



Acoustic Radiation Force Impulse Imaging is a Useful Tool for Predicting Fibrosis Level in Patients with Chronic Hepatitis B Infection

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Abstract

Even though liver biopsy has been considered as the gold standard for the assessment of liver fibrosis, it has several limitations, including its invasive nature, small tissue sample size, and subjective grading system. In recent studies, various non-invasive methods for liver fibrosis assessment have been demonstrated, including serum biomarkers and elastography techniques alternative to liver biopsy. In this letter, we want to emphasize the usefulness of acoustic radiation force impulse (ARFI) method for predicting fibrosis level which is one of the most important non-invasive techniques estimating the stiffness of the liver tissue by measuring shear wave velocity.

Keywords: Liver, fibrosis, acoustic radiation force impulse

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ARFI method for predicting fibrosis level in patients with chronic hepatitis B infection

Assessment of liver fibrosis is considered essential to the management of patients with chronic hepatitis B, supporting prognostic information and helping in making therapeutic decisions [1]. Even though liver biopsy has been considered as the gold standard for the assessment of liver fibrosis, it has several limitations, including its invasive nature, small tissue sample size, and subjective grading system. In recent studies, various non-invasive methods for liver fibrosis assessment have been demonstrated, including serum biomarkers and elastography techniques alternative to liver biopsy [1,2]. Acoustic radiation force impulse (ARFI) method is one of the most important non-invasive techniques estimating the stiffness of the liver tissue by measuring shear wave velocity.

A sixty-year-old male patient with a previous diagnosis of hepatitis B virus (HBV) infection was seen at the outpatient Infectious Diseases Clinic in our center. He was first diagnosed with HBV infection in 2008 and found to have a positive family history of HBV infection at the time of diagnosis. Since then, the patient had been followed up with treatment for chronic hepatitis B (CHB) virus infection. In January 2012, the patient's laboratory study results were notable for an HBV DNA level of 20,000 IU/ml, ALT: 65 U/L, AST: 44 U/L and thrombocytes: 204,000/mm³. He underwent liver biopsy and findings were consistent with chronic hepatitis B (histological activity index [HAI] of 6/18, and grade 1/6 fibrosis). He was followed up without antiviral therapy until February 2013, when an increase in his DNA levels (HBV DNA: 2,000,000 IU/mL) and a decrease in his thrombocytes (140,000/mm³) was noted. Biopsy of the liver biopsy was performed to determine further treatment options. At this time, biopsy findings showed grade 5/6 fibrosis and an HAI score of 9/18. Antiviral treatment with Tenofovir at a dosage of 245 mg perorally daily was initiated.

Since the rate of rapid progression of fibrosis levels in a one-year period is usually low, the patient underwent Acoustic Radiation Force Impulse (ARFI) elastography examination for further evaluation. ARFI was performed uneventfully in the right liver lobe in segment 8 through the intercostal space in a region free of vessels, at least 2 cm under the liver capsule. Images demonstrated one of the 10 measurements obtained in the same location. The median stiffness measurement was 1.1 m/sec in concordance with fibrosis F1 in the region where the first biopsy was performed (Fig 1a) while the mean value of the second measurement was 3.6

m/sec in concordance with fibrosis F5 in the region where the second biopsy was done (Fig 1b). This case deemed significant, as it showed that fibrosis was heterogeneously distributed throughout the liver in hepatitis B patients and liver biopsy provided only a very small part of the whole liver. Patient evaluation with ARFI prior to biopsy can be useful for both clinicians and radiologists. Moreover, it can serve as a guide for accurate collection of samples from identified regions of the liver. ARFI would be a useful tool for both to initially assess patients and then as a monitoring tool to assess response to therapy. Further studies of the pathophysiological importance of ARFI in CHB are warranted.

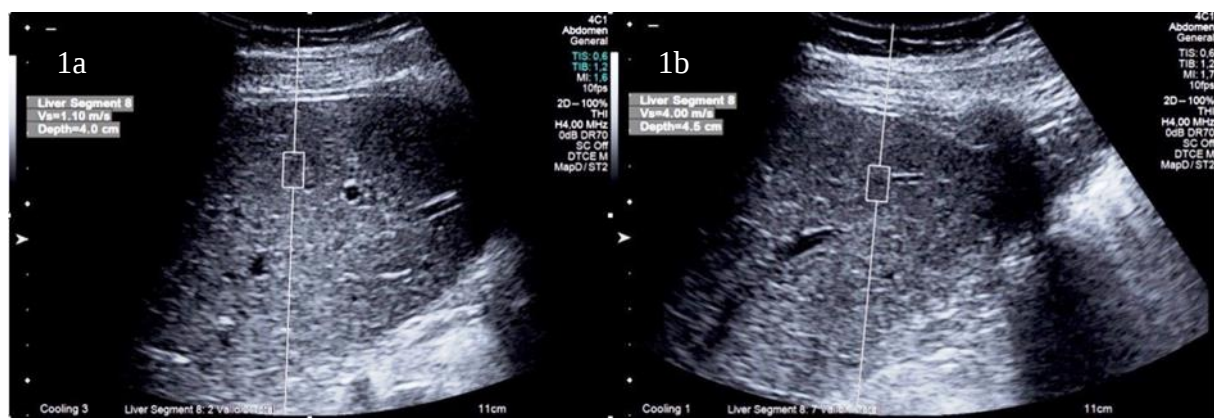


Figure 1. ARFI imaging in a 60-year-old man with a history of hepatitis B. Note the white boxes that are the ROI where the measurements are obtained. Image demonstrates one of the 10 measurements obtained in the same location. The median stiffness measurement was 1.1 m/sec in concordance with fibrosis F1 in the region where the first biopsy was performed (Figure 1a) while the mean value of the second measurement was 3.6 m/sec in concordance with fibrosis F5 in the region where the second biopsy was done (Figure 1b).

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