SCIENTIFIC PAPER

Laparoscopic Cholecystectomy in Cirrhotic Patients

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ABSTRACT

Background and Objectives: Gallstones are twice as common in cirrhotic patients as in the general population. Although laparoscopic cholecystectomy (LC) has become the gold standard for symptomatic gallstones, cirrhosis has been considered an absolute or relative contraindication. Many authors have reported on the safety of LC in cirrhotic patients. We reviewed our patients retrospectively and assessed the safety of LC in cirrhotic patients at a tertiary care hospital in Pakistan.

Methods: From January 2003 to December 2005, a retrospective study was conducted at SU IV, Liaquat University of Medical & Health Sciences Jamshoro. All the cirrhotic patients with Child-Pugh class A and B cirrhosis undergoing LC were included in the study. Cirrhosis was diagnosed based on clinical, biochemical, ultrasonography, and intraoperative findings of the nodular liver and histopathological study.

Results: Of 250 patients undergoing laparoscopic cholecystectomy, 20 (12.5%) were cirrhotic. Of these 20, 12 (60%) were Childs group A and 8 (40%) were group B. Thirty percent were hepatitis B positive, and 70% were hepatitis C positive. Preoperative diagnosis of cirrhosis was possible in 80% of cases, and 20% were diagnosed during surgery. Morbidity rate was 15% and mortality rate was 0%. Two patients developed postoperative ascites, and mean hospital stay was 2.8±0.1 days. Of the 20 cases, 2 (10%) were converted to open cholecystectomy. The mean operation time was 70.2±32.54 minutes.

Conclusion: Laparoscopic cholecystectomy is an effective and safe treatment for symptomatic gallstone disease in select patients with Child-Pugh A and B cirrhosis. The advantages over open cholecystectomy are the lower morbidity rate and reduced hospital stay.

Key Words: Cirrhosis, Laparoscopic cholecystectomy.

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INTRODUCTION

Chronic liver disease is a major health problem in Pakistan. The most common cause is viral hepatitis B and C, which is now endemic in Pakistan. According to one study,[1] 4.3% of the population is sero-positive for hepatitis B surface antigen and 6% for hepatitis C antibodies. This results in an increasing number of patients who ultimately will develop cirrhosis.

Gallstones are twice as common in cirrhotic patients as in the general population.[2–4] With this increase in the prevalence in viral hepatitis, surgeons now more frequently encounter cirrhotic patients with symptomatic gallstones.

Since the introduction of laparoscopic cholecystectomy in the United States in 1988, it has become the gold-standard treatment for symptomatic gallstones. Postoperative morbidity and mortality rates are significantly lower with LC compared with those for open cholecystectomy. Although laparoscopic cholecystectomy has become the treatment of choice, cirrhosis has been considered an absolute or relative contraindication.[5] However, with surgeons' increased experience in laparoscopic surgery, it has been shown to be safe and well tolerated in cirrhotic patients. Several studies have reported the efficacy and safety of laparoscopic cholecystectomy in cirrhotic patients.[6–11]

The aim of our study was to assess the safety of laparoscopic cholecystectomy in cirrhotic patients and to evaluate its benefits compared with the benefits in noncirrhotic patients.

PATIENTS AND METHODS

From January 2003 to December 2005, a total of 250 patients underwent laparoscopic cholecystectomy for symptomatic gallstone disease in our unit. Of these 250 patients, 20 had cirrhosis. All of these patients provided a medical history followed by a physical examination, ultrasonography, liver function tests, prothrombin time, platelet count, and viral hepatitis screening. The diagnosis of cirrhosis was made based on preoperative workup, intraoperative findings of a nodular liver, and histopathological study. All patients were evaluated preoperatively according to the American Society of Anesthesiologists

(ASA) scoring system. Laparoscopic cholecystectomy was performed with the standard 4-port technique with the patient under general anesthesia. Pneumoperitoneum was created through the first port subumbilically by means of the open (Hassan) technique. A subhepatic drain was kept in place in all cases.

