Surgical risk in patients with cirrhosis
BRIEF SUMMARY OF THE LITERATURE

Introduction

Patients with cirrhosis have an increased risk of mortality and morbidity after surgery. (1, 2) The Child-Turcotte-Pugh (CTP) class, the model for end-stage liver disease (MELD) and the American Society of Anesthesiologists (ASA) physical status classification are currently used for pre-operative risk stratification and prediction of prognosis in cirrhotic patients. (3) In the following document, we review published data on risks of various surgeries in cirrhotic and based on the literature, suggest guidelines for the management of patients with cirrhosis undergoing surgery.

Abdominal Surgery and Cirrhosis

For intra-abdominal (e.g., cholecystectomies) & abdominal wall (hernias) surgery, the largest series included 138 surgical cases in 123 cirrhotic patients undergoing abdominal surgery. In this series, the aetiology of the liver disease was: alcohol in the majority of cases (60%), followed by viral hepatitis (21%). In these patients, the overall mortality was 28%, with 9% on elective surgery patients, 47% with emergency surgery. Based on the extent of liver disease as assessed by Child classification of liver disease (Appendix 1), mortality rates were: Child A:10%, Child B:17%, and Child C:63%. Mortality based on MELD assessment (Appendix 1) was as follow: MELD <10 was 9%, MELD 10-15 was 19%, while patients with MELD score of 15 had a mortality of 54%. Predictors of mortality by multivariate analysis were: CTP, ASA, intra-operative blood transfusion, Na<130. (3-5)

In patients with cirrhosis undergoing abdominal surgery, patients with Child B are at increased risk of developing post-operative complications such as intractable ascites which has been reported to occur in around 40% of cases. Other common complications are wound and pulmonary infection, & haemorrhage.(3, 4, 6-8)

For Hepatic resection, The MELD score has also been used to predict mortality and morbidity after liver resection for hepatocellular carcinoma in patients with cirrhosis. In a previous study, 0% mortality rate was reported in patients with a MELD score 8 while a 29% mortality rate occurred in patients with a MELD score 8 after liver resection for hepatocellular carcinoma. Further MELD score accurately predicts the frequency of post-liver resection liver failure which was 0%, 3.6%, and 37.5% in patients with MELD scores of 9, 9–10, and 10, respectively. (9, 10)

Finally, in patients with portal hypertension, postoperative morbidity in patients with Child A, and selected cases of patients with Child B and C may be reduced by preoperative placement of a transjugular intrahepatic portosystemic shunt (TIPS). (11, 12)

Colorectal Surgery

Neefe et al (13) looked at the effect of underlying cirrhosis on 138 surgical patients, which included 31 cases of colon surgery, including 8 hemicolecotomies. Mortality of elective cases 8.7%, and of emergency procedures was 47% overall mortality (in hospital) was 27.5%. Mortality stratified by Child score showed Childs A 10% (n=41), Childs B 17% (n=59), Childs C 63% (n=38). Mortality stratified by MELD score: MELD <10 9% (n=44) MELD 10-15 19% (n=48) and MELD >15 54% (n=46). In this study the type of surgery was not a significant indicator of mortality. Elective cases had mortalities of Childs A: 11%, B: 3%, and C: 17%). The Childs score, MELD, serum sodium, major vs minor surgery, whether the surgery involved the GI tract, and need for intraoperative blood or platelet transfusion, were all multivariate predictors of mortality. (13)

Additionally, Lai et al reported on colon cancer surgery in Taiwan, looking at risk factors of poor outcome in all patients (not just cirrhosis).(14) 3,849 patients were included, and hypoalbuminaemia was seen in patients with advanced age, female gender, cirrhosis, right colon or large tumours, mucinous adenocarcinoma, poor differentiation, and stage II cancer & and higher T stage cancer, diabetes and previous myocardial infarction. The patients were divided into albumin <35or ≥35g/l. The 5 year survival rates were 78% for normal albumin and 60% for hypoalbuminaemia. (14)
Head and Neck Surgery in Patients with Cirrhosis

62 patients were included with Childs A:42, B:17, C:3. The mortality of Childs B+C patients was 30% compared with 4.8% in Childs A. Similarly there were more complications in child B+C patients (80% cf 19.1%), including pulmonary, acute renal failure and sepsis. Using a logistic regression model: pre-operative platelets, intra-operative blood transfusion, intra-operative blood loss >500ml, Child score, albumin, and prothrombin time, were all risk factors for poor outcome. (15)

