

Similar findings have been reported in analyses of the National Inpatient Sample (92,93) and in a multicenter Italian cohort of 1,935 patients who underwent liver resection for HCC (94). This study reported lower adjusted mortality rates and lower incidence of failure to rescue at high-volume centers. Regarding nonhepatic surgeries, an National Inpatient Sample analysis of patients with cirrhosis undergoing orthopedic procedures demonstrated an inverse relationship between hospital cirrhosis volume and in-hospital mortality (95). The data thus suggest that it is reasonable to refer patients with cirrhosis planned for major surgery to an experienced center when feasible.

Preoperative management of cirrhosis-related decompensations

Key concepts

22. Remaining current with routine cirrhosis-related management prior to elective surgery, including hepatocellular carcinoma screening, optimization of ascites and hepatic encephalopathy, variceal screening and/or bleeding prophylaxis, and spontaneous bacterial peritonitis (SBP) prophylaxis when indicated, may mitigate operative risk.

While there are limited data evaluating in detail the perioperative management of cirrhosis decompensations, there are several principles that should be followed. Ascites, when present, should be preoperatively sampled to rule out SBP. Active SBP should prompt delay of elective surgery until a course of appropriate antibiotics has been completed. In patients without active SBP, indications should be reviewed for initiation of SBP prophylaxis, including previous SBP and low-protein ascites (<1.5 g/L) with concomitant renal dysfunction (creatinine >1.2 mg/dL, blood urea nitrogen >25 mg/dL, or serum sodium <130 mEq/L) or liver failure (CTP score >9 and bilirubin >3 mg/dL) (96). Large-volume ascites should be preoperatively drained (albumin 6–8 g/L should be given if >5 L is removed) and actively managed in the postoperative setting. This is especially critical for abdominal surgeries, where recurrent tense ascites increases the risk of wound dehiscence and surgical site infection. In the absence of preoperative acute kidney injury or major electrolyte derangements, diuretics (if prescribed) should be continued in the perioperative period. Patients with hepatic encephalopathy should have lactulose and/or rifaximin continued through the perioperative period, with close attention to serum sodium and minimization of medications that may exacerbate encephalopathy. Patients taking nonselective beta blockers (NSBBs, e.g., carvedilol) for CSPH or secondary prevention of esophageal variceal bleeding should continue these medications in the perioperative period, provided that the systolic blood pressure is over 90 mm Hg. In patients not taking NSBBs and with unclear variceal status, upper endoscopy should be performed and NSBBs or band ligation should be pursued for large varices or medium varices with high-risk stigmata. Finally, hepatocellular carcinoma screening should be up-to-date, especially as diagnosis of liver cancer may affect surgical decision-making and transplant consideration in selected patients. The importance of the above routine management is underscored by data demonstrating that patients with recent outpatient gastroenterology/hepatology visits (along with active management of cirrhosis-related medications and paracentesis) before surgery have lower postoperative mortality relative to patients without recent outpatient visits (97).

SURGERY-SPECIFIC CONSIDERATIONS

In addition to the above general guidance on preoperative risk evaluation and risk mitigation strategies, there are several specific surgical scenarios that are uniquely affected by cirrhosis, which warrants additional discussion.

Abdominal hernia repair

Key concepts

23. In patients with cirrhosis and abdominal hernia, surgical consultation after optimizing ascites control for elective repair may reduce risk of hernia complications such as incarceration or spontaneous rupture that would require higher-risk emergent repair.

The prevalence of abdominal hernia can reach up to 40% in patients with decompensated cirrhosis (98). Although there are no strict contraindications for elective repair, management is often deferred because of the presence of severe hemostatic derangements, CSPH, refractory ascites, and/or malnutrition/sarcopenia. Conservative management additionally avoids the risks of anesthesia, which is an important consideration given the degree of systemic disease and high ASA score in many patients with decompensated cirrhosis. However, deferring operative repair also increases the risk of complications requiring emergent repair including incarceration, strangulation, spontaneous or threatened rupture, evisceration, gangrenous skin changes, or secondary peritonitis.

The decision to pursue elective abdominal hernia repair in cirrhosis is a common clinical dilemma. In the CRUCIAL randomized controlled trial of 34 adults with liver cirrhosis and umbilical hernia, there was no significant difference in time to minor or major complications between elective repair and conservative management through a 2-year follow-up (overall complication rate 64.7%; group difference $P = 0.66$) although the study might have been underpowered. Among those who underwent repair, recurrent hernia occurred in 16.7% (99). A 2022 systematic review of 23 studies comprising 3,229 patients undergoing hernia repair demonstrated an increased risk of mortality in patients with cirrhosis (odds ratio 8.50, 95% CI 1.91–37.86); however, much of the increased risk was attributed to emergent hernia repair (100). This point is underscored by a Veterans Health Administration study of 1,475 patients with cirrhosis who underwent open umbilical hernia repair. Patients who underwent emergency hernia repair had significantly higher 30-day mortality than those who underwent elective repair (12.2% vs 1.2%), and of patients who underwent elective repair, mortality was higher in patients with ascites (2.2% vs 0.7%). Most importantly, chart review revealed that elective umbilical hernia repair might have been feasible in 30% of patients requiring emergency umbilical hernia repair in the previous year (9). Another Veterans Health Administration study similarly demonstrated that elective hernia repair would yield higher quality-adjusted life years in patients with cirrhosis and a MELD score of up to 21 in a Markov decision analysis. The literature therefore suggests that elective hernia repair should be considered in patients with cirrhosis with close monitoring as liver disease progresses. For patients on the transplant waiting list who are expected to undergo transplant within 6 months, hernia repair can be deferred to the transplant operation. Findings such as