

Laparoscopic Cholecystectomy in Patients With Cirrhosis of the Liver and Symptomatic Cholelithiasis

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ABSTRACT

Background: The indications and benefits of laparoscopic cholecystectomy (LC) in patients with liver cirrhosis and symptomatic cholelithiasis have not been satisfactorily documented. The aim of this study was to investigate its efficacy and safety in such patients.

Methods: Medical records of 38 patients with liver cirrhosis (stages Child-Pugh A and B) who underwent LC were retrospectively reviewed. Demographic characteristics and other parameters including initial presentation, conversion rate, complication rate, mortality, and duration of hospital stay were investigated and compared with non-cirrhotic patients' parameters in our database.

Results: Cirrhotic patients who underwent LC were older than noncirrhotic patients ($P=0.021$). Both the conversion rate (15.78%) and the duration of hospital stay were increased in the cirrhotic group, but without significant differences. Major complications occurred more often in the cirrhotic group ($P=0.027$), increasing morbidity; however, the mortality was zero.

Conclusions: LC can be safely performed in Child-Pugh A and B cirrhotic patients with symptomatic gallstone disease, with acceptable complication and conversion rates. The increased risk for a major complication, however, demands more attention than usual.

Key Words: Laparoscopic cholecystectomy, Cholelithiasis, Gallstone disease, Liver Cirrhosis, Surgical care, Gallbladder.

INTRODUCTION

Since its introduction in the late 1980s, laparoscopic cholecystectomy (LC) has rapidly changed the face of modern surgery and has become the treatment of choice for symptomatic cholelithiasis. Improvements in operating skills and equipment have gradually permitted its application in several previously contraindicated circumstances. Although some well-defined risk factors influencing the conversion rate have been described,¹ LC has been performed safely in various "difficult" conditions, even in the extremely elderly.²

It is known that cholelithiasis appears with an increased prevalence in cirrhotic patients, a fact that can be attributed to a decrease in bile salt production or to elevation of unconjugated bilirubin. Patients with liver cirrhosis, however, have been considered poor candidates for LC, especially those with end-stage disease and portal hypertension; the latter was initially regarded as a contraindication to laparoscopic cholecystectomy.³ The hardness of the fibrotic liver and the increased vasculature secondary to portal hypertension with a high risk for bleeding are the 2 main operative problems that must be overcome during the procedure. Over the years, accumulating experience in LC has resulted in an increasing number of authors reporting that LC can be safely performed in cirrhotic patients.⁴

This retrospective study, which is based on our long experience, evaluates the outcome of LC in the subgroup of patients with liver cirrhosis, highlighting operative hazards and its overall efficacy and safety.

METHODS

From January 1993 to August 2008, a total of 1478 patients underwent LC for symptomatic gallstone disease. Among them, 38 patients (2.57%) had liver cirrhosis (group C). Patients who had a clinical history and positive biopsy for cirrhosis as well as those who were found to be cirrhotic at the time of the surgery were included in this group. We retrospectively reviewed the medical records of group C patients and compared their characteristics with those of noncirrhotic patients (group NC).

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Investigated data included demographic characteristics (age and sex), Child-Pugh classification, positive history of either hepatitis B, C, or dual infection, presentation of the disease (biliary colic or acute cholecystitis), rate of conversion to open cholecystectomy, major complications, and duration of hospital stay. A summary of the clinicopathological characteristics of the cirrhotic patients is presented in **Table 1**.

The diagnosis of cholelithiasis was confirmed by abdominal ultrasonography in all cirrhotic patients. Preoperative preparation of patients with coagulopathy included administration of either fresh frozen plasma in cases of prolonged prothrombin time (PT) or platelets in cases of thrombocytopenia. The standard 4-trocar "American technique" was applied, with few manipulations to minimize operative trauma. By placing the umbilical trocar on the right or left of the median line, injuries to recanalized umbilical veins can be avoided. Transillumination of the abdominal wall during trocar placement aided in identification of abdominal wall vessels and helped to avoid troublesome bleeding. The procedure progressed with meticulous dissection and complete hemostasis by making use of monopolar electrocautery or titanium clips in case of large vessels.

