

Laparoscopic hepatic left lateral lobectomy combined with fiber choledochoscopic exploration of the common bile duct and traditional open operation

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Abstract

AIM: To investigate the possibilities and advantages of laparoscopic hepatic left lateral lobectomy combined with fiber choledochoscopic exploration of the common bile duct compared with traditional open operation.

METHODS: Laparoscopic hepatic left lateral lobectomy combined with fiber choledochoscopic exploration of the common bile duct and traditional open operation were performed in two groups of patients who had gallstones in the left lobe of liver and in the common bile duct. The hospitalization time, hospitalization costs, operation time, operative complications and post-operative liver functions of the two groups of patients were studied.

RESULTS: The operation time and post-operative liver functions of the two groups of patients had no significant differences, while the hospitalization time, hospitalization costs and operative complications of the laparoscopic hepatic left lateral lobectomy combined with fiber choledochoscopic exploration in the common bile duct group were significantly lower than those in the traditional open operation group.

CONCLUSION: For patients with gallstones in the left lobe of liver and in the common bile duct, laparoscopic hepatic left lateral lobectomy combined with fiber choledochoscopic exploration of the common bile duct can significantly shorten the hospitalization time, reduce the hospitalization costs and the post-operative complications, without prolonging the operation time and bringing about more liver function damages

compared with traditional open operation. This kind of operation has more advantages than traditional open operation.

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Key words: Laparoscopy; Fiber choledochoscopy; Hepatic lobectomy; Exploration of common bile duct

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INTRODUCTION

Since the first laparoscopic hepatic lobectomy performed by Reich in 1991, the laparoscopic operation procedure has been practiced in hepatobiliary surgery^[1,2]. Because of the abundant blood supply for the liver and pneumoperitoneum, hemorrhage and gas embolism often occur during the operation^[3]. Laparoscopic hepatic lobectomy is an operation procedure with high difficulties and risks^[4]. However, in recent years, with the development of laparoscopic instruments and operative skills, laparoscopic hepatic lobectomy has gradually become a common operation procedure in clinical practice^[5,6]. It has many advantages over the traditional open operation^[7]. In traditional open operation, T-pieces should be placed in the common bile duct to drain the bile after exploration of the common bile duct, which provides channels for surgeons to take out the possible remnant gallstones. However, it also brings about heavy burdens on the patients, such as prolonged hospitalization time, unbalance between electrolytes and digestive dysfunction caused by bile drainage, local infection on the abdominal wall caused by the T-piece, complicated care for the T-piece. Researchers have tried to solve these problems for a long

time. In this study, we performed laparoscopic hepatic left lateral lobectomy combined with fiber choledochoscopic exploration of the common bile duct in 10 patients with gallstones in the left lobe of liver and in the common bile from September 2005 to December 2005. At the same time, traditional open hepatic lobectomy and T-piece drainage were performed in 12 patients. The former operation procedure has significant advantages over the latter. The results are reported here.

MATERIALS AND METHODS

Clinical data

Twenty-two patients were definitely diagnosed having gallstones in the left lobe of liver and in the common bile duct by CT and operative exploration from September 2005 to December 2005. Among these patients, 9 were male and 13 were female. Their age ranged from 29 to 58 (average 44) years and their liver functions were normal (Child grade A). Eleven patients had no icterus. The total bilirubin level ranged from 20 to 100 $\mu\text{mol/L}$ in 8 patients, and was higher than 100 $\mu\text{mol/L}$ in 3 patients.

Operation methods

In ten patients, ligments of the liver were dissociated by laparoscopic instruments under pneumoperitoneum condition. The trocar puncture point near the xiphoid was extended to about 5 cm, from which the left lateral lobe of liver was resected and the calculi in the intrahepatic duct were taken out without pneumoperitoneum, the left intrahepatic duct and the common bile duct were examined under a fiber choledochoscope for the possible remnant gallstones. After the remnant gallstones were taken out and the duodenal papillae were validated to be normal. The open part of the left intrahepatic duct and the left liver section were sutured. Traditional open operation was performed in 12 patients. After the left lateral lobe of liver was resected and the remnant gallstones were taken out from the common bile duct, T-pieces were conventionally used to drain the bile.

Statistical analysis

Data were processed with the Systat software (SPSS11.0) for statistical computation and graphing. One-way analysis of variance (ANOVA), independent-sample *t* test and chi square test were used to evaluate the differences between groups. $P < 0.05$ was considered statistically significant.

