

Review Article

Utilization of Laparoscopic Surgery in Cirrhosis of the Liver

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ABSTRACT

Surgery in patients with cirrhosis of the liver is dangerous and risky due to abnormalities in their physiology. However these patients do present with conditions that may require surgical intervention. Laparoscopic surgery is safer for these patients as it mitigates the dangers and complications associated with open surgery, offers shorter operation time and subserves a diagnostic value in its safe use to determine and confirm the pathology of the liver. The aim of this study is to determine if laparoscopic surgery is dangerous or safe for patients with cirrhosis of the liver. A literature review was done using search engines viz Hinari, goggle, high wire press and overview of our experiences in patients in university of medical science teaching hospital Ondo. References to our experiences during our subspecialty training at world laparoscopy hospital New-Delhi were also beneficial in the course of this study. The results show that the technique of laparoscopy in all index cases is more favourable than open surgery in cirrhotic patients. We conclude that cirrhosis of the liver does not contraindicate the procedure of laparoscopy.

Keywords: Cirrhosis, Laparoscopy, Open surgery

INTRODUCTION

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 the liver was considered an absolute contraindication to laparoscopic surgery. 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, but 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 enables us 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 the liver¹. Pathophysiologically, cirrhosis of the 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 the liver is not possible leading to great morbidity and finally mortality. 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 laparoscopy 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 cirrhosis in patients^{2,3}.

METHODS OF REVIEW

A literature search was performed using the following search engines: Hinari, Google, High Wire Press, PubMed and the online Springer link Meta Press 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 laparoscopic surgery is more useful and less harmful than open surgery because of the associated disease of cirrhosis.

RESULTS

There are only a few larger studies on patients with liver cirrhosis undergoing laparoscopic cholecystectomy. Out of 24 cirrhotic patients that had laparoscopic cholecystectomy only 3(12.5%) were converted to open procedures mainly because of the surgeon's inexperience. A comparative study of 4 patients with advanced cirrhosis and 38 patients with early disease found a morbidity rate of 75.0% in the advanced disease compared to 26.0% in early cirrhosis. 14 cirrhotic patients had laparoscopic incisional and umbilical hernia with a low recurrence rate of 0.1%. Three hundred and seventy six laparoscopic appendectomy was done in cirrhotics with a post operative complication of 2-10%.

DISCUSSION

A tremendous amount of patience is necessary in laparoscopic surgery for cirrhotics because conversion to open surgery does not help to control the coagulopathy which is the main danger in cirrhosis.³ In a particular study, they converted 3 out of 24 laparoscopic procedures in cirrhotics. Two of those conversions was due to surgeon's inexperience. Hence, the experience of the surgeon plays a key role in surgery of patients with cirrhosis of the liver. 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 to increase hepatic-arterial resistance. Fentanyl, vecuronium and pancuronium do not significantly affect hepatic blood flow and may be preferable in cirrhotic patients.⁴ 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 prophylactically by Vitamin-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. It is important to

determine 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 pre-operative variables that predict surgical outcome in cirrhotic patients.⁵ 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 patients is transmission of hepatitis B and/or C virus from the patient to the operating team. Hence, as a precaution, proper disposal of sharps and gentle and meticulous transfers of instruments are key to safety.

As said earlier, patience during operation makes it safe, and meticulous haemostasis 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.

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.⁶

Historically, histopathology of the biopsied liver specimen has been the gold standard in the diagnosis of cirrhosis of the liver. The danger associated with the invasive procedures made surgeons to be 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 non-invasive 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 the liver. Direct visualization of both lobes of the 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 even when there may be cirrhosis.⁷

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 it was recommended that diagnostic laparoscopy should be incorporated into the training programs for gastroenterologists in America.⁸ Also it was advocated that physicians in the United Kingdom should be the ones performing diagnostic laparoscopy. The incidence of gallstones is reported to be twice in patients with cirrhosis than in the general population.⁹⁻¹¹ Most stones are small pigment stones which are friable and so associated with more complications.¹² 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 confirmed as an alternative and better procedure for cirrhotic patient as it is associated with less bleeding and associated with shorter duration of hospital stay. There are certain difficulties during laparoscopy which includes adhesions around gall bladder 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 gall bladder 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

Child– Pugh's class C(advanced disease) remains relatively contraindicated to laparoscopy. The experience of a particular study with laparoscopic cholecystectomy in 226 cirrhotic patients represents the largest series published so far. However, no patient with advanced disease was operated upon. Another study, compared four patients with advanced disease who had laparoscopic cholecystectomy with 38 patients with early disease in the same center and found a morbidity rate of 75.0% in the advanced disease patients compared with 26.0% in those with early disease. The authors further advised that surgery in patients with advanced disease 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 gall bladder and other conservative procedures may suffice.¹³ 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.

In a report of 14 cirrhotic patients who underwent laparoscopic incisional and umbilical hernia repair, it was observed that 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 portal 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.¹⁴ 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 reported¹⁵. In the report, the authors used dual mesh prosthesis and advocated meticulous sterile fashioning 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 pre-peritoneal space.¹⁶

Ascites itself may be treated laparoscopically more effectively by placing the peritoneovenous shunt.¹⁷ 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 is done.¹⁸ In a reported study, 52 laparoscopic procedures were performed on 50 cirrhotic patients. These procedures, including cholecystectomies, splenectomies, colectomies, diagnostic laparoscopies, ventral hernia repairs, nissen fund application, Heller's myotomy, gastric bypass and radical nephrectomy had a morbidity rate of 16.0% but no mortality¹⁹ Another study had earlier compared open and laparoscopic appendicectomies among patients with liver cirrhosis^{20,21,22} 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^{23,24,25} and laparoscopic ultrasound with radiofrequency ablation are now routinely done in cirrhotic patients in some centers.

CONCLUSION

Cirrhosis of the 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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Conflict of interest

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