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The role of magnetic resonance elastography in the evaluation of nonalcoholic fatty liver disease

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Magnetic resonance elastography (MRE) is a diagnostic tool for the evaluation of chronic liver diseases in terms of the presence and assessment of hepatic fibrosis. Propagating waves transmitted through a passive driver to the liver region produced by an active driver are the fundamentals of the technique. These waves produce microscopic shear displacement, which can be imaged by a phase contrast MR sequence. The stiffness of the tissues can be evaluated on stiffness maps that are produced automatically. The mean liver stiffness measurement (LSM) can be calculated from the region of interest drawn on the four obtained slices and expressed in kilopascals (kPa).[1]

Liver biopsy was accepted as the best way to assess hepatic fibrosis, which has several disadvantages such as invasiveness and capability of small parenchymal evaluation that causes lower reproducibility. Today, several noninvasive biochemical techniques, such as fibrosis-4 (FIB-4) score, AST to platelet ratio index, nonalcoholic fatty liver disease (NAFLD) index, and imaging methods including vibration-controlled transient elastography and MRE, are used for identifying and assessing liver fibrosis. MRE can assess a larger portion of the liver with excellent intra- and interobserver agreement in contrast with liver biopsy assessment.[1,2] It is shown that MRE is a valuable imaging method for identifying liver fibrosis that has a good correlation with liver biopsy in several chronic liver diseases and NAFLD.[3,4] MRE has also been shown to be superior to other noninvasive methods in assessing liver fibrosis.[5,6] Risk stratification is important in patients with NAFLD. A diet and exercise program is recommended in patients with nonalcoholic fatty liver (NAFL). However, nonalcoholic steatohepatitis (NASH) is characterized by the presence of inflammation, ballooning, and/or fibrosis, indicating the progressive forms of the disease. NASH patients with significant hepatic fibrosis (stage ≥2) are at risk for liver-related morbidities and are candidates for clinical trial participation.[7] It was shown that MRE is a useful tool for the discrimination of NASH from NAFL and for the detection of significant fibrosis.[8,9]

MRE can also be used in the follow-up of NAFLD patients noninvasively. A recent study showed a 15% increase in MRE-LSM is the strongest predictor of progression to advanced fibrosis in patients with NAFLD.[10] Tamaki et al.[7] also proposed that a combination of MRE with FIB-4 score (MEFIB index) can be used for detecting patients with NAFLD and significant fibrosis for enrollment in NASH clinical trials. Beyond that, MRE-LSM is shown to be a significant predictor of the development of cirrhosis as well as baseline LSM is predictive of the development of liver-related events such as decompensation or death.[11] A recent study that evaluated the MEFIB index showed excellent negative predictive value for hepatic decompensation in patients with NAFLD-related cirrhosis. In this study, the investigators also observed that MRE-LSM is associated with hepatic decompensation, hepatocellular carcinoma, and death in patients with NAFLD-related cirrhosis.[12]

In conclusion, MRE-LSM is a useful tool for the detection and assessment of hepatic fibrosis in patients with NAFLD. MRE-LSM can also be used for the evaluation of disease progression as well as the prediction of disease courses in NAFLD patients.

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