RESULTS

Operation time and hospitalization time

There were no significant differences in the operation time of laparoscopic hepatic left lateral lobectomy combined with fiber choledochoscopic exploration of the common bile duct and traditional open operation between the two groups. There were no significant differences in the time of hepatic inflow occlusion during the left lateral lobectomy between the two groups. While the hospitalization time and hospitalization costs of the laparoscopic hepatic left lateral lobectomy combined

Table 1 Operation time, hospitalization time and costs of different groups of patients (mean \pm SD)

Comparative aspects	Laparoscopy and choledochoscopy group	Traditional open operation group
Operation time (h)	2.5 \pm 0.3	2.0 \pm 0.5
Time of hepatic inflow occlusion (min)	15.0 \pm 3.0	10 \pm 5.0
Hospitalization time (d)	5.0 \pm 1.0	13.0 \pm 3.0
Hospitalization cost (ten thousand yuan)	1.2 \pm 0.3	1.5 \pm 0.5

Table 2 Postoperative complications in 22 patients

Postoperative complications	Laparoscopy and choledochoscopy group	Traditional open operation group
Hemorrhage of hepatic incisional margin	0	0
Biliary fistula	0	1
Biliary tract stenosis	0	0
Biliary tract bleeding	0	0
Infection or exudation of abdominal fistulas	0	12

with fiber choledochoscopic exploration in the common bile duct group were significantly lower than those in the traditional open operation group ($P < 0.05$, Table 1).

Postoperative complications

The incision in the laparoscopic and choledochoscopic group was much shorter than that in the traditional open operation group. During the operation, the common bile duct needed not to be cut open and T-piece needed not to be used to drain the bile. Postoperative complications such as biliary fistula, biliary tract bleeding and stenosis in the laparoscopic and choledochoscopic group were not as common as in the traditional open operation. Mild biliary fistula only occurred in one patient of the open operation group. All T-pieces were safely pulled out from all patients of the open operation group one month after operation and the abdominal fistulae healed quite well (Table 2).

Postoperative liver function

There were no significant differences in the postoperative liver function between the two groups three and seven days after operation. However, the liver function in the two groups was better seven days than three days after operation ($P < 0.05$, Table 3).

DISCUSSION

Micro-wound operation is becoming the trend of surgery in the 21st century. Laparoscopic surgery is regarded as an important component part of micro-wound surgery, because of its advantages such as alleviate wound and rapid concrescence. Laparoscopy has been tried in many aspects of abdominal operation^[8,9]. Both hepatic artery and portal vein give the blood supply for liver, hepatic inflow

Table 3 Postoperative liver functions in 22 patients (mean \pm SD)

Postoperative liver functions	Laparoscopy and choledochoscopy group		Traditional open operation group	
	3 d after operation	7 d after operation	3 d after operation	7 d after operation
Albumin (g/L)	30.2 \pm 5.0	40.0 \pm 3.5	28.8 \pm 4.2	41.0 \pm 5.0
Total protein (g/L)	60.0 \pm 4.0	75.0 \pm 3.0	58.5 \pm 5.0	70.5 \pm 4.0
AKP (U/L)	90.5 \pm 10.0	55.5 \pm 7.0	80.0 \pm 8.0	50.5 \pm 5.0
ALT (U/L)	150.0 \pm 32.0	50.0 \pm 10.0	180.0 \pm 42.0	55.0 \pm 8.0
AST (U/L)	70.0 \pm 5.0	20.3 \pm 7.5	75.8 \pm 8.0	18.5 \pm 8.5
TBIL (μ mol/L)	8.0 \pm 2.5	5.0 \pm 3.2	7.8 \pm 3.5	5.2 \pm 2.6
SBIL (μ mol/L)	16.5 \pm 3.0	8.4 \pm 1.7	17.5 \pm 2.5	9.1 \pm 2.0

