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Detecting liver fibrosis with Gd-EOB-DTPA-enhanced MRI: A confirmatory study

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Strong correlations between the grade of fibrosis and cirrhosis, classified using the Ishak scoring system, and the uptake characteristics of Gd-EOB-DTPA with the relative enhancement (RE) of the liver parenchyma have been reported. To confirm the results of a retrospective analysis, patients undergoing liver surgery were prospectively examined with Gd-EOB-DTPA-enhanced liver 3 Tesla MRI to determine the degree of liver fibrosis. Correlations between the grade of fibrosis and cirrhosis, classified using the Ishak scoring system, and RE were investigated and compared with those derived from an initial retrospective study. After validating the cut-off values in the retrospective study (Ishak $\geq$ 1, RE-cut-off 0.90; Ishak $\geq$ 2, RE-cut-off 0.79; Ishak $\geq$ 4, RE-cut-off 0.60; and Ishak = 6, RE-cut-off 0.47), we showed that Gd-EOB-DTPA has a high sensitivity ($\geq$86%) and a high positive predictive value ($\geq$86%). These results support the use of Gd-EOB-DTPA-enhanced liver MRI as a non-invasive method for determining the degree of liver fibrosis and cirrhosis.

Chronic liver disease and cirrhosis are leading causes of mortality in the Western hemisphere. The epidemic increase in obesity, nonalcoholic fatty liver disease and alcohol-induced liver cirrhosis contribute to this growing problem, as morbidity and mortality are directly correlated with the progression of hepatic fibrosis[1–5].

Information regarding the grade of liver fibrosis and cirrhosis is essential for determining the prognosis and clinical management of patients with a chronic liver disease or patients who undergo liver surgery[6,7].

Liver fibrosis and cirrhosis are currently considered to be dynamic processes that can be corrected with adequate treatment[8]. In clinical practice, obtaining a liver biopsy is the gold standard for monitoring the state of liver fibrosis and observing treatment response.

However, liver biopsies are an invasive procedure known to have poor patient compliance. Biopsies are also prone to both misinterpretation in cases of missing fibrotic septa or nodular configurations and to inter-observer variability[9,10]. The quality of the grading is directly correlated with the sampling size. Furthermore, liver fibrosis may cause heterogeneity of the liver tissue; therefore, sampling results or faulty sampling in liver biopsy may not be representative of the whole organ[10–12]. An image-based technique would be helpful, as it would allow not only a small section of the liver but also the entire organ to be examined.

Upper abdominal ultrasonography is a common tool for analysing liver stiffness with elastography[13]. However, ultrasound examinations are examiner-dependent and limited by a restricted field of view, and they are therefore not usually able to assess the entire liver.

Non-invasive assessment of liver fibrosis is an important area of study. Multiple techniques have been proposed, such as elastography. Specifically, area under the curve (AUC) analyses of MR elastography showed a diagnostic accuracy of 90.9–99.4%. The corresponding values for US-based vibration-controlled transient elastography have been reported to be 83.7–91.4%[14–16]. One disadvantage of these examinations is that liver stiffness is only an indirect sign of liver fibrosis; concomitant diseases, such as heart failure, also affect liver stiffness. Thus, elastography techniques are prone to mismeasurements. In addition to those limitations, some of the above-mentioned examinations require additional equipment, limiting the applicability and the routine use of these techniques in clinical practice.

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