Magnetic Resonance Elastography of Liver for Evaluation of Liver Fibrosis in Chronic Viral Hepatitis B and C in Asians: Experience From Two Tertiary Care Centres.

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Introduction

MR Elastography (MRE) is currently the most accurate non-invasive technique for detection and staging of liver fibrosis. The clinical experience in MRE of liver is increasing, however, optimal cut off values for detection and staging of liver fibrosis resulting from various etiologies are not established. Chronic viral hepatitis B (CHB) and C (CHC) are the most common causes of liver cirrhosis in Asia. Pathological differences between the two diseases are well known: CHB usually results in macronodular cirrhosis whereas CHC results in micronodular cirrhosis and the degree and extent of fibrosis is more in CHC as compared to CHB especially in cirrhotic stage. As MRE is increasingly used for clinical evaluation of liver fibrosis, it is of importance to determine the stiffness values and set cut-off values for predicting each fibrosis stages for the two diseases. We evaluated MRE derived stiffness values of livers in patients with CHB and CHC for any differences as well as determining optimal cut off values for predicting various stages of fibrosis with histopathological staging as reference standard.

Methods

The study population consisted of 202 patients with chronic liver disease from two institutions in Asia. CHB was present in 83 subjects and CHC in 119 subjects. All patients underwent MRE within 6 months of liver biopsy and received no treatment for fibrosis. MRE was performed on a 1.5T clinical scanner with breath hold MRE sequence at 60Hz (TR/TE: 50/22ms; slice thickness: 10 mm). Two to four slices were obtained through the largest cross section of the liver in each subject. Stiffness maps were automatically generated by the software at the workstation and displayed. Regions of interest were placed on the right lobe of the liver and copied on to the stiffness maps avoiding major vessels, liver edge and wave interference and any other artifacts seen on the magnitude and phase images. Mean values were used to see for significant differences. The fibrosis staging was performed with METAVIR scoring system (F0 through F4) by experienced pathologists. Wilcoxon test was carried to see if there were any differences between stiffness values at each stage. Receiver operator characteristic (ROC) analysis was also performed to determine accuracy of MRE in differentiating significant (F2−F4) from non-significant fibrosis (F0−F1) and cirrhosis (F4) from non-cirrhotic fibrosis (F0−F3).

Results

The median liver stiffness (kPa) of the for each fibrosis stage in CHB and CHC respectively were as follows; F0, 2.7 and 2.1 ($p = 0.1115$); F1, 2.8 and 2.4 ($p = 0.2046$); F2, 3.4 and 2.9 ($p = 0.0136$); F3, 4.0 and 4.0 ($p = 0.5468$); F4, 6.2 and 6.2 ($p = 0.7189$). There was only significant difference at F2 level. The cut off value, sensitivity, specificity and area under ROC curves (AUC) for significant liver fibrosis was 3.2 kPa, 0.93, 1.00, 0.98 and 3.1 kPa, 0.83, 0.83, 0.90 for CHB and CHC respectively. The AUCs were 0.98 and 0.95 and cut-off values of 4.4 and 4.3 kPa for CHB and CHC for distinguishing cirrhosis from non-cirrhotic fibrosis. These cut off stiffness values were not significantly different between CHB and CHC.

Conclusion

There were no significant differences in mean liver stiffness values between CHB and CHC especially in severe or cirrhotic livers. The cut-off values for diagnosing significant fibrosis or cirrhosis also were not significantly different between the two groups. Our study results show that there are no significant differences in liver stiffness values measured with MRE between CHB and CHC at different stages. More studies with larger populations are needed to validate our experience.