The data were analyzed for patient demographics, laboratory findings, cause of cirrhosis, Child-Pugh class, operative time, conversion rate, procedure-related morbidity, and mortality and hospital stay. The data were evaluated by using SPSS version 16.0. Fisher's exact test and Pearson's chi-square test were applied for categorical parameters, and the independent *t* test was used to compare the means (2-tailed) among continuous variables. The results were calculated on 95% confidence interval. $P \leq 0.05$ was considered significant.

RESULTS

Twenty patients with cirrhosis, 3 males and 17 females, underwent laparoscopic cholecystectomy. Mean age of the patients was 43.9±8.06, whereas mean age of noncirrhotic patients (n=230) was 43.5±7.28.

Of these 20 patients, cirrhosis was diagnosed as secondary to hepatitis C in 14 (70%) patients and hepatitis B in 6 (30%) patients. Child-Pugh classification was used to assess the severity of liver cirrhosis; 12 (60%) patients were class A, and 8 (40%) were class B.

Two (10%) patients in the cirrhotic group and 15 (6.5%) in the noncirrhotic group had a history of previous abdominal surgery. Significant comorbidity was present in 4 (20%) cirrhotic patients and 20 (8.7%) noncirrhotic patients **(Table 1)**.

Table 2 shows the laboratory data collected before surgery. Elevated levels of total bilirubin, aspartate aminotransferase (AST), alanine aminotransferase (ALT), and lower albumin were noted in patients with cirrhosis.

The mean operation time was 70.2±32.54 minutes in patients with cirrhosis, significantly longer compared with operative time for patients without cirrhosis. Conversion to an open procedure was required in 2 (10%) patients because of hemorrhage in the liver bed. The mean length of hospital stay was 2.8±0.1 days, not much different from that for noncirrhotic patients **(Table 3)**.

No operative mortalities occurred. Postoperative morbidity was observed in 3 (15%) patients with cirrhosis **(Table 3)**. Postoperative complications for each group are presented in **Table 4**. Two patients with Child-Pugh class B cirrhosis developed ascites after surgery; one patient with Child-Pugh class A had bile leakage. All patients were followed up for 2 years.

DISCUSSION

Gallstone disease is a prevalent disease worldwide and more common in patients with cirrhosis of the liver. Its incidence is 29.4% for patients with cirrhosis compared with 12.8% for patients without cirrhosis.[2,12] According to a study[13] conducted at a teaching hospital, in Pakistan, the frequency of gallstones is 31%. Pathogenic factors seem to be responsible for the high incidence of gallstones in cirrhosis including intravascular hemolysis, hypersplenism, reduction in biliary acidity, increased levels of estrogen, and functional alterations of the gallbladder (reduction in motility and emptying). Several published reports have shown that cirrhosis of the liver has a major

Table 1.
Patient Demographics (n = 250)

	Cirrhotic (n = 20)	Noncirrhotic (n = 230)	P Value
Age (in years)	43.9 ± 8.06	43.5 ± 7.28	0.82
Sex			
Male	3 (15.0%)	22 (9.6%)	0.4
Female	17 (85.0%)	208 (90.4%)	
Child Pugh Class			
A	12 (60.0%)	-	< 0.001*
B	8 (40.0%)	-	
Hepatitis B Positive	6 (30.0%)	-	< 0.001*
Hepatitis C Positive	14 (70.0%)	-	< 0.001*
Previous Abdominal Operation	2 (10.0%)	15 (6.5%)	0.63
Associated Disease	4 (20.0%)	20 (8.7%)	0.11

* P value is statistically significant.

