

Role and Advantages of Laparoscopic Surgery in Liver Cirrhosis

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ABSTRACT

Liver cirrhosis has always been associated with operative morbidity and mortality because of associated coagulopathies, nutritional disorders and portal hypertension. Laparoscopic surgery has changed the thinking and now liver cirrhosis is not a contraindication for mild to moderate liver cirrhosis patients.¹ This article's review studies done by operating laparoscopically on patients with liver cirrhosis and the methods with which the complications are avoided by laparoscopy during various surgeries and also in the diagnosis and management of cirrhosis of liver.

Keywords: Laparoscopy, Cirrhosis, Portal hypertension, Laparoscopic surgery in cirrhosis, Cirrhosis and laparoscopy, Surgical procedures in cirrhosis.

BACKGROUND

Surgical diseases appear more frequently in patients who present with cirrhosis. Cholecystitis and cholelithiasis is a common problem in patients with cirrhosis and open surgery is definitely riddled with dangers due to changes in homeostasis in the patients which leads to greater morbidity and mortality.

In the past, cirrhosis of liver was considered an absolute contraindication to laparoscopic surgery.¹⁷ Even the open surgical procedures were fraught with life-threatening complications because of associated coagulation disorders, nutritional deficiencies and sometimes portal hypertension which itself was complicating the outcome of surgery. As the experience of the surgeons grew, even in the laparoscopic surgery, cirrhosis is not considered an absolute contraindication for laparoscopic procedures,² but it is taken with an extra ounce of care. Lots of surgeons have described procedures previously unthought-of laparoscopically but now can be done very safely by just taking a few precautions and following the rules of good laparoscopic techniques. This article reviews some of the effects of cirrhosis on the outcomes of minimal access surgery in recent times.

Laparoscopic cholecystectomy is definitely a better option because of the focal vision and to some extent the magnification offered by the telescope which enable to see the vessels clearly and also because of the availability of better instruments for example harmonic scalpel. The proven benefits of laparoscopy seem to be especially applicable to patients with chronic disease like cirrhosis of liver.²²

BASICS OF CIRRHOSIS OF LIVER

Cirrhosis of liver is a chronic and progressive disease most commonly associated with chronic alcoholism which leads to

deformity of the normal liver parenchyma into fibrous nodules which in turn reduce the liver function to such an extent that the normal functioning of liver is not possible leading to great morbidity and finally mortality.^{5,6} The physiological changes lead to change in the coagulation profiles, nutritional deficiencies, fluid retention, greater susceptibility to infections which in turn increase the peri- and postoperative morbidity due to change in tissue texture and great fluid retention. The diagnostic armamentarium is sometimes not able to correctly classify the stage of cirrhosis. But the latest articles show that cirrhosis is no longer a contraindication, but in fact is recommended as a safe procedure and provides some advantages for some surgeries when cirrhosis is associated. Child–Pugh classification of cirrhosis is still the gold standard for assessing the severity of the cirrhosis in patients.⁷

METHODS OF REVIEW

A literature search was performed using the following search engines: Hinari, Google, HighWire Press, PubMed and the online Springerlink MetaPress Library available at the Laparoscopy Hospital, New Delhi, India, where this study was carried out. The following terms were used for the search: 'Laparoscopy in liver cirrhosis', 'Liver cirrhosis, diagnosis', 'Laparoscopic surgery in cirrhosis', 'Surgery and cirrhosis' and 'Surgical procedures in cirrhosis'.

A review of articles has proven that patient number size varies from 50 to 1000 in which it is proven that laparoscopic surgery is more useful and less harmful than open surgery because of the associated disease.

AIM

During this review, the aim was to find out if the laparoscopic surgery was dangerous or safe for patients with cirrhosis of liver. Most of the earlier studies have concluded that open

surgery is definitely not safe in patients with cirrhosis as it is associated with a high rate of morbidity and mortality due to associated malnutrition, coagulopathies and ascites. But a review of articles proved that laparoscopy is safer than open surgery in mild to moderate cases of cirrhosis.

This study reviewed:

- The risk of laparoscopy and laparoscopic surgery in cirrhotic patients,
- Previous role and current trends in the use of laparoscopy in the diagnosis of liver cirrhosis, and
- Safety and efficacy of laparoscopy in the treatment of various surgical conditions in cirrhotic patients.

SAFETY CONSIDERATIONS IN CIRRHOTIC PATIENTS UNDERGOING LAPAROSCOPIC PROCEDURES

Factor 1: The Surgeon

A tremendous amount of patience is necessary during the procedure because conversion does not help to control the coagulopathy which is the main danger in cirrhosis (Schiff et al 2005).⁸ During their study, they converted 3 out of 24 laparoscopic procedures in cirrhotics, two were due to surgeon's inexperience. Hence, the experience of surgeon plays a key role in performing a safe surgery in patients with cirrhosis of liver.

