Surgical Challenges of Laparoscopic Cholecystectomy in Cirrhotic Liver

Ayman Elesawy MD, Nader Shabaan MD,
Salah Said Soliman, MD, MRCS
Department of General Surgery,
Faculty of Medicine, Fayoum University

ABSTRACT

***Background**: Cholelithiasis is a common disease in patients with liver cirrhosis. The presence of liver cirrhosis has been an absolute or relative contraindication to LC .With increased experience in laparoscopy, LC has become the treatment of choice for symptomatic cholelithiasis in cirrhotic patients. The aim of this study was to report the safety and efficacy of LC in the treatment of symptomatic cholelithiasis in cirrhotic patients.* ***Methods**: Fifty patients with symptomatic calcular cholecystitis and hepatic cirrhosis (Child Pugh class A and B) were operated upon by standard Laparoscopic cholecystectomy.* ***Results**: All fifty patients underwent laparoscopic cholecystectomy were cirrhotic as diagnosed preoperatively and confirmed by histopathological examination of liver biopsy. Thirty nine (78%) were Child group A and eleven (22%) were Child group B, 50% were hepatitis B positive, 30% hepatitis C positive, 12% with dual infection and 8% with unknown etiology. Mortality rate was 0% and Morbidity rate 28%. The conversion rate was 14% and mean operative time was 76.4 minutes. Mean hospital stay was 3.2 day.* ***Conclusion**: LC seems to be safe in selected child-pugh class A and B with compensated cirrhosis, with acceptable morbidity rate, conversion rate and short hospital stay and no mortality.*

***Keywords**: Laparoscopy, cholecystectomy, cirrhosis.*

INTRODUCTION

Chronic liver Disease is a major health problem in Egypt and hepatitis B and C viruses which are now endemic, are the most common cause of liver cirrhosis in developing countries.[1]

Gallstones occur more commonly in patients with cirrhosis. The incidence is 29.4% for patients with cirrhosis as compared with an incidence of 12.8% for patients without cirrhosis.[2] This is probably due to hemolysis, hypersplenism, reduction in biliary acidity, functional alterations in gallbladder and metabolic liver failure resulting in an increase in unconjugated bilirubin secretion.[3] The risk of developing Gallstones is correlated with the severity of chronic liver Disease as graded by Childs-pugh classification, rather than the etiology of Liver diseases.[4]

With increasing prevalence of viral hepatitis and chronic liver disease, surgeons are now more frequently encountering cirrhotic patients with symptomatic gall stones requiring intervention [5]

When the era of Laparoscopy began in the early 1990s, liver cirrhosis was considered an absolute contraindication for performance of the laparoscopic technique, due to unacceptable increases in intra and postoperative complications and associated morbidity [6] However, recent advances and growing of experience have now made it increasingly possible for experienced surgeons to perform laparoscopic cholecystectomy on this high risk population.[7] The hardness of fibrotic liver and difficulty of its retraction and increased vasculature secondary to portal hypertension with a high risk for bleeding are the two main operative problems that must be overcomed during the procedure [9].

An overall morbidity rate of 21% is described in cirrhotic patients undergoing laparoscopic chlecystectomy compared with 8% morbidity in non-cirrhotic patients.[6]

These morbidities include liver bleeding, bile leaks, wound infection, disruption, ascites leakage and new onset of ascites, peritonitis, pulmonary embolism and cardiopulmonary complications. Conversion rates from the laparoscopic procedure to open cholecystectomy were 7% in cirrhotics versus 3.6% in non-cirrhotics. These patients with chronic liver Disease were principally of child Pugh class A and B. The Laparoscopic procedure in patients with child C was avoided with the potential risks of mortality and morbidity in this group being unacceptable [8].

The management of gallstones in patients with chronic liver disease is a frequent dilemma. The risks of surgery need to be weighed against the likelihood of gallstones progressing to acute cholecystitis or bile duct obstruction[9].