Table 2.
Patient Laboratory Data (n = 250)

	Cirrhotic (n = 20)*	Noncirrhotic (n = 230)*	P Value
While Blood Cells (μL)	6525.00 ± 1098.7	6711.30 ± 953.620	0.4
Albumin (g/dL)	3.01 ± 0.5	4.21 ± 0.81	0.003
Bilirubin	1.22 ± 1.3	1.02 ± 1.29	0.12
Creatinine	1.03 ± 0.25	1.36 ± 3.51	0.03
AST (IU/L)	69.5 ± 75.2	34.5 ± 55.0	<0.001
ALT (IU/L)	67.5 ± 80.0	39.8 ± 70.2	0.0006
ALP (IU/L)	93.2 ± 52.6	83.2 ± 72.2	0.087
Prothrombin Time	16 ± 3.0	12 ± 1.0	0.001

*Results are expressed as mean ± standard deviation.

Table 3.
Surgical Outcomes After Laparoscopic Cholecystectomy (n = 250)

	Cirrhotic (n = 20)*	Noncirrhotic (n = 230)*	P Value
Operation time (minutes)	70.2 ± 32.54	53.9 ± 4.56	< 0.001*
Hospital stay (in days)	2.8 ± 1.19	2.8 ± 1.16	0.86
Conversion Rate	2 (10.0%)	10 (4.3%)	0.24
Morbidity	3 (15.0%)	44 (19.1%)	1.00
Mortality	0	0	0

*Results are expressed as mean ± standard deviation.

Table 4.
Causes of Morbidity (n = 250)

	Cirrhotic (n = 20)	Noncirrhotic (n = 230)
Wound Infection	0	8 (3.5%)
CBD Injury	0	0
Residual CBD Stone	0	0
Bile Leakage	1 (5.0%)	2 (0.9%)
Trocar Site Hematoma	0	4 (1.7%)
Intraabdominal Abscess	0	4 (1.7%)
Ascites	2 (10.0%)	2 (.9%)

*CBD = common bile duct.

†P value = 0.01.

impact on morbidity and mortality after open cholecystectomy. Because of the high rates of mortality (83.3%) and morbidity, Aranha et al[14] considered cholecystectomy in patients with cirrhosis as "a formidable operation." The main complications of open cholecystectomy in cirrhotic patients are ascites, wound and pulmonary infection, and hemorrhage. By the late 1980s, better surgical results have been published for cirrhotic patients with normal hepatic synthetic function who underwent elective cholecystectomy.

Laparoscopic cholecystectomy has been proven safe and feasible for symptomatic gallstones, but its role in cirrhotic patients remains controversial. Yerdel et al[10] in 1993 reported the first study of laparoscopic cholecystectomy in cirrhosis. Although a small number of patients were included in the study, no morbidity or mortality occurred. However, with surgeons' increase in laparoscopic experience, various recent studies have demonstrated that laparoscopic cholecystectomy in cirrhosis is safer and better tolerated than open cholecystectomy. Proper patient selection after estimating the risk is an essential requirement. The Child-Pugh classification is helpful in estimating the

risk and provides an idea of the patient's liver reserve.[15,16] The need for blood transfusion and patient mortality and morbidity all correlate with the Child-Pugh classification. Block et al[17] reported a mortality of 27% among Child-Pugh C, 9% among Child-Pugh B, and no mortality among Child-Pugh A patients. Kogut et al[18] also reported a zero percent mortality among Child-Pugh A patients, and Wu et al[19] suggested that Child-Pugh A patients can even be regarded as "noncirrhotic" in biliary surgery.