occlusion and suturing the hepatic incisional margin are usually used to control the bleeding during the open operation^[10,11]. However, during laparoscopic hepatectomy, it would be impossible to use these methods, since they can lead to bleeding more easily^[12]. The negative pressure of the hepatic vein and the positive pressure of the abdominal cavity cause CO₂ gas embolism in the blood more easily during laparoscopic hepatectomy^[13,14]. Thus, laparoscopic hepatectomy is considered a difficult operation with a high risk requiring high techniques^[15,16]. In recent years, with the development of laparoscopic appliance and operative skills, laparoscopic operation is widely performed in hepatobiliary surgery^[17,18]. In traditional open common bile duct exploration, T-pieces are used for bile drainage and treatment of possible remnant gallstones^[19]. However, it also brings about heavy mental burdens to the patients, such as prolonged hospitalization time, electrolytical and digestive unbalance caused by bile drainage and local infection of the abdominal wall near the T-piece^[20-22]. In our study, laparoscopic hepatic left lateral lobectomy combined with fiber choledochoscopic exploration of the common bile duct was performed in 10 patients with gallstones in the left lobe of liver and in the common bile duct. Ligaments of the liver were dissociated with laparoscopic instruments under pneumoperitoneum condition, which avoided the long incision of the ligaments, and dissociation in traditional open operation. The trocar puncture point near the xiphoid was extended to about 5 cm, from which we resected the left lateral lobe of liver and took out the calculi in the intrahepatic duct without pneumoperitoneum, thus making it possible to use hepatic inflow occlusion for bleeding control and avoiding CO₂ gas embolism under pneumoperitoneum^[23,24]. From the extended trocar incision and the left intrahepatic duct, the common bile duct was examined under fiber choledochoscope for the possible remnant gallstones. After the remnant gallstones were taken out and the duodenal papillae were found to be normal. We sutured the open part of the left intrahepatic duct and the left liver section, thus making the bleeding and biliary fistulae more easily to be controlled. In the laparoscopic operation^[25], the wall of the common bile duct needs not to cut open, thus avoiding many common complications of open operation, such as biliary fistula, cholangitic stenosis, biliary tract bleeding, electrolytical or digestive unbalance and local infection. In our study, the liver function of the two groups was changed. The liver function impairment of the

laparoscopic group was milder than that of the traditional open operation group. These findings reflect the advantages of laparoscopic operation. As an important component of micro-wound surgery, laparoscopic operation is widely used in many fields of surgery. Because of its micro-wound and safety, it has gradually become the first choice of method for many operations. In laparoscopic hepatic left lateral lobectomy combined with fiber choledochoscopic exploration of the common bile duct, the much shorter incision lessens the post-operative pain of patients and no T-piece drainage also markedly reduces the post-operative complications.

In conclusion, laparoscopic hepatic left lateral lobectomy combined with fiber choledochoscopic exploration of the common bile duct has more advantages than traditional open operation.

COMMENTS

Background

Since the first laparoscopic hepatic lobectomy performed by Reich in 1991, the laparoscopic operation procedure has been practiced in hepatobiliary surgery. Because of the abundant blood supply for the liver and pneumoperitoneum, hemorrhage and gas embolism often occur during the operation, laparoscopic hepatic lobectomy is considered an operation procedure with high difficulties and risks. However, in recent years, with the development of laparoscopic instruments and operative skills, laparoscopic hepatic lobectomy has gradually become a common operation procedure in clinical practice and has many advantages over the traditional open operation.

Research frontiers

Micro-wound operation is becoming the trend of surgery in the 21st century and laparoscopic surgery is considered an important component part of micro-wound surgery. In this study, we investigated the possibilities and advantages of laparoscopic hepatic left lateral lobectomy combined with fiber choledochoscopic exploration of the common bile duct over the traditional open operation.

Innovations and breakthroughs

In this study, laparoscopic hepatic left lateral lobectomy combined with fiber choledochoscopic exploration of the common bile duct was performed in patients with gallstones in the left lobe of liver and in the common bile duct. Ligaments of liver were dissociated with laparoscopic instruments under pneumoperitoneum condition. The trocar puncture point near the xiphoid was extended to about 5 cm, from which we resected the left lateral lobe of liver and took out the calculi in the intrahepatic duct without pneumoperitoneum. From the extended trocar incision and the left intrahepatic duct, the common bile duct was examined by fiber choledochoscopy for the possible remnant gallstones. After the remnant gallstones were taken out and the duodenal papillae were validated to be normal, we sutured the open part of the left intrahepatic duct and the left liver section.

Applications

In the laparoscopic hepatic left lateral lobectomy combined with fiber choledochoscopic exploration of the common bile duct, the much shorter incision lessened the post-operative pain of patients and no T-piece drainage also markedly reduced the post-operative complications.

Peer review

This clinical study by Zhang *et al* describes a comparison between laparoscopic hepatic left lateral lobectomy *etc* vs traditional open operations. This manuscript is very informative and has impact the methodology used for common bile duct exploration.

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