

Why is transient elastography essential in hepatology?

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Hepatic fibrosis is an integral stage in the progression of chronic liver disease, ultimately leading to cirrhosis and hepatocellular carcinoma (HCC). Globally, alcohol consumption, hepatitis B, and hepatitis C (HCV) have been the main causes of cirrhosis. Recently, the increasing prevalence of obesity and the metabolic syndrome has resulted in an increasing incidence of cirrhosis secondary to nonalcoholic fatty liver disease (NAFLD) in both developed and developing countries. Chronic liver disease and cirrhosis are important causes of morbidity and mortality throughout the world.¹ Moreover, the burden of chronic liver disease is predicted to increase, attributed in part to the increasing prevalence of end-stage liver disease and HCC secondary to NAFLD and HCV.^{1,2}

Liver biopsies are most commonly used to determine the stage of fibrosis. Unfortunately, liver biopsy is an invasive procedure with a small but significant risk of morbidity and mortality. Pain and hypotension are the most frequent complications of the procedure. Intraoperative bleeding is considered the most serious complication. The mortality rate is about 1 in 10,000.³ For these reasons, patients may reject the procedure, thereby leaving their possible fibrosis undiagnosed. Furthermore, the accuracy of liver biopsy in assessing fibrosis has come into question because of sampling error and intra and inter-observer variability, which can lead to the over or underestimation of the stage of fibrosis.⁴⁻⁶

Why is the recognition of the degree of liver fibrosis important? It is important because the treatment of chronic hepatitis and the diagnosis of cirrhosis are prerequisites to the prevention of various complications. A new technology in the diagnosis of fibrosis was recently introduced using a noninvasive, modified ultrasound device that mea-

sures elasticity in the liver. Several studies have shown that transient elastography (TE) can, in most cases, be used instead of liver biopsy to diagnose fibrosis.

Advantages and interpretation of TE

TE is a promising new technique with which to assess liver fibrosis. It has very high sensitivity and specificity, especially in determining cirrhosis. TE is painless, rapid (a few minutes), and easy to perform at the bedside or in an outpatient clinic. The examination is performed on a nonfasting patient lying flat on his or her back. The volume of the sample acquired is at least 100 times larger than a biopsy sample and is therefore far more representative of the hepatic parenchyma.

For TE results to be considered reliable strict adherence to quality criteria should be followed while performing the TE examination. It is important to ensure that the interquartile range does not exceed 30% of the median value and that the success rate (the ratio of the number of successful measurements to the total number of acquisitions) should be at least 60% if the TE result is to be deemed valid. The results should always be interpreted by an expert clinician according to the clinical context.

Clinical experience

The results for hepatitis C show that liver stiffness values correlate strongly with the Metavir fibrosis stages. The areas under the receiver operating characteristic curves (AUROCs) range from 0.79 to 0.83 for significant fibrosis.

TE has also been assessed in a number of chronic liver diseases other than hepatitis C, to identify significant fibrosis,^{7,8} including chronic hepatitis B,^{9,10} HIV-HCV coinfection,^{11,12} cholestatic diseases such as primary biliary cirrhosis and primary sclerosing cholangitis,^{13,14} and nonalcoholic steatohepatitis,^{15,16} with AUROCs ranging from 0.74 to 0.93 and cut-offs ranging from 4.0 to 8.7 kPa.

Limitations

Liver stiffness measurements can be difficult in obese patients or in those with narrow intercostal spaces, and impossible in patients with ascites.¹⁷ Failure rates have

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ranged from 2.4% to 9.4% in different studies.¹⁸ In our experience from 2,114 examinations, liver stiffness could not be measured in 4.5% of patients.¹⁹ On multivariate analysis, the only factor associated with failure was a body mass index above 28 (odds ratio 10.0, 95% confidence interval 5.7–17.9, $P = 0.001$). However, with further experience, we now consider that a fatty thoracic belt rather than a high body mass index is the limiting factor for successful measurement. In overweight or obese patients, the fatty thoracic belt attenuates both the elastic waves and ultrasound, making liver stiffness measurements impossible. Specific probes are being developed for obese patients.

In conclusion, TE is an easy and quick, noninvasive, clinical method of liver assessment. The results are available immediately and the technique is accurate in predicting significant fibrosis. Therefore, TE should be useful not only in evaluating liver fibrosis to monitor liver disease progression, but in monitoring the effects of antiviral or antifibrotic therapies and in the decisions of daily clinical practice.

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