An overall mortality rate for patients with chronic liver disease undergoing anesthesia and cholecystectomy is as high as 11.5%. Although the risks of development symptoms and complications are low, the mortality associated with acute complications is in comparison higher with symptomatic gall stones in cirrhotic patients than in noncirrhotics [11]

The benefits and successful use of laparoscope in patients with cirrhosis are less well documented and over years, accumulating experience in laparoscopic cholecystectomy has resulted in an increasing number of authors reporting that LC in cirrhotic patients is a safe procedure. The aim of the study is to assess the feasibility and safety of L.C in cirrhotic patients and analyze if our results are similar to published data in literature.

PATIENTS AND METHODS

This study was conducted in surgical department Faculty of Medicine Fayoum University from June 2010 to September 2012 The study included fifty patients with symptomatic calcular cholecystitis and hepatic cirrhosis (CTP A and B) operated upon by the standard laparoscopic cholecystectomy. The main presentation was severe recurrent biliary colic and acute cholecystitis. The diagnosis of cirrhosis was based on preoperative (Clinical, biochemical and U.S) workup, intraoperative findings of a nodular liver and a histopathological study for a liver biopsy taken during laparoscopic cholecystectomy. Gallstone disease was evaluated and confirmed preoperatively with abdominal ultrasound and cirrhosis as well. All patients were subjected to Clinical history taking followed by a physical examination, abdominal ultrasonography, liver function tests, prothrombin time, viral hepatitis markers and complete Blood count.

The Child-Turcotte-Pugh classification system was used to assess the severity of cirrhosis and only patients with classes A and B were included.

Preoperative preparation of patients with coagulopathy included administration of either fresh frozen plasma in cases of prolonged prothrombin time (PT) or platellets transfusion in cases of thrombocytopenia.

Patients were fully informed about the risks and benefits of the laparoscopic procedure and the possibility of conversion to open surgery. Informed consent was obtained from every patient.

All laparoscopic cholecystectomies in cirrhotic patients were performed under General anaesthesia with the standard 4-trocar technique. Hepatotoxic drugs were avoided whether during induction of anaesthesia or in postoperative analgesics and antibiotics. The standard four port technique for laparoscopic cholecystectomy was used.

Pneumoperitoneum was created by open technique. By placing the umbilical port on the left or right of the midline, injuries to recanalized umbilical veins can be avoided. The rest of the three standard ports were placed under direct vision by prior transillumination of the abdominal wall. . The subxiophoid 10-mm port was placed more to the right of the midline to completely avoid the falciform ligament and its accompanying umbilical vein. An additional port can be used to retract the liver.

The procedure progressed with meticulous dissection and complete hemostasis by making use of monopolar electrocautery or special devices such as US dissection (Harmonic scalpel) which was available for handling tissue dissection or bleeding when needed. Abdominal tube drain was placed in the hepatorenal pouch and gall bladder bed for all patients for at least 24 hours and was removed once there was no bile or blood leakage **(Figures 1, 2, 3).**

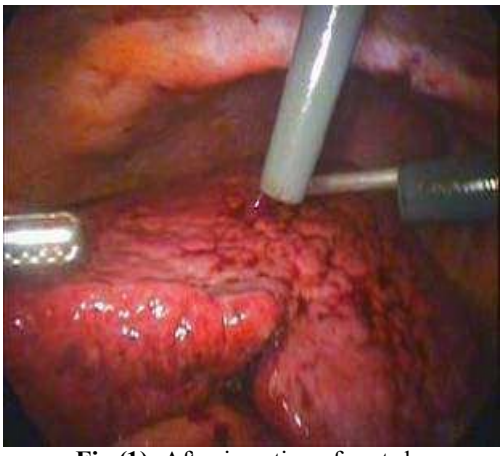

Fig (1): After insertion of ports by transillumination showing coarse liver cirrhosis