Cardiac Surgery in Patients with Liver Cirrhosis

Analysis of 9 clinical studies of cardiac surgery (1 prospective) involving 210 adult patients showed that patients with Child class A have a mortality risk of 5.08% while the mortality risk for Child B and C was 32.2% and 66.6% respectively. (16),(17) (18) In addition to an elevated CTP or MELD score, clinically significant portal hypertension is a contraindication to cardiothoracic surgery. Portal decompression with TIPS placement may make the risk acceptable if the CTP and MELD scores remain low; however, elevated right-sided cardiac pressures from cardiac dysfunction and pulmonary hypertension are absolute contraindications to TIPS placement. (19-21)

Validation of a Mayo Post-operative Mortality Risk Prediction Model

The largest retrospective study of the MELD score as a predictor of peri-operative mortality, by Teh and colleagues, evaluated 772 patients with cirrhosis who underwent abdominal (other than laparoscopic cholecystectomy), orthopedic, and cardiovascular surgery. In the latter cohort, patients with a MELD score of 7 or less had a mortality rate of 5.7%; patients with a MELD score of 8 to 11 had a mortality rate of 10.3%; and patients with a MELD score of 12-15 had a mortality rate of 25.4%. (2) In addition to the MELD score, the ASA classification (on a scale of 1 to 5) and the patient’s age were shown to contribute to postoperative mortality. This data was further validated in a Korean cohort of 160 patients with cirrhosis who had operative procedures. In this Korean cohort either MELD or CTP, age and ASA class were predictors of mortality. (22)

Summary:

In a patient with liver disease, surgical risk depends on the severity of liver disease, nature of the surgical procedure and presence of co-morbid conditions. Child Pugh classification and the MELD score provide reasonable estimations of peri-operative mortality, in addition to: ASA, age and low serum albumin level. In Child A, the surgical risk is relatively low, but in Child B the risk of morbidity and mortality is relatively high and appropriate assessment and management of specific manifestations of hepatic disease, including ascites, encephalopathy, and renal dysfunction, should be optimised pre-operatively. Child C has the highest mortality, and in these patients, risk versus benefits of surgery should be weighed carefully.
Appendix 1

Staging Systems for Liver Disease:

Child-Turcott-Pugh

The Childs score or grade is the most widely used in the literature, as it is easy to calculate at the bedside and has correlated reasonably well with outcomes. However, it has been criticized because it allows a wide variation in each group, and 2 of the parameters are subjective (encephalopathy and ascites), which may allow clinicians to underestimate or overestimate liver disease severity. General surgery mortality rates are generally of the order: Childs A 10%; Childs B 30%; and Childs C 76- 82% [2,3].

MELD

The MELD (model for end-stage liver disease) score has been used for allocation of liver transplantation since 2002[5]. It is also used as a method of assessing liver disease severity and takes renal function into consideration, which can be problematic in dialysis patients. Its advantage over the Childs score is that it is more objective and gives a weighting to each variable, rather than a yes or no. In one study it was the only predictor of 30d mortality, and demonstrated a linear relationship to mortality [6]. MELD: 5-20: each 1 point increment in MELD for 1% increase in mortality risk. MELD >20: Each 1 point increment in MELD increases mortality by 2%. MELD has been similarly a predictor of poor prognosis in cardiac surgery (MELD >13 poor prognosis) [7]. Other studies in abdominal surgery have shown that a MELD >8 predicts mortality [8,9], and MELD>14 predicts mortality[10].

MELD + age + ASA.

Inclusion of the ASA and patient’s age with MELD in patients having abdominal surgery has been shown to be a guide for mortality [11]. It showed that age >70y added 3 MELD points, and if age <30y the mortality was zero. ASA was guide to 7d mortality (ASA V – all died). MELD remained the best predictor of 30d & 90d mortality. The relative risk increased by 14% for each 1 MELD point.

- MELD          mortality
  - <7            5.7%
  - 8-11          10.3%
  - 12-15         25.4%
  - Increased risk of death much higher if MELD>8

Comparing MELD and Childs (Mayo Clinic Model)

772 patients having gastrointestinal, orthopaedic or cardiac surgery (excluding cholecystectomies) were reviewed retrospectively. They were divided into CTP >7 vs <7, and assessed as MELD score >8 or <8. They found that both predicted mortality, but MELD was more specific as a single point increase in MELD resulted in a 14% increase in mortality [2]. This is the largest study of cirrhosis and surgery in the last decade. ASA was the best predictor of 7 day mortality and MELD score was the strongest predictor of mortality beyond 7 days and long-term. [2]
REFERENCES