Factor 2: Anesthetic Techniques

As such, an adequate circulation and volume maintenance is the key to a successful anesthesia in all cases. It does not change in cirrhotics as hepatosplanchnic perfusion may be impaired in cirrhotic cases. But certain drugs like isoflurane increase hepatic regional blood flow, halothane is noted of increase hepatic arterial resistance. Fentanyl, vecuronium and pancuronium do not significantly affect hepatic blood flow and may be preferable in cirrhotic patients.⁹

Factor 3: Preoperative Preparation

In elective surgery, a good preoperative preparation is surgery half done. No words can describe the importance of recognition of coagulopathies by proper investigations and correcting them prophylactic Vit-K administration and/or transfusion with fresh frozen plasma, lowering of portal hypertension with medications, maintain adequate fluid and electrolyte balance and control of infection if present. Garrison et al (1984)¹⁰ had identified absolute serum albumin concentration, presence of infection or contamination and number of seconds partial thromboplastin time is deviated from its control value as the three main preoperative variables that predict surgical outcome in cirrhotic patients.¹⁰

Factor 4: Good Operative Technique

Some authors have advocated a number of operative techniques to help minimize the morbidity associated with surgery in cirrhotic patients undergoing laparoscopic procedures.

The major risk in cirrhotic is transmission of hepatitis B and/or C virus in cirrhotic from the patient to the operating team. Hence, a safe disposal of sharps and gentle and meticulous transfers of instruments are key to the safety.

As said earlier, patience during operation makes it safe and meticulous hemostasis will prevent the unavoidable blood loss in patients with cirrhosis.

An open technique (Hassan's trocar) for access to prevent inadvertent puncture of an umbilical varix or placement of trocar away from umbilicus in whom the umbilical varices are evident, is another precaution that can be taken.¹¹

Modification of surgery in the form of subtotal cholecystectomy, use of ultrasonic energy like harmonic scalpel, glue, oxidized cellulose are other means to prevent more bleeding.¹¹

ROLE OF LAPAROSCOPY IN DIAGNOSIS OF LIVER CIRRHOSIS

Historically, histopathology of the biopsied liver specimen has been the gold standard of the diagnosis of cirrhosis of liver. The danger associated with the invasive procedures made surgeons cautious in performing those procedures. Hence, other biochemical and indirect tests were performed to give evidence as to the status of liver. Ultrasound provided a good noninvasive means but its ability to diagnose early cirrhosis is debated. It can very well provide clue to the damaged liver in the form of architectural damage and portal engorgement in advanced stage of disease, but its ability to diagnose cirrhosis in early stage is debatable. Moreover, it gives false-positive results of metastatic disease in some cases of macronodular cirrhosis.

Laparoscopy has an advantage over other diagnostic means especially in liver cirrhosis. It gives a visual impression of the severity of the case and also macroscopic evidence of the destruction of liver. Direct visualization of both lobes of liver gives a comprehensive view of the amount of liver diseased by cirrhosis. A biopsy performed laparoscopically has the advantage of taking the specimen under direct vision and not blindly as taken by needle biopsy which may not hit the target and falsely give a negative report though there may be cirrhosis.¹⁹

Laparoscopy also allows application of direct pressure or a heater probe to attain hemostasis in the event of bleeding from a biopsy site and may hence be carried out safely despite hematological abnormalities (e.g. PTR > 1.3; platelet < 80,000/mm³) which routinely contraindicate blind percutaneous biopsy.

The use of diagnostic laparoscopy has, therefore, expanded in liver cirrhosis so much that Vargas et al (1995) recommended that diagnostic laparoscopy should be incorporated into the training programs for gastroenterologists in America.⁴ Haydon and Hayes (1997) also advocated that physicians in the United Kingdom should be the ones performing diagnostic laparoscopy.

LAPAROSCOPY AS TREATMENT MODALITY IN PATIENTS WITH ASSOCIATED CIRRHOSIS

Laparoscopic Cholecystectomy in Cirrhotic Patients

The incidence of gallstones is reported to be twice in patients with cirrhosis than in general population.¹³⁻¹⁵ Most stones are small pigment stones which are friable and are also associated with more complications.¹⁶ Laparoscopic cholecystectomy is hence the most widely performed surgery on patients with cirrhosis.