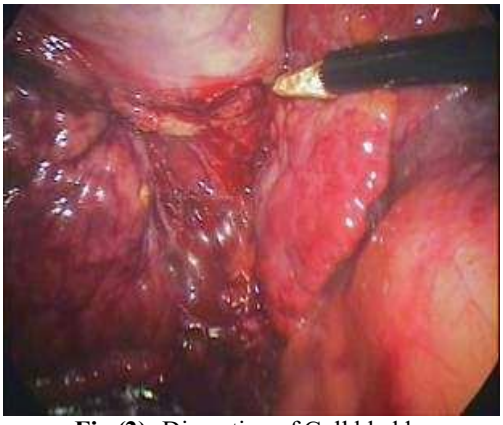

Fig (2): Dissection of Gall bladder from liver bed

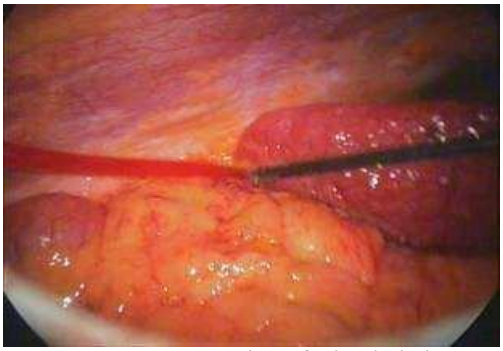

Figure (3): Insertion of tube drain in hepatorenal pouch

Intraoperative bleeding and blood loss was estimated from suction devices and blood loss was classified during the procedure as mild less than 200 mL, moderate (200-500 mL) and significant (> 500 mL).

Operative time was recorded, as well as intraoperative finding of nodular liver, adhesions and difficulties during the procedure, necessitating conversion to open cholecystectomy.

Patients were given sips of water after passing flatus or feces or after hearing intestinal sounds. Postoperatively all patients received analgesics in the form of Paracetamol injections for 24 hours, then oral analgesics were given upon the patient request. Hospital stay, procedure related mortality and morbidities were recorded, including continued liver bed bleeding in the drain, bile leak, wound infection, port site hematoma, and development of ascites or worsening of already ascitic patients. Peritonitis and cardiopulmonary complications were also recorded.

The discharge criteria are met once the patients were afebrile with audible bowel sounds and able to tolerate liquid diet and oral analgesia. The specimens including the Gall bladder and liver biopsy were sent for histopathological diagnosis.

Patients were followed up weekly for the 1st month then monthly for six months, clinically and laboratory by liver functions.

RESULTS

The study was conducted in Surgery department, Faculty of Medicine, Fayoum University from June 2010 to September 2012.

The fifty patients included 33 men and 17 women (a ratio of 2:1) with a mean age of 51 years (range, 34 – 68 years).

The etiology of cirrhosis was different and included twenty five (50%) patients with hepatitis B, fifteen patients (30%) hepatitis C, six patients (12%) with dual infection and four patients (8%) with unknown etiology.

Thirty nine patients (78%) were classified as child-Pugh A, and eleven (22%) patients were classified as child-Pugh B.

Preoperative evaluation revealed mild to moderate Ascites, in nine patients, moderate splenomegally in twenty one patients and

esophageal varices grade 1 and 2 in sixteen patients. No patients had Jaundice. Seven(14%) patients had a history of previous abdominal surgery. Significant comorbidities and chronic debilitating diseases were present in eleven patients, as ischemic heart diseases in three patients, Diabetes mellitus in four patients. .Four patients with coagulopathy, received fresh frozen Plasma and Vit k I.V before surgery.

Eleven patients (22%) had an attack of acute cholecystitis on top of chronic calcular cholecystitis and underwent emergency surgery after 48- 72 hours of conservative treatment.

No mortality either from anaesthesia or the procedure itself was reported. Difficulties and challenges faced during the procedure were intraoperative bleeding during dissection. The bleeding was usually venous and occurred in seven patients(14%) all in child group B. Traditional methods of hemostasis as compression ,use of spongstan and surgicell succeeded to stop bleeding in four patients while conversion to open procedure was necessary in three patients to stop bleeding. Recent tools of hemostasis as Harmonic scalpel and Ligasure pistol were available. Inability to clearly visualize the biliary anatomy and safely dissect the gall bladder was recorded in two patients with previous upper abdominal surgery and two patients with acute cholecystitis. Patients with mild or moderate ascitis completed their procedure safely with no difficulties. Conversion to open cholecystectomy was necessary in seven patients (14%).