Numerical data were compared using the independent samples *t* test, while nominal data were compared using either the Pearson χ^2 test or Fisher's exact test, where appropriate. All statistical analyses were computed using SPSS software (SPSS Inc., Chicago, IL, USA). Statistical significance was considered when $P < 0.05$.

RESULTS

Group C included 14 men (36.8%) and 24 women (63.2%). Male patients represented 29.8% and female patients 70.2% of the total number of NC patients. No statistical difference was found between the 2 groups ($P = 0.450$). The mean age of group C was 62.39 ± 13.3 years (range, 28

to 80). That was significantly higher ($P = 0.021$) than the mean age of group NC (54.08 ± 15.4 years).

Twelve group C patients (31.6%) had either a history of hepatitis B infection or a positive test for HbsAg. The rate of hepatitis C infected patients was even higher (34.2%); 2 patients had dual infection. Clinical presentation of gallstone disease in cirrhotic patients was biliary colic in 31 (81.6%) patients or acute cholecystitis in 7 (18.4%) patients. In the NC group, 59 patients were operated on for acute cholecystitis (4.09%). They were fewer than those in the C group, with a statistically significant difference ($P < 0.001$).

Conversion of laparoscopic cholecystectomy to an open procedure was necessary in 6 patients in the C group (15.78%); this rate was higher (almost twice) than the conversion rate in the NC group (8.75%), but without a statistical difference between them ($P = 0.104$). LC was converted in cirrhotic patients, because of the inability to clearly identify local anatomy due to dense fibrosis in Calot's triangle in 2 cases and because of extensive adhesions in one case. In 2 patients, conversion was necessary because of bleeding from the gallbladder bed and in one patient because of bleeding from an epiploic vessel injury during the insertion of the Veress needle. The Veress needle technique to establish pneumoperitoneum has been abandoned in the last 4 years; direct vision using the open technique (Hasson's method) was applied instead.

Three major postoperative complications (7.89%) were encountered in cirrhotic patients. A duodenal perforation with peritonitis was treated with reoperation. Two cases of continuing hemorrhage from the gallbladder bed were managed conservatively with erythrocyte and fresh frozen plasma transfusions. In one of them, a reoperation was required for hemostasis. The above-mentioned complication rate of 7.89% is significantly higher ($P = 0.027$) than that in the NC group (1.59%). The difference in postoperative mortality was not significant between groups. No deaths occurred in the C group, whereas 2 deaths occurred in the NC group. Hospitalization time was not significantly ($P = 0.058$) longer in the C group (mean time, 4.4 ± 3.6 days), than in the NC group (mean time, 2.97 ± 2.35 days). A synopsis of the perioperative results is shown in **Table 2**.

DISCUSSION

The prevalence and incidence of cholelithiasis in patients with liver cirrhosis is 2 times higher than that in noncirrhotic patients.^{5,6} In these patients, gallstone formation is

Table 1.

Clinicopathological Characteristics of Patients With Liver Cirrhosis Who Underwent Laparoscopic Cholecystectomy

| Characteristic | No. |
|-----------------------------------|-------------------|
| Age | 62.39 ± 13.26 |
| Sex (Male/Female) | 14/24 |
| Child-Pugh classification (A/B/C) | 29/9/0 |
| Hepatitis (B/C/B+C) | 12/13/3 |
| Presentation (chronic/acute) | 31/7 |

Table 2.
 Perioperative Results of Cirrhotic and Noncirrhotic Patients Who Underwent Laparoscopic Cholecystectomy

| Parameter | Cirrhotic Patients (%) (n = 38) | Noncirrhotic Patients (%) (n = 1440) | P |
|---------------------|---------------------------------|--------------------------------------|-------|
| Conversion rate | 6 (15.78) | 126 (8.75) | 0.104 |
| Major complications | 3 (7.89) | 23 (1.59) | 0.027 |
| Mortality | 0 (0) | 2 (0.13) | 1.0 |
| Hospital stay | 4.40±3.59 | 2.97±2.35 | 0.058 |

