EDITORIAL

Perioperative Management of Cirrhosis

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Patients with cirrhosis present a clinical challenge in the normal course of their illness. Management becomes particularly challenging in the event of surgery. The stress of surgery and effects of anesthesia can affect the outcome and require identification of risk factors before any surgery is contemplated. Patients with decompensated liver disease have a higher risk of postoperative complications such as acute liver failure, sepsis, hemorrhage, and renal dysfunction.[1]

Surgical risk factors should be addressed prior to surgery in these patients. Traditionally, this has been performed by means of the Child-Pugh-Turcotte (CPT) score and Model for End-stage Liver Disease (MELD) score. The CPT score takes into consideration three biochemical elements (prothrombin time, albumin and bilirubin) and two clinical parameters (ascites and encephalopathy). Patients are deemed class A, B, or C according to the score. A higher score is suggestive of higher risk for perioperative complications. A patient with class A score is estimated to have 10% mortality after abdominal surgery, but this risk increases to 30% in class B and nearly 70-80% in class C.[2]

MELD score was originally developed for transjugular intrahepatic portosystemic shunt (TIPS), but has evolved for use in orthotopic liver transplantation. This score takes into account serum bilirubin, creatinine, and INR (International Normalized Ratio) and is arrived at by a validated calculation (3.8 x bilirubin + 11.2 x INR + 9.6 creatinine, values in mg). A MELD score of less than 8 predicts a good outcome for TIPS, whereas a score of > 18 portends a poor outcome.[1] MELD has also been used to predict the mortality of hepatic resection for hepatocellular carcinoma; a MELD score of less than 5 was associated with 0% postoperative liver failure.[3] Scores of 9-10 were associated with 3.6% postoperative failure, and a score of > 10 was associated with 37% incidence of postoperative liver failure.[3] MELD score has been validated as an independent predictor to calculate postoperative mortality and it compares fairly well with Child-Pugh score.[4]

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In addition to the MELD and Child-Pugh scores, the American Society of Anesthesiologist (ASA) classification has also been used to predict postoperative mortality in surgical patients. ASA class > 2 increases the risk 1.5 to 3 fold in cirrhotic patients.[5] In addition to the assessment of hepatic status prior to surgery, patients require pre-operative cardiopulmonary evaluation before all elective surgery. Assessment of functional capacity by exercise electrocardiography or dobutamine stress echocardio-graphy have been recommended.[6] Other tools used to predict postoperative cardiopulmonary complications are the American College of Physicians (ACP) guidelines for assessing and managing perioperative risk, and the Goldman Cardiac Risk Index.[6]

Pre-operative evaluation in an asymptomatic patient should include a thorough history and physical examination with particular attention to signs of liver failure such as gynecomastia, asterixis, or encephalopathy. Coagulation studies, liver function tests, and complete blood counts are required prior to surgery in these patients. Asymptomatic patients with scheduled elective surgery that are found to have abnormal liver function tests should postpone surgery until completion of evaluation.[7] Cirrhotic patients with encephalopathy, coagulopathy, thrombocytopenia, or ascites, need appropriate treatment and optimization of their condition before elective surgery is contemplated. In these patients, non-steroidal anti-inflammatory drugs should be avoided, and renal and cardiopulmonary function should be assessed, as previously discussed. Nutrition is critical in these patients and parenteral nutrition may be instituted, if needed.[8]

Intraoperative considerations such as type of anesthesia should be discussed with patient's anesthesiologist, as general anesthesia reduces total hepatic blood flow and may compromise hepatic function.[9] Anesthetic agents that cause sympathetic blockade further blunt blood flow, and subsequent reduction of hepatic perfusion may lead to drastic loss of the marginal hepatic function.[1] Inhaled anesthetic agents such as Halothane and Enflurane may reduce hepatic artery blood flow due to systemic dilatation, resulting in hepatotoxicity and hepatitis, and should be avoided. Isoflorane has fewer effects on hepatic blood flow and less hepatic metabolism, and should be considered as a preferred agent in patient with liver disease.[1] Newer agents such as sevoflurane and desflurane also undergo less hepatic metabolism.[1] Effects of neuromuscular blocking agents may be prolonged in patients with liver disease; Atracurium has been recommended as the agent of choice because it does not rely on liver metabolism.[10] For narcotic use, Fentanyl is the preferred drug in these patients.[10]