The mean operative time was 76.4 minutes (range, 35-130).

None of our patients required Blood transfusion, even those five patients (10%) with significant intraoperative blood loss (500ml).

Fourteen patients (28%) had postoperative complications, including three patients (6%) with continued postoperative liver bed bleeding in the tube drain (200-500 ml) in the first 48 hours, which decreased gradually with administration of fresh frozen plasma and parentral vitamin k, seven patients with wound complications (14%) (two wound infection, five trocar site hematoma) that resolved with wound drainage and removal of blood clots under cover of antibiotics and local anesthesia. Four patients (8%) developed chest infection which was controlled by medical treatment. No biliary leak or ascitic fistula or postoperative collections were reported **(Table 1)**. Follow up for six months (Clinically and laboratory) showed no significant deterioration in liver condition, or development of new onset of ascites, or peritonitis. The length of hospital stay ranged from 1 to 5 days (mean, 3.2 days).

Table (1): Complications of laparoscopic cholecystectomy in cirrhotic liver (n=50) ***Complications***

	No. of patients (%)	***Management***
Continued post-operative liver bed bleeding (tube)	3 (6%)	FFP + Vitamin K IV
Wound Complications	7 (14%)	
Wound infection	2	Antibiotics
Trocar site hematoma	5	Drainage under local anesthesia + antibiotics
Chest infection	4 (8%)	Medical treatment

FFP: Fresh frozen plasma

DISCUSSION

Cholelithiasis in patients with cirrhosis occurs twice as often as in the general population. [(2)]

At first open cholecystectomy was considered an acceptable therapeutic option in cirrhotic patients with relatively normal hepatic function, however, several published reports have shown that cirrhosis of the liver has a major impact on morbidity and mortality rates after open cholecystectomy, therefore some authors considered it a formidable operation.[(12)]

Laparoscopic cholecystectomy has been proven safe and feasible for symptomatic gallstones in non cirrhotic liver, but its role in cirrhotic liver remains controversial. With increasing experience in laparoscopy, lap cholecystectomy has been attempted in cirrhotic liver with encouraging results [(13)].

There is abundant evidence in the literature showing that lap cholecystectomy has been improved and refined such that it is now safe for patients with symptomatic gall bladder disease and child class A and B cirrhosis [14]. Proper selection of patients according to liver reserve seems to be important and the child- Pugh classification was used in our study to estimate the risk and provide an idea of the patient's liver reserve. [17]

In our study, the majority of patients were child A (78%) and (22%) of the patients were child B.

Hepatitis B and C were the leading causes of cirrhosis in our study, which is contradictory to the literature which indicates that alcoholic liver disease is more prevalent in the west[24].

The mean operative time in our study was 76.4 minutes, which is significantly shorter than that reported in earlier literature as Rizk and Saleem showed mean operative time of 118 min and Jose B et al with operative time of 84.3 min.[18,19]

Nevertheless, our study showed a conversion rate to open cholecystectomy (14%) comparable to previous published data. Failure to control intraoperative bleeding during dissection and difficulties to clearly visualize the biliary anatomy were the reasons for conversion . In the literature, this rate ranged from 0% to 16% in cirrhotic patients. A 0% conversion rate was reported in some small series containing less patients that might indicate selected patients in the series as in Flores et al and Mancero et al wheras Rizk and Saleem showed conversion rate of 16%. [18]

Although it was not available in our study, using a set of surgical instruments such as Harmonic scalpel or Ligasure pistol while dissecting and even harmonic scalpel can be a safe alternative to the standard clipping of the cystic duct and artery for these patients and offers a shorter operative time and less blood loss[22]. Some investigators advocate the use of subtotal cholecystectomy as an alternative to avoid intraoperative bleeding however we did not perform subtotal cholecystectomy in our study.[23].

