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Noninvasive assessment of liver fibrosis in patients with chronic hepatitis B using MR elastography

Jeong Eun Lee[1], Jeong Min Lee[2], Kyung Bun Lee[3], Jeong Hee Yoon[3], Cheong Il Shin[3], Joon Koo Han[2], Byung Ihn Choi[2]

[1]Chungnam National University Hospital, [2]Seoul National University College of Medicine, [3]Seoul National University Hospital, Korea.

jmsh@snu.ac.kr

PURPOSE: To evaluate the diagnostic performance of MR elastography (MRE) for predicting significant fibrosis or cirrhosis in chronic hepatitis B patients.

MATERIALS AND METHODS: Patients with chronic hepatitis B (n = 195) and living donors (n = 166) underwent MRE as part of the routine liver MRI examination. Liver stiffness values were measured on quantitative shear stiffness maps. The technical success rate of MRE was then determined. Liver cell necroinflammatory activity and fibrosis (F) in patients with HBV were assessed using histopathologic examinations as a reference. Areas under the receiver operating characteristic curve (AUROCs) were calculated in order to predict each fibrosis stage.

RESULTS: The technical success rate of MRE was 92.5%. The causes of technical failure were poor wave propagation (n = 12), severe respiratory motion (n = 3), or the presence of an iron deposits in the liver (n = 12). The mean stiffness values of the liver, as measured by MRE, increased significantly together with the increased fibrosis stage ($r = 0.901$, $p < 0.001$), although they not significantly increase together with necroinflammation activity. ROC curve analysis showed that MRE was able to discriminate patients without fibrosis (F0) from those with mild fibrosis (F1) (AUC, 0.985; sensitivity, 92.2%; specificity, 98.2%) with a shear stiffness cutoff value of 2.45 kPa. In addition, the cutoff values of liver stiffness for $\geq$ F2, $\geq$ F3, and F4 were 2.69 kPa, 3.0 kPa, and 3.94 kPa, respectively, and with AUC values of 0.987–0.988.

CONCLUSIONS: MRE has a high technical success rate and excellent diagnostic accuracy for the staging of liver fibrosis in patients with chronic hepatitis B.