Type of surgery can be a potentially important determinant of postoperative liver dysfunction. Because of traction on the abdominal viscera, intra abdominal operations are more likely than extra abdominal surgeries to cause reflex systemic hypotension and reduction in hepatic blood flow.[1] Surgeries that involve large amounts of blood loss can lead to increased ischemic hepatic injury. To avoid excessive bleeding, appropriate use of fresh frozen plasma, platelets, and blood components should be encouraged. Cholelithiasis is common in liver disease[11] and laparoscopic cholecystectomy can be performed safely in compensated patients.[12] However, patients in child class C are at higher risk.[9] A MELD score of 8 or higher resulted in increased risk of postoperative complications.[13] For patient undergoing liver resection, mortality was 8.7% in cirrhotics and 21% in obstructive jaundice.[3,14] Cardiac surgery in patients with cirrhosis is associated with high operative mortality (Table I).[15] Obstructive jaundice, hematocrit < 30%, serum bilirubin > 11 mg/dl, malignant biliary obstruction, azotemia and cholangitis have been risk factors resulting in increased mortality[9] and reached 100% with CPT class C.[16]

Emergency surgery has substantial risks in cirrhotics, as there is not enough time to correct reversible factors such as electrolyte imbalance, ascites, hepatic encephalopathy, and coagulopathy which may pose additional risk with adverse outcomes. Cirrhotic patients undergoing emergency abdominal surgery have an average of 50% mortality, starting with 2% for class A, 38% for class B and 100% for class C.[2] This compares unfavorably to an 18% mortality rate in the case of elective surgery.[2] In patients who have severe liver disease, alternatives to surgery need to be considered. These include transjugular intrahepatic portosystemic shunt (TIPS) for refractory bleeding, percutaneous stenting and ERCP for biliary strictures and choledocholithiasis, coronary angioplasty and percutaneous interventions for patient who need bypass graft.

Postoperative management consists of close supervision, as liver failure can occur in this period resulting in adverse outcomes. These patients should be monitored for signs of acute hepatic decomposition such as jaundice, encephalopathy, and ascites. Signs of renal dysfunction, sepsis, bleeding, and wound dehiscence should prompt ICU observation in the immediate postoperative period. Sedatives and pain medications should be avoided if possible, or carefully titrated. Early enteral feeding has been suggested to improve outcome.[1]

Table I: Mortality figures for various surgical procedures in patients with liver disease.[9]

Type of surgery	Mortality				MELD score
	Child class				
	Overall	A	B	C	
Appendectomy	9%	NA	NA	NA	NA
Cardiac surgery	16-17%	0-3%	42-50%	100%	NA
Cholecystectomy	1-3%	0.5%	3%	NA	(< 8=0% > 8=6%)
Colorectal cancer surgery	12.5%	6%	13%	27%	NA
Esophagectomy, hepatic resection	17%	NA	NA	NA	NA
Major abdominal surgery	26-30%	10%	30-31%	76-82%	NA
Total knee arthroplasty	0%	0%	NA	NA	NA
Treatment of hepatic hydrothorax with talc	39%	NA	NA	NA	NA

NA = Not available.

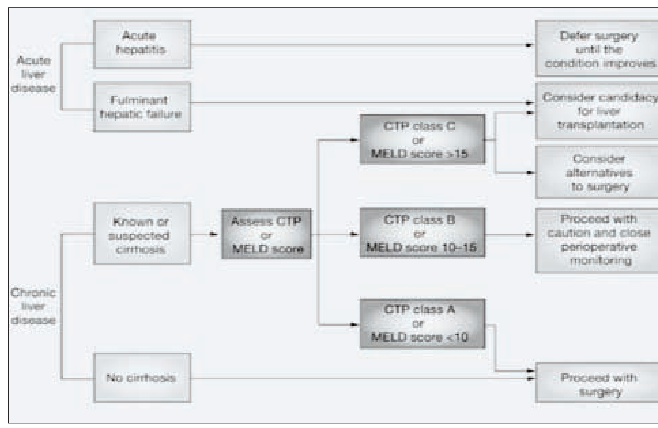

Figure 1: Proposed algorithm for the pre-operative assessment of patients with liver disease (modified from Hanje and Patel.[18]

In summary, patients with liver disease pose a formidable challenge for all involved physicians. It is often said that "there is no such thing as a good cirrhotic patient", and therefore, patient selection before surgery is of paramount importance.[17] Pre-operative, intraoperative, and postoperative management are critical to avoid acute liver decompensation. Certain algorithms have been proposed (Figure 1).[18] Established risk stratifications systems such as the CPT score, MELD score, and ASA classification should be used for evaluation prior to surgery. Special attention should be given to coagulopathy, encephalopathy, renal dysfunction and sepsis. In emergent situations, alternatives to surgery should be strongly considered. A multidisciplinary approach to management of these patients and close liaison between the internist, hepatologist, anesthesiologist, and surgeon should be pursued for a favorable outcome.

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