# Management of End-stage Liver Disease

Iris W. Liou, MD

**KEYWORDS**

• Cirrhosis • Ascites • Peritonitis • Varices • Hepatic encephalopathy
• Decompensation

**KEY POINTS**

- Patients with cirrhosis should be referred to a liver transplant center if they (1) have a model for end-stage liver disease score greater than or equal to 10 or Child-Turcotte-Pugh score greater than or equal to 7, (2) develop a complication caused by cirrhosis (eg, ascites, variceal hemorrhage, or hepatic encephalopathy), or (3) are diagnosed with hepatocellular carcinoma within Milan criteria (solitary lesion less than 5 cm or up to 3 nodules each smaller than 3 cm).
- Treatment of ascites in patients with cirrhosis should be focused on dietary sodium restriction of less than 2000 mg daily and the use of diuretics; specifically, spironolactone and furosemide, titrated using a respective ratio of 100 mg to 40 mg.
- An ascitic fluid absolute polymorphonuclear (PMN) count greater than or equal to 250 cells/$mm^3$ should prompt empiric antibiotic treatment of spontaneous bacterial peritonitis with intravenous cefotaxime (2 g intravenously every 8 hours) for 5 days.
- Nonselective β-blockers (NSBBs) are recommended for the prevention of the first variceal hemorrhage in those with large esophageal varices or small esophageal varices at high risk of bleeding (red wale marks or Child class B or C cirrhosis). Endoscopic variceal ligation can be performed for large esophageal varices when NSBBs are contraindicated or not tolerated.
- Lactulose can be used as initial drug therapy for the treatment of acute hepatic encephalopathy, even in the absence of high-quality, placebo-controlled trials, based on extensive clinical experience supporting efficacy. Rifaximin is a reasonable alternative in those who do not respond to lactulose alone.
- Patients with cirrhosis should undergo ultrasound imaging every 6 months for hepatocellular carcinoma surveillance.

## INTRODUCTION

Cirrhosis is a progressive, diffuse fibrotic process in the liver, leading to nodule formation and disruption of the normal architecture, and can result from any chronic insult to

No financial disclosures.
Division of Gastroenterology, Department of Medicine, University of Washington School of Medicine, 1959 Northeast Pacific Street, Box 356175, Seattle, WA 98195-6175, USA
*E-mail address:* irisl@medicine.washington.edu

Med Clin N Am 98 (2014) 119–152
http://dx.doi.org/10.1016/j.mcna.2013.09.006 **medical.theclinics.com**
0025-7125/14/$ – see front matter 

the liver. Specific liver diseases that can lead to cirrhosis include chronic viral hepatitis (eg, hepatitis B and hepatitis C), autoimmune hepatitis, alcoholic liver disease, cholestatic liver diseases (eg, primary biliary cirrhosis, primary sclerosing cholangitis, and cystic fibrosis), metabolic disorders (eg, alpha-1-antitrypsin deficiency, Wilson disease, nonalcoholic steatohepatitis, and hereditary hemochromatosis), and vascular disorders (eg, Budd-Chiari syndrome). Well-compensated cirrhosis can remain asymptomatic for many years until a decompensating event occurs, such as the development of jaundice, ascites, spontaneous bacterial peritonitis, variceal hemorrhage, or hepatic encephalopathy (HE). Once a complication of cirrhosis develops, the 5-year survival decreases to less than 20%, and patients should be referred for consideration of liver transplantation.[1] Liver-related mortality is the 12th leading cause of mortality in the United States, as reported by the National Center for Health Statistics, and, because of under-reporting, the true mortality is likely even higher.[2] The vigilant care of patients with cirrhosis centers on the prevention and management of these events.

## ASCITES

### *Evaluation of Ascites*

Ascites is the most common complication of cirrhosis, with approximately 50% of patients with compensated cirrhosis developing ascites over the course of 10 years.[1,3] After the development of ascites necessitating hospitalization, the risk of mortality increases to 15% at 1 year and nearly 50% at 5 years.[4]

#### *History and physical examination*

In the United States, approximately 85% of patients with ascites have cirrhosis as the cause of ascites.[5] In addition to the assessment of risk factors for liver disease, a history or risk factors for malignancy, heart failure, nephrotic syndrome, thyroid myxedema, recent abdominal surgery, and tuberculosis should be elicited. Physical examination findings for ascites include bulging flanks and shifting dullness.

#### *Diagnostic and therapeutic paracentesis*

The evaluation for the cause of clinically apparent ascites should begin with an abdominal paracentesis with appropriate ascitic fluid analysis. Prophylactic blood products do not routinely need to be given before a paracentesis in patients with cirrhosis with associated thrombocytopenia and coagulopathy.[6,7] The paracentesis procedure is generally safe, with only a 1% risk of abdominal wall hematoma and a less than 0.5% risk of mortality, even in patients with coagulopathy related to liver disease. However, this procedure should be avoided in the setting of clinically evident hyperfibrinolysis or disseminated intravascular coagulation.

#### *Initial evaluation of cause of ascites*

The following includes a summary of major laboratory tests to consider performing with diagnostic paracentesis (**Table 1**). Other tests not discussed can be ordered if there is suspicion for alternative or additional causes of ascites.

**Albumin and total protein** Ascitic fluid sample should routinely be sent for albumin and total protein. The serum-ascites albumin gradient (SAAG) is calculated by subtracting the ascitic fluid albumin value from the serum albumin concentration obtained on the same day. A SAAG value greater than or equal to 1.1 g/dL indicates portal hypertension,[5] but does not exclude additional causes of ascites in a patient with portal hypertension. An ascitic fluid total protein value less than 2.5 g/dL is consistent with ascites from cirrhosis or nephrotic syndrome, whereas a high ascitic fluid protein value greater than 2.5 g/dL is seen in patients with cardiac or thyroid causes of ascites.