The increased risk for postoperative liver failure can be caused by the anaesthetic agent which decreases hepatic arterial blood flow causing hepatic ischaemia. The ability of cirrhotic patients to compensate for this ischaemia is impaired, so hepatic dysfunction can develop postoperatively [10]

Increased risk of infection can be explained by impaired liver function in cirrhotic patients which leads to diminished Kupfer cell function, leading to reduced intravascular clearance of the enteric organisms and endotoxaemia [10].

Although ascitic fluid is an excellent growth medium for bacterial contaminants, infected ascites is far less freequent in laparoscopic chloecystectomy than in open cholecystectomy[2].

Our study did not include child-pugh class C patients As mortality and morbidity are higher in this group, these patients can benefit from alternative procedures, like perductaneous cholecystostomy or subtotal cholecystectomy[2]

The length of hospital stay in our study 3.2 days was similar to that in recent studies .It was 4 days in Delis et al., 2010 and 3.1 days in Jose B. Lledo et al., 2011)[16,19]

Puggioni and wong in their metanalysis reported that operative time and length of hospital stay in cirrhotic patients were considerably reduced for Laparoscopic cholecystectomy compared with the open approach.[6]

There was no mortality in both class child A and B cirrhosis and the morbidity rate was 28%. This is a comparable rate to other studies as Hamad et al., 2010 which showed a morbidity rate of 33% and Delis et al., 2010 with 19% morbidity rate [15, 16]. Generally, the major causes of post operative morbidity in cirrhotic patients are excessive blood loss, liver failure and sepsis. All morbidities could be attributed to associated comorbidities. In our study, seven patients (14%) developed significant intraoperative liver bed bleeding and three cases needed conversion to open cholecystectomy, due to inability to control bleeding by laparoscope.

Bleeding may result from abdominal varcies of portal hypertension (Periumbilical, Falciform Ligament) or coagulopathy secondary to depressed clotting factor synthesis and thrombocytopenia from hypersplenism [20]

It can be avoided with routine administration of frozen plasma or platelets preoperatively .In our study four patients received preoperative fresh frozen plasma.[20] Abdominal wall vessel injury can be avoided by wall transillumination

during port insertion.and venous bleeding can be controlled by decreasing the pressure of pneumoperitoneum[13] as required. All these measures have been followed in our study.

CONCLUSION

Although cholecystectomy remains a high risk procedure in cirrhotic patients, laparoscopic cholecystectomy (LC) is the treatment of choice for symptomatic cholelithiasis in patients with well compensated liver disease. Inspite of surgical challenges and difficulties faced LC seems to be safe in selected child-pugh class A and B with compensated liver cirrhosis with no mortality and acceptable morbidity rate, conversion rate and short hospital stay. .Indications for cholecystectomy should be evaluated carefully in cirrhotic patients and controlled trials and further studies are also required to evaluate the management of gall bladder disease in patients with child-Pugh class C cirrhosis.

