clinics and has the advantages of a shorter operation time, smaller blood loss and lower adverse reaction rate. Patients recover faster and have lower pain while preserving the gallbladder and gallbladder function, improving the quality of life.

References

1) Wu X, Huang ZJ, Zhong JY, Ran YH, Ma ML, et al. Laparoscopic common bile duct exploration with primary closure is safe for management of choledocholithiasis in elderly patients. Hepatobiliary Pancreat Dis Int 2019; 18: 557-561.
2) Hao L, Hu LH, Xu ZL. Trends in the timing of inpatient ERCP relative to cholecystectomy need to be improved. Gastrointest Endosc 2018; 88: 884-885.
3) Sousa M, Pinho R, Proença L, Rodrigues J, Silva J, et al. Choledocholithiasis in elderly patients with gallbladder in situ - is ERCP sufficient. Scand J Gastroenterol 2018; 53: 1-5.
4) Sun XY. Progress in minimally invasive treatment of choledocholithiasis complicated with cholecystolithiasis. Chin J Surg Integr Tradit Western Med 2016; 22: 306-309.
5) Cheng Y, Luo YP, Deng Y, Luo XP, Zhang S, et al. Clinical study of LC + LCBDE and ERCP/S + LC in treating cholecystolithiasis wtih choledocholithiasis. Chin J Laparosc Surg 2017; 10: 222-225.
6) Huang PY, Ding YM, Wang B. Comparison of two laparoscopic choledochoscopy for gallbladder stones and common bile duct stone. J Clin Surg 2016; 5: 369-371.
7) Zhang YJ. Ultrasonic diagnosis and clinical value of 45 cases of extrahepatic cholelithiasis. J Clin Med Literature 2019; 6: 163.
8) Tang JR. Clinical effect of therapeutic pattern of laparoscopic common bile duct exploration combined with intraoperative choledochoscopy on common bile duct stones complicated with cholecystolithiasis. Clin Med 2017; 12: 1.
9) Sharma A, Bhattarai P, Sharma A. eFAST for the diagnosis of a perioperative complication during percutaneous nephrolithotomy. Crit Ultrasound J 2018; 10: 7.
10) Tomohide H. Comprehensive and innovative techniques for laparoscopic choledocholithotomy: A surgical guide to successfully accomplish this advanced manipulation. World J Gastroenterol 2019; 25: 1531-1549.
11) Kulikovsky VF, Soloshenko AV, Karpachev AA, Yarosh AL, Vlasyuk YY. [Endoscopic interventions in diagnosis and treatment of Mirizzi syndrome]. 2016; 4: 11-14.
12) Luo H, Liu WH, Liang HY, Yan HT, Lin N, et al. Differentiation-inducing therapeutic effect of Notch inhibition in reversing malignant transformation of liver normal stem cells via MET. Oncotarget 2018; 9: 18885-18895.
13) Purkait B, Kumar M, Sokhal AK, Bansal A, Sankhwar SN, et al. Percutaneous nephrolithotomy of bilateral staghorn renal calculi in pediatric patients: 12 years experience in a tertiary care centre. Urolithiasis 2017; 45: 393-399.
14) Zou WQ, Wu JW, Lai SH, Xue LF. Analysis of correlation factors of recurrent choledocholithiasis after ERCP. Chin Foreign Med Res 2018; 16: 34-35.
15) Garcés-Albir M, Martí-Fernández R, Martínez-Fernández G, Peña-Aldea A, Muñoz Forner E, et al. The role of endoscopic retrograde cholangiopancreatography in the management of iatrogenic bile duct injury after cholecystectomy. Rev Esp Enferm Dig 2019; 111: 690-695.

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