includes stabilization (airway, breathing, and circulation) and blood transfusions to maintain a hemoglobin level of 7 to 8 g/dL. Combined pharmacologic and endoscopic therapy is the current standard for control of bleeding and is superior to either therapy alone. Prophylactic intravenous antibiotics should be administered early because they reduce the risk for infection, rebleeding, and death.

Current pharmacologic therapy consists of octreotide, a somatostatin analogue, which is widely used because of a good safety profile. This agent is best instituted before endoscopic examination. Endoscopic therapy includes EBL or sclerotherapy or both. EBL is the preferred modality given the lower incidence of adverse effects and complications. In patients with gastric variceal hemorrhage, endoscopic variceal ablation with cyanoacrylate glue is superior to EBL, although this therapy is not approved in the United States. Balloon tamponade (Sengstaken-Blakemore tube, Linton tube, or Minnesota tube) is a temporary measure reserved only for cases in which endoscopic therapy has failed in the setting of massive hemorrhage. In these patients, there is evidence that early placement of a transjugular intrahepatic portosystemic shunt (TIPS) for active variceal bleeding improves survival. The most common side effect of the TIPS is postprocedural encephalopathy.

Recommendations for secondary prophylaxis to prevent rebleeding include a combination of nonselective β-blockers (propranolol and nadolol) and variceal obliteration through repeated courses of EBL. In patients who undergo TIPS, the patency must be assessed using Doppler ultrasound on a regular basis.

Prognosis

Overall, the frequency and mortality rates from variceal bleeding appear to be decreasing in the United States over the past 2 decades. However, variceal hemorrhage is life-threatening, and after an initial episode the risk of rebleeding approaches 60% with a mortality rate of approximately 33% if secondary prophylaxis is not instituted.

ASCITES

Definition and Pathology

Ascites represents the accumulation of excess fluid in the peritoneal cavity. Although cirrhosis is the most common cause of ascites, there are also other important causes (Table 43-4). The precise sequence of events leading to the development of cirrhotic ascites remains debated. The *overflow* theory suggests that portal hypertension and splanchnic vasodilation result in excess renal sodium and water retention and overflow of fluid into the peritoneum. The *underflow* theory suggests that decreased effective circulating blood volume resulting from systemic arterial vasodilation leads to activation of neurohumoral systems and results in sodium and water retention. In any case, avid renal Na^+ retention is characteristic and results in an increase in total body Na^+ and water.

TABLE 43-4 CLASSIFICATION OF ASCITES

SAAG HIGH (>1.1 g/dL)	SAAG LOW (<1.1 g/dL)
Cirrhosis	Peritoneal carcinomatosis
Alcoholic hepatitis	Peritoneal tuberculosis
Chronic hepatic congestion	Pancreatic and biliary disease
Right ventricular heart failure	Nephrotic syndrome
Budd-Chiari syndrome	
Constrictive pericarditis	
Massive liver metastases	
Myxedema	
Mixed ascites	

SAAG, Serum-ascites albumin gradient.

Diagnosis

Physical examination is relatively insensitive for detection of small volumes of ascites, but bulging flanks, shifting dullness, and evidence of portal hypertension (e.g., distended veins over the abdominal wall and caput) become evident with increasing amounts of fluid. Abdominal ultrasound is both sensitive and specific and is widely used in screening. When fluid is present, abdominal paracentesis is the quickest and most direct approach for confirmation of the presence of fluid in the abdominal cavity and initial characterization of the cause. In addition to standard measures such as cell count, the serum-ascites albumin gradient (SAAG), which is proportional to the sinusoidal portal pressure, is calculated as follows:

$$\text{SAAG} = (\text{Serum albumin concentration}) - (\text{Ascitic fluid albumin concentration}).$$

An elevated SAAG (>1.1 g/dL) correlates well with portal hypertension as the likely cause of fluid accumulation (see Table 43-4).

Clinical Presentation

Patients usually report increasing abdominal girth, fullness of the flanks, and weight gain with or without peripheral edema. Ascites becomes clinically detectable with fluid accumulation greater than about 500 mL. Shifting dullness to percussion is the most sensitive clinical sign of ascites, but about 1500 mL of fluid must be present for reliable detection.

Treatment

Management of cirrhotic ascites depends on the cause. Patients with high SAAG (>1.1 g/mL), which is used as a surrogate measure for elevated portal pressures, usually respond to salt restriction (<2 g/day) and diuretics to stimulate renal Na^+ loss. The administration of spironolactone, an aldosterone antagonist, supplemented with a loop diuretic (e.g., furosemide), is effective in about 90% of patients. Diuresis should be monitored closely because aggressive diuretic therapy may result in electrolyte disturbances (e.g., hyponatremia, hypokalemia) and hypovolemia, leading to impaired renal function and potentially precipitating HE. Water restriction is implemented when the serum sodium concentration is less than 120 to 125 mEq/L.

Prognosis

Refractory ascites occurs in up to 10% of patients with cirrhosis and is defined as the persistence of tense ascites despite maximal diuretic therapy (spironolactone, 400 mg/day, and furosemide, 160 mg/day) or the development of azotemia or electrolyte disturbances at submaximal doses of diuretics. Treatment includes repeated large-volume paracentesis and colloid volume