REFERENCES

1. **Halim AB, Garry RF, Dash S.** Effect of Schistosomiasis and hepatitis on liver disease. Am. J. Trop Med. Hyg. 1999; 915-20.
2. **Tuech JJ, Pessaux P, Regenet N, Rouge C, Bergamaschi R, Arnauld JP.** Laparoscopic cholecystectomy in cirrhotic patients. Surg Laparosc Endosc 2002.4 : 227 – 231.
3. **Cappellani A, Cacopardo B, Zanghi A, et al.** Retroscpective survey on laparoscopic cholecystectomy in the cirrhotic patient. Eur Rev Med Pharmacol Sci. 2008; 12: 257-260.
4. **Buchner AM, Sonnenberg A.** Factors influencing the prevalence of gallstones in liver disease: The beneficial and harmful influences of alcohol. Am J Gastroentrol 2002; 97: 905 – 909.
5. **Stroffolini T, Sagnelli E, Mele A, Cottone C, Almasio PL;**' Italian Hospitals Collaborating Group. HCV infection is a risk factor for gallstone disease in liver cirrhosis: An Italian epidemilological survey. Jviral Hepat 2007; 14: 618- 23.
6. **Puggioni A , Wong LL.** A meta analysis of laparoscopic cholecystectomy in patients with cirrhosis J Am Coll Surg 2003; 197; 921 – 926.
7. **Shaikh AR, Muneer A.** Laparoscopic cholecystectomy in cirrhotic patients. JSLS. 2009; 13: 592 – 596.
8. **Yeh CN, Chen MF, Jan YY.** Laparoscopic cholecystectomy in 226 cirrhotic patients. Experience of a single center in Taiwan. Surg Endosc 2002; 16: 1583-1587.
9. **Silva MA, Wong T.** Gallstones in Chronic Liver Disease. J Gastrointest Surg 2005; 9: 739 – 746.
10. **Ziser A, Plevak DJ, Wiesner RH.** Morbidity and Mortality in cirrhotic patients undergoing anaesthesia and surgery. Anaethesiology 1999;90; 42 – 54.
11. **Acalovschi M, Blendea MD, Feier C, et al.** Risk factors for symptomatic gallstones in patients with **liver cirrhosis. A case control study. Am J.** Gastroentrol 2003; 98: P 1856-1860.
12. **Morino M, Cavuoti G, Miglietta C, et al.** Laparoscopic cholecystectomy in cirrhosis: contraindication or privilege indication? Surg Laparosc Endosc Percutan Tech. 2000; 10: 360-363.
13. **Clark JR, Wills VL, Hunt DR.** Cirrhosis and Laparoscopic cholecystectomy. Surg Laparosc Endosc 2001; 11: 165-169.
14. **Poggio JL, Rowland CM, Gores GJ, et al.** A comparison of laparoscopic and open cholecystectomy in patients with compensated cirrhosis and symptomatic gallstone disease. Surgery. 2000; 127: 405-411.
15. **Hamad MA, Thabet M, Badawy A, et al.** Laparoscopic versus open cholecystectomy in patients with liver cirrhosis; a prospective randomized study. J Laparoendosc Adv Surg Tech A. 2010; 20; 404-409.
16. **Delis S, Bakoyiannis A, Madariaga J, et al.** Laparoscopic cholecystectomy in cirrhotic patients: The value of MELD score and child-pugh classification in predicting outcome. Surg Endosc. 2010; 24: 407-412.
17. **Curro G, Iapichino G, Melita G, et al.** Laparoscopic cholecystectomy in child-Pugh class C cirrhotic patients. JSLS. 2005; 9: 311-315.
18. **Rizk HA, Saleem AA.** Laparoscopic cholecystectomy for patients with

cholelithiasis and liver cirrhosis. J. Egypt Soc Parasitol 2008; 38: 609- 620.

19. **Jose B,, Jose C, Ibanez, Lucas Garcy a Mayor, and Manuel B.** Juan, Laparoscopic cholecystectomy and Liver cirrhosis Surg Laparosc Endosc Percutan Tech volume 21, Number 6 2011.
20. **Bessa SS, Abdel Razek AH, Sharaan MA, et al.** Laparoscopic cholecystectomy in cirrhotics: A prospective randomized study comparing the conventional diathermy and the harmonic scalpel for gallbladder dissection. J Laparoendosc. Adv Surg Tech A. 2011; 21: 1-5
21. **Mancero JM, D'Albuquerque LA, Gonzalez AM, et al.** Laparoscopic cholecystectomy in cirrhotic patients with

symptomatic chlelithiasis: a case control study World J Surg. 2008; 32: 267- 270.

22. **El Nakeeb A, Askar W, El Lithy R, et al.**
Clipless Laparoscopic cholecystectomy
using the Harmonic scalpel for cirrhotic patients: a prospective randomized study. Surg Endosc. 2010; 24 : 2536 – 2541.
23. **Palanivelu C, Rajan PS, Janik, et al.**
Laparoscopic cholecystecotmy in Cirrhotic patients: the role of subtotal cholecystectomy and its variants. JAm Coll. Surg. 2006; 203 : 145- 151.
24. **Tayeb M, Khan MR, Nazia R.**
Laparoscopic cholecystectomy in cirrhotic
patients:feasibility in a developing country.Saudi Journal of Gastroenterology. 2008;14:66-69.