Open cholecystectomy is associated with high rates of morbidity (5-30%) and mortality (7-25%) in cases with cirrhosis. Hence, laparoscopic surgery was studied as an alternative and better procedure for cirrhotic patient as it is associated with less bleeding because better visualization with magnification, shorter duration of hospital stay. There are certain difficulties like, some adhesions around gallbladder and hilum of liver, thick margin of liver which makes traction on liver difficult and increased vascularity of gallbladder bed. But the use of additional port and extracting the gallbladder fundus first, or a partial cholecystectomy makes life easier for the surgeon and also for the patient. Laparoscopic cholecystectomy is more useful for mild and moderate degree of cirrhosis, but is Child-Pugh's class C, it still remains relatively contraindicated. The experience of Yeh et al (2002) with LC in 226 cirrhotic patients represents the largest series published so far. However, no patient with Child-Pugh's class C was operated upon. Curro et al (2005) compared four Child-Pugh's class C patients who had LC with 38 Child-Pugh's A and B patients in the same center and found a morbidity rate of 75% in the Child-Pugh's C patients compared with 26% in the A and B group. The authors further advised that surgery in Child-Pugh's C patients should be avoided except in acute emergencies where conservative procedures, such as gallbladder aspiration and partial cholecystectomies may be considered. Even in such instances, percutaneous drainage of the gallbladder and other conservative procedures may suffice.¹⁸

Laparoscopic Hernia Repair in Cirrhosis

The main concern during hernia repair is the approach. In cirrhosis, the abdominal wall may be riddled with multiple engorged vein due to associated portal hypertension. Performing an open repair of hernia is riddled with bleeding due to these veins and bleeding disorders.

Laparoscopically, all these distended veins are avoided and the abdominal wall is left untouched. The whole surgery is behind the abdominal wall and just involves insertion of a mesh between the peritoneum and the abdominal wall. Hence, avoiding all the potentially distended veins and bleeding.²⁰

In a report of 14 cirrhotic patients who underwent laparoscopic incisional and umbilical hernia repair, Giulio et al (2006) observed that though open repair in cirrhotic patients has significant recurrence rates and frequent wound infections,

laparoscopic repair yields less morbidity and fewer recurrences. The study further highlighted that the preservation of the anterior abdominal wall in laparoscopic repair avoids the interruption of collateral veins which are not infrequently distended in cirrhotic patients.

There is a tendency to develop umbilical hernias in cirrhosis due to increased porta systemic communication and opening of obliterated umbilical veins to accommodate the pressure. Laparoscopic umbilical hernia repair in cirrhotic patients appears to offer advantages over the open methods.²⁰ Ascites may add to this effect of producing umbilical hernia due to increased intra-abdominal pressure.

Successful laparoscopic repair of recurrent incarcerated umbilical hernia in a cirrhotic patient with refractory ascites has also been reported.⁴ In the report, the authors used dual mesh prosthesis and advocated meticulous sterile fashion of mesh insertion and fixation. This is important since ascitic fluid infection, which may occur after surgery may affect the hernia mesh repair. The possibility of mesh migration due to the ascitic fluid can be reduced by placing the mesh in a preperitoneal space.¹²

Ascites itself may be treated laparoscopically more effectively by placing the peritoneovenous shunt.²¹ Surgical treatment of ascites is reserved for severe ascites, others can be treated medically. In cases of ascites with renal failure, insertion of peritoneal dialysis catheters under vision.²²

Other Laparoscopic Procedures in Cirrhotic Patients

Cobb et al (2004)² reported 52 laparoscopic procedures performed on 50 cirrhotic patients. These procedures, including cholecystectomies, splenectomies, colectomies, diagnostic laparoscopies, ventral hernia repairs, nissen fundoplication, Heller's myotomy, gastric bypass and radical nephrectomy had a morbidity rate of 16% but no mortality. Tsugawa et al (2001)³ had earlier compared open and laparoscopic appendicectomies among patients with liver cirrhosis.³ They reported fewer rates of wound infection and wound bleeding in the laparoscopic group. Many other laparoscopic procedures including laparoscopic liver resections for hepatocellular carcinomas^{21,22} and laparoscopic ultrasound with radiofrequency ablation are now routinely done in cirrhotic patients in some centers.

CONCLUSION

Cirrhosis of liver because of its associated comorbidity, is not a contraindication of any simple or advance procedure by laparoscopy. Although technically challenging because portal hypertension, varices and thrombocytopenia frequently coexist, basic and advanced laparoscopic procedures are safe for patients with mild to moderate cirrhosis of the liver. However, its safety in advanced disease like Child-Pugh's class C is not yet proven, we advocate caution in such cases and further

studies need to be done to find out other ways to make laparoscopic surgery safer even in these cases.

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