facilitated by a decrease in bile salt production and by elevated levels of unconjugated bilirubin, which are possibly caused by intravascular hemolysis and/or functional gallbladder alterations.⁷ LC, although it was once contraindicated for cirrhotic patients, has gradually replaced open cholecystectomy as the standard of care of gallstone disease in cirrhotic patients. Such patients can actually benefit from less intraoperative blood loss, less postoperative pain, and quicker recovery, the major advantages of the laparoscopic technique. Open surgery is associated with increased morbidity and mortality,^{7,8} and results in more adhesions than a laparoscopic procedure. This latter can be of significant importance in cirrhotic patients, which may potentially become candidates for transplantation. Previous open cholecystectomy can be the cause of increased hypervascular adhesions, which makes the dissection of porta hepatis more hazardous.⁹

In this study, mortality was zero in the cirrhosis group without any significant difference between the 2 groups. Major complications occurred significantly more often in the cirrhosis group, but the increased morbidity did not reflect on the duration of hospital stay or on the conversion rate, which were both longer but without significant differences. Similar results are demonstrated in a large metaanalysis, which compares the results of LC in cirrhotic patients with LC in noncirrhotic patients and laparoscopic to open cholecystectomy in cirrhotic patients.⁹

The technical problems that were encountered intraoperatively in our patients resulted in conversion to an open procedure in 15.78% of cases, almost twice more often than in the NC group. A similar outcome was reported in another study.¹⁰

The major causes of postoperative morbidity and mortality in cirrhotic patients are the excessive blood loss, liver failure, and sepsis. Increased bleeding is the most feared complication. It is mainly due to either coagulopathy resulting from inadequate synthesis of clotting factors, thrombocytopenia secondary to hypersplenism, or to abdominal varices of portal hypertension.¹¹ Cirrhotic pa-

tients who underwent LC had significantly increased blood loss compared with noncirrhotic patients, but less than the cirrhotic patients who underwent an open procedure.⁹ In our series, half of the reasons for conversion and 2 out of the 3 postoperative complications were related to uncontrolled bleeding. Bleeding disorders can be significantly avoided with routine administration of fresh frozen plasma or platelets preoperatively. Needless to say, the laparoscopic technique produces less bleeding than a right subcostal incision. Furthermore, abdominal wall vessel injury can be avoided by wall transillumination, and venous bleeding can be controlled by decreasing the pressure of pneumoperitoneum as required.¹²

The increased risk for postoperative liver failure can be partially explained by the anesthetic agent's action, which is known to decrease hepatic arterial blood flow. This hepatic ischemia can be the cause of the release of inflammatory mediators that can lead to multisystem organ failure. The ability of cirrhotic patients to compensate for this ischemia is impaired, so hepatic dysfunction can develop postoperatively.¹³ Impaired liver function in cirrhosis leads to diminished Kupffer cell function, which in turn leads to reduced intravascular clearance of the enteric organisms and endotoxemia.¹⁴ This can explain the increased risk of infection in cirrhotic patients, which is also directly correlated with the patient's Child-Pugh classification.^{14,15} Additionally, ascitic fluid is an excellent growth medium for bacterial contaminants released in cholecystectomy. Fortunately, infected ascites is far less frequent in LC than in open surgery, because bacterial contamination of the peritoneal cavity through the 5-mm or 10-mm ports does not occur as easily as contamination through a wide right subcostal incision.¹⁶

The present study does not include Child-Pugh class C patients. The fact that mortality and morbidity rates are higher in this subgroup makes surgeons reluctant to attempt LC. These patients, along with other high-risk patients can benefit from alternative procedures like percutaneous cholecystostomy or subtotal cholecystectomy. Even though experience is limited, authors reported fa-

favorable results with these procedures, which follow the rationale of “less is more.”^{17,18}

CONCLUSION

Based on our results, we can conclude that LC can be performed in Child-Pugh A and B patients with symptomatic gallstone disease, with acceptable complication and conversion rates, morbidity and mortality. The increased risk for a major complication however, demands more attention than usual.

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