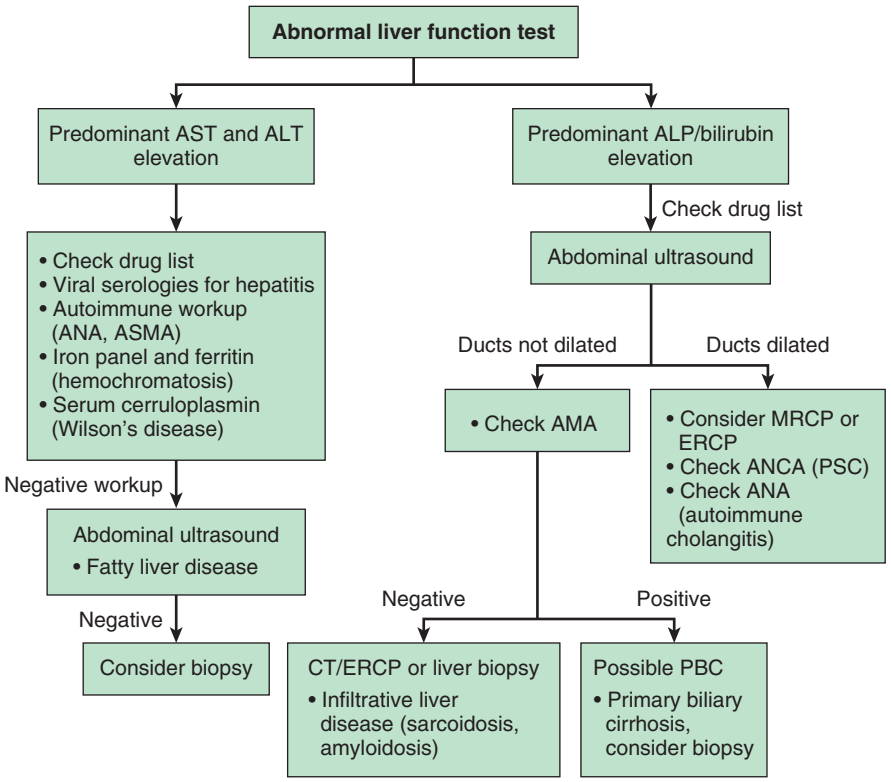

FIGURE 39-1 Diagnostic approach to abnormal liver function test. ACE, Angiotensin-converting enzyme; ALP, alkaline phosphatase; ALT, alanine aminotransferase; ANA, antinuclear antibody; ANCA, antineutrophil cytoplasmic antibody; AMA, antimitochondrial antibody; ASMA, anti–smooth muscle antibody; AST, aspartate aminotransferase; CT, computed tomography; ERCP, endoscopic retrograde cholangiopancreatography; MRCP, magnetic resonance cholangiopancreatography; PBC, primary biliary cirrhosis; PSC, primary sclerosing cholangitis.

for possible α_1-antitrypsin deficiency and Wilson's disease, respectively. Serum ammonia is a poor marker of hepatic function. However, it is used frequently as an aide in the evaluation of possible portosystemic encephalopathy. Carbohydrate-deficient transferrin (CDT) is a marker used to identify chronic alcohol use.

Biomarkers of Liver Histology

Liver biopsy remains the "gold standard" for detection and quantitation of liver cirrhosis, fibrosis, inflammation, steatosis, tumors, and necrosis. Biopsy of the liver is a straightforward procedure that can be performed by either a percutaneous or a transjugular approach. Although it is generally safe, serious complications such as bleeding (1 per 1000) and death (1 per 10,000) may occur. There is also a finite risk of introducing an infection.

Given these potential concerns, noninvasive alternatives to liver biopsy would be attractive if validated. Both noninvasive serum markers and ultrasonographic elastography have been evaluated as potential alternatives to liver biopsy to assess hepatic fibrosis. FibroTest (known as FibroSure in the United States) is the most studied biomarker panel. Other patented biomarker panels include the Enhanced Liver Fibrosis (ELF) test, Hepascore, Fibro Meter, and FIBROSpect by Western blotting. The FibroTest panel incorporates six serum markers: α_2-macroglobulin, haptoglobin, apolipoprotein A-I, GGT, total bilirubin, and ALT. An algorithm is used to calculate a score, represented as a range from F0 to F4, that indicates the probability of fibrosis (F0, no cirrhosis; F4, liver cirrhosis).

Another scoring system, called the NAFLD fibrosis score, uses six variables (age, body mass index [BMI], AST, ALT, platelet count, and serum albumin) to predict advanced fibrosis in patients with NAFLD. The utility of this scoring system in routine clinical practice is not clearly established.

Imaging modalities such as real-time shear wave elastography (SWE) on the Aixplorer ultrasound machine, transient elastography (FibroScan), and acoustic radiation force imaging (ARFI) are sonographic techniques based on the theory that a "shear wave" moves faster in a less elastic liver (i.e., one with more fibrosis and scarring) than in a normal or less fibrotic liver. These imaging modalities have a high specificity in detecting liver fibrosis, comparable to that of serum biomarkers.

Liver Biopsy

Biopsy and histologic examination of liver tissue is still the standard protocol for patients who are undergoing induction therapy for chronic viral hepatitis or are on the transplant list for any other cause of liver failure. Contraindications for biopsy include an uncooperative patient, impaired hemostasis (INR >1.5), thrombocytopenia (fewer than 50,000 to 60,000 platelets per microliter), use of nonsteroidal anti-inflammatory drugs (NSAIDs) within the previous 7 to 10 days, and suspected echinococcal cysts in the liver.

For a deeper discussion on this topic, see Section XIII: Disease of the Liver, Gallbladder, and Bile Ducts in Goldman-Cecil Medicine, *25th Edition.*

SUGGESTED READINGS

Chen J, Liu C, Chen H, et al: Study on noninvasive laboratory tests for fibrosis in chronic HBV infection and their evaluation, J Clin Lab Anal 27:5–11, 2013.

de Lédinghen V, Vergniol J, Gonzalez C, et al: Screening for liver fibrosis by using FibroScan and FibroTest in patients with diabetes, Dig Liver Dis 44:413–418, 2012.