Surgery in Patients with Portal Hypertension

A Preoperative Checklist and Strategies for Attenuating Risk

Gene Y. Im, MD, Nir Lubezky, MD, Marcelo E. Facciuto, MD, Thomas D. Schiano, MD*

KEYWORDS

• Surgery • MELD • Child-Turcotte-Pugh • Ascites • Cirrhosis • Portal hypertension • Variceal bleeding • TIPS • Checklist

KEY POINTS

- Patients with liver disease and portal hypertension, usually as a result of advanced fibrosis or cirrhosis, are at increased risk of complications when undergoing surgery.
- Acute or fulminant liver failure and acute viral and alcoholic hepatitis are contraindications to elective surgery.
- The model for end-stage liver disease score is likely more accurate than the Child-Turcotte-Pugh score in predicting perioperative morbidity and mortality.
- Improved assessment of surgical risk can improve informed consent as well as surgical decision making and thus lead to the implementation of medical and surgical strategies, including preoperative transjugular intrahepatic portosystemic shunt, to mitigate risks.
- Use of a preoperative liver assessment checklist (POLA) may be useful as a guideline for assessing surgical risk.

INTRODUCTION

Patients with liver disease and portal hypertension, usually as a result of advanced fibrosis or cirrhosis, are at increased risk of complications when undergoing surgery. Recent advances in hepatology, intensive care medicine, radiology, surgery, and liver transplantation have allowed better optimization of cirrhotic patients before surgery and the reduction of postoperative complications. Despite this progress, the estimation of surgical risk in a patient with cirrhosis is challenging, often involving more art

Disclosures: The authors have no disclosures to report.
Icahn School of Medicine at Mount Sinai, The Mount Sinai Medical Center, Recanati/Miller Transplantation Institute, One Gustave Levy Place, Box 1104, New York, NY 10029-6574, USA
* Corresponding author.
E-mail address: thomas.schiano@mountsinai.org

Clin Liver Dis 18 (2014) 477–505
http://dx.doi.org/10.1016/j.cld.2014.01.006 **liver.theclinics.com**
1089-3261/14/$ – see front matter

than science. This article addresses current concepts in the perioperative evaluation of patients with liver disease and portal hypertension with a focus on medical and surgical strategies to mitigate perioperative complications, including a preoperative liver assessment (POLA) checklist.

PATHOPHYSIOLOGY

Understanding about the effects of anesthesia and surgery on the liver has not changed significantly in the past decade.[1] The liver is responsible for the synthesis of most serum proteins, metabolism of nutrients and drugs, detoxification of toxins, and filtering of portal venous blood.[1] Hepatic dysfunction can significantly impair any or all of these functions.[2,3] In particular, the duration of action of many drugs can be increased as a result of altered metabolism by cytochrome P450 enzymes, decreased plasma-binding proteins, and decreased biliary excretion.[4] As a result, opioids like morphine and oxycodone and benzodiazepines like midazolam and diazepam should be avoided to reduce the risk of central nervous system depression and hepatic encephalopathy (HE).[5,6] The metabolism of fentanyl, oxazepam, and temazepam do not seem to be affected by hepatic dysfunction.[7,8]

In healthy patients, the induction of anesthesia with neuromuscular blocking agents and volatile anesthetics reduced hepatic blood flow by up to 36% during the first 30 minutes, but it improves thereafter.[9] Halothane can cause a severe hepatitis and, like enflurane, can also reduce hepatic arterial blood flow. Isoflurane, desflurane, and sevoflurane undergo minimal hepatic metabolism and are preferred.[1] Although propofol is metabolized extensively by the liver, it does not alter hepatic blood flow significant or require dose adjustment in cirrhosis.[10–12] In contrast, spinal or epidural anesthetics may reduce mean arterial pressure and impose significant bleeding risks in patients with cirrhosis and portal hypertension.[13]

Cirrhosis and portal hypertension lead to a hyperdynamic circulation and splanchnic vasodilation, with subsequent activation of the sympathetic nervous system and neurohormonal axis to maintain arterial perfusion pressure.[14] This carefully compensated milieu becomes easily disrupted by the hemodynamic shifts that occur during surgery such as induction of anesthesia, hemorrhage, hypotension, and vasoactive medications.[5] Hypoxemia can occur from ascites, hepatic hydrothorax, hepatopulmonary syndrome, and portopulmonary hypertension.[15] Intermittent positive-pressure ventilation, pneumoperitoneum from laparoscopy, and even traction on abdominal viscera may reduce hepatic blood flow.[15,16] These insults lead to hepatic ischemia and increase the risk of hepatic decompensation.[17]

These various effects on the liver can explain why most surgical procedures are followed by minor increases in liver enzymes, regardless of anesthesia type.[18] However, these disturbances are usually transient and subclinical without consequence in patients without liver disease.[1]

PREOPERATIVE SCREENING FOR LIVER DISEASE

Routine assessment of liver function is not recommended unless suggested by a patient's history and physical examination.[5,19] In an older study of 7620 patients undergoing elective surgery over a period of 1 year, preoperative screening revealed abnormal liver enzymes in only 11 patients (0.14%).[20] If a patient's transaminase or alkaline phosphatase levels are increased to more than 3 times the upper limit of normal or with any increase of the total bilirubin, surgery should be delayed until a thorough work-up is performed.[5,21,22] Asymptomatic patients with this biochemical profile have an incidence of undiagnosed cirrhosis of 6% to 34% and are likely to have an