

CIRRHOSIS AND ABDOMINAL SURGERY

Cirrhotic patients are at increased operative risk for a variety of reasons

- depending on the severity of liver disease, patients may have a very low hepatic functional reserve, making them more vulnerable to the effects of hypotension, sepsis, or hepatotoxic drugs
- at the same time, they are more likely to experience those events
 - cirrhotics are coagulopathic due to depletion of coagulation factors manufactured in the liver [I (fibrinogen), II (prothrombin), V, VII, IX, X, XII, and XIII]
 - portal hypertension may lead to congestive splenomegaly with trapping of platelets, leading to thrombocytopenia
 - patients with liver disease advanced enough to produce ascites are commonly complement-deficient and hence immunocompromised
 - cirrhotics with prior abdominal surgeries may develop highly vascular adhesions surrounding the liver

A number of retrospective studies have demonstrated this risk

- most studies focused on biliary surgery
 - in a study of cirrhotics (n=49) undergoing cholecystectomy/-ostomy demonstrated a mortality of 10.2%, massive intraoperative blood loss in 16.3%, and major wound problems (dehiscence, abscess) in 12.2% (Bloch RS, Arch Surg, 1985)
 - more recently, laparoscopic cholecystectomy in cirrhotics was examined via a meta-analysis of 25 publications involving 400 cirrhotics (Child's class A [n=265], class B [n=73], class C [n=6], probably based on 1992 NIH consensus statement regarding contraindications) undergoing lap cholecystectomy between 1993 and 2000; cirrhotics had higher conversion rates (7.1% vs 3.6%), operative time, bleeding complications (26.4% vs 3.1%), and morbidity (20.9% vs 8.0%); no statistical difference between mortality rates (Puggioni A, J Am Coll Surg, 2003)
- a couple of studies addressed specifically colectomy in cirrhotics
 - a series of 100 consecutive cirrhotics who underwent laparotomy had a mortality rate of 30% and complication rate of 30%; in nine colectomies included in the series, there was a 55% mortality rate (5 in 9) (Garrison RN, Ann Surg, 1984)
 - retrospective study of cirrhotics (n=54) undergoing colectomy in a 14-year period between 1970 and 1984 demonstrated a perioperative mortality rate of 24% and complication rate of 48% (Metcalf AM, Dis Colon Rectum, 1987)

There is a correlation between Child-Turcotte/Child-Pugh (CTP) class and perioperative mortality and morbidity.

Parameter	Points assigned		
	1	2	3
Ascites	Absent	Slight	Moderate
Bilirubin, mg/dL	≤ 2	2-3	>3
Albumin, g/dL	>3.5	2.8-3.5	<2.8
Prothrombin time Seconds over control	1-3	4-6	>6
INR	<1.7	1.8-2.3	>2.3
Encephalopathy	None	Grade 1-2	Grade 3-4

Child-Pugh classification of severity of liver disease Modified Child-Pugh classification of the severity of liver disease according to the degree of ascites, the plasma concentrations of bilirubin and albumin, the prothrombin time, and the degree of encephalopathy. A total score of 5-6 is considered grade A (well-compensated disease); 7-9 is grade B (significant functional compromise); and 10-15 is grade C (decompensated disease). These grades correlate with one- and two-year patient survival: grade A – 100 and 85 percent; grade B – 80 and 60 percent; and grade C – 45 and 35 percent.

- retrospective review of cirrhotics undergoing any surgical procedure at the Mayo Clinic between 1980 and 1991 (n=733) showed a peri-operative mortality of 11.6% and complication rate of 30.1% (pneumonia most common); multivariate analysis showed that factors associated with complications included: male gender, high Child-Pugh score, presence of ascites, diagnosis of cirrhosis other than PBC, elevated creatinine concentration, diagnosis of COPD, preoperative infection, preoperative UGI bleed, surgery on the respiratory system, intraoperative hypotension (Ziser A, Anesthesiology, 1999)
- the Bloch paper demonstrated mortality rate of 23.5% for Child C versus 0% for Child A and correlated intra-operative blood loss, amount of blood transfused, and mortality with Child class
- the Garrison paper showed mortality rates of 10, 31, and 76 percent in Child-Pugh class A, B, and C, respectively; hypercoagulability, presence of active infection, and hypoalbuminemia predicts survival with 89% accuracy; intra-operative transfusion, absence of post-operative ascites, pulmonary failure, GI bleed, and culture-positive urine predicts survival with 100% accuracy
- Loyola study of 92 cirrhotics undergoing abdominal operations concluded that the most accurate predictor of outcome is pre-operative Child's class; mortality rates were 10, 30, 82 percent in Child's class A, B, and C, respectively (Mansour A, Surgery, 1997)

Risk Factors for Morbidity and Mortality in Patients with Cirrhosis Undergoing Surgery[†]

Type of surgery

Abdominal (especially cholecystectomy, gastric resection or colectomy)
Cardiac
Emergency
Hepatic resection

Patient characteristics

Anemia
Ascites
Child's class (C>B)
Encephalopathy
Hypoalbuminemia
Hypoxemia
Infection
Jaundice
Malnutrition
Portal hypertension
Prolonged prothrombin time (>2.5 seconds above control that does not correct with vitamin K)

[†]Friedman, LS. The risk of surgery in patients with liver disease. *Hepatology* 1999; 29:1617. Copyright © 1999 Elsevier Science.

Pre-operative preparation of cirrhotic patients

- maintain PT < 3.0, platelets > 100,000, treat ascites aggressively to reduce wound dehiscence and abdominal wall herniation (pre-operative diuretics, intra-operative drainage during laparotomy), correction of electrolyte abnormalities (in particular, hypokalemia and metabolic alkalosis to prevent cardiac arrhythmias and hepatic encephalopathy), nutritional support
- neoadjuvant TIPS procedures
 - mortality rates in cirrhotics undergoing elective abdominal extrahepatic surgery ranges from 10-57%, usually due to hemorrhage, sepsis, or hepatorenal syndrome
 - surgical shunts/TIPS has been shown to diminish intra-operative blood loss
 - Schwartz performed the first surgical shunt in 1981 and Richter performed the first TIPS procedure in 1989
 - neoadjuvant TIPS procedure was first described by Azoulay in 2001 (Azoulay D, *J Am Col of Surgery*, 2001) on a series of 7 patients with severe portal hypertension based on history of variceal bleed, varices at risk of bleed, or intractable ascites with planned colon (3), GE (2), kidney (1), and aortic procedures (1); decrease in pressure gradient from 18+/- 5 to 9 +/- 5; operative mortality in one patient 36 days after resection of left colon cancer (highest Child's score of series)
 - a second smaller series of three cirrhotics with abdominal tumors (Child B, right colon cancer; Child A, gastric/colon cancer; Child A, pancreatic cancer) and neoadjuvant TIPS showed a reduction in pressure gradient of 18 (Gil A, *Eur J of Surg Onc*, 2004) and no post-operative mortality

Post-operative management of cirrhotics

- monitor for signs of hepatic decompensation (worsening jaundice, encephalopathy, ascites)
- follow PT and serum bilirubin as indicators of liver function
- follow renal function, serum electrolytes, glucose

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