We performed LC only on patients with Child-Pugh class A and B cirrhosis. Those classified as Child-Pugh class C were referred to the medical team for conservative management. A similar approach was used by investigators in a recent study carried out at a tertiary care hospital in Pakistan.[20] The literature also shows a prevalence of Child-Pugh A patients, whereas only a few studies report Child-Pugh C patients, and it is impossible to draw a conclusion about these very high-risk patients.[12]

Our study reflects the patient population at our hospital. Hepatitis B and C were the leading causes of cirrhosis in our patients, which is contradictory to reports in the literature, which indicate that alcoholic liver disease is more prevalent in the West. In our setting, chronic liver disease due to viral hepatitis is common; therefore, abnormal laboratory data raised the suspicion of cirrhosis, and we further investigated our patients to reach a final diagnosis. Most of the patients in our study were diagnosed preoperatively and confirmed by intraoperative liver biopsy. This is in contrast to previous reports where many patients were found to have cirrhosis incidentally at the time of laparoscopic cholecystectomy.[20–22] Hamid et al[23] recommend that in areas where liver disease is prevalent, all patients undergoing surgery should have prothrombin time, serum albumin, hepatitis B surface antigen, and careful abdominal ultrasound with particular emphasis on the liver. The results of laboratory data in our series are similar to that reported by Yeh et al[24] and differ from the results reported in Fernandes et al's[25] control study.

Mean operation time in our study was 70.2 minutes, which is significantly shorter than that reported in the earlier literature. Our study showed an increased conversion rate to open cholecystectomy that differs from previous published data. In the literature, the conversion rate of laparoscopic cholecystectomy in cirrhotic patients ranged from 0% to 9%.[10,11] However, a 0% conversion rate was reported in some small series containing less than 10 patients that might indicate selected patients in the series. The mean hospital stay was 2.8 days, similar to that in patients without cirrhosis. However, Puggioni and Wong[26] in their metaanalysis reported that operative time and length of hospital stay in cirrhotic patients were considerably reduced for laparoscopic cholecystectomy compared with the open approach.

The morbidity rate in this study was 15%. The main complication in our series was ascites and bile leakage, which were managed conservatively. The incidence of ascites after open cholecystectomy is unknown. Brown and Burk[27] reported a 39% rate of ascites after exploratory laparotomy for various indications in cirrhotic patients. Several causes are postulated, such as leakage of lymphatic vessels interrupted at surgery, gallbladder bed lymphatics, and blood loss.

Based on previous published reports,[21,22] it is evident that bleeding complications are more common in patients with cirrhosis. To avoid these complications in patients with cirrhosis, we used a Harmonic scalpel during surgery while dissecting the gallbladder from the liver bed. The bleeding that occurs during gallbladder dissection is usually venous and can easily be controlled. In case of troublesome bleeding, Spongstan can be used. If the blood is spurting then a figure of eight stitch can be applied. Because of the anticipated difficulties during surgery in patients with cirrhosis, particular care is necessary. The surgeon should avoid excessive traction on the gallbladder. In cases where there is uncontrolled bleeding or difficulty in retraction of the liver, we advise insertion of additional ports.

Results of several studies have been published that show encouraging outcomes with laparoscopic cholecystectomy in cirrhotic patients. Laparoscopic cholecystectomy offers several advantages over open cholecystectomy including less bleeding, lower morbidity, and shorter hospital stay. Blood loss is reduced because magnification of the surgical field permits meticulous dissection of the gallbladder and a hemostasis role for pneumoperitoneum (barohemostasis).[10,28]

In addition, laparoscopy avoids the subcostal incision that would increase hemorrhage in patients with cirrhosis. Another advantage of this approach is the lower chance of postoperative adhesion, which is beneficial for patients who may have a liver transplant in the future.[7]

Morino et al[13] also note that laparoscopic cholecystectomy has distinct advantages for the surgical team. Laparoscopy reduces the risk of contamination, especially in treatment of patients with hepatitis B and C related cirrhosis.

CONCLUSION

Based on our results as well as those of others, we conclude that laparoscopic cholecystectomy is an effective and safe treatment for symptomatic gallstone disease in select patients with Child-Pugh A and B cirrhosis. However, appropriate preoperative preparations and careful intraoperative techniques are required for better outcomes. LC has the advantages over open cholecystectomy of lower morbidity and reduced hospital stay.

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