Characterization of focal hepatic lesions on diffusion-weighted MR imaging: Comparison between single-shot echo-planar imaging and single shot fast spine echo sequence.

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PURPOSE: To compare single-shot echo-planar imaging (EPI) and single-shot fast spin-echo (SSFSE) sequences in the characterization of focal hepatic lesions on diffusion-weighted MR imaging.

METHOD AND MATERIALS: Diffusion-weighted EPI and SSFSE were performed in 33 patients with 44 hepatic lesions (7 cysts, 7 hemangiomas, 17 hepatocellular carcinomas [HCCs] and 13 metastases). The apparent diffusion coefficients (ADCs) of all lesions were calculated. Two radiologists evaluated the degree of distortion on these lesions due to artifacts.

RESULTS: The ADCs with diffusion-weighted EPI and SSFSE were 3.73, 2.95×10^{-3}/mm^{2}sec in cysts, 2.36, 2.36×10^{-3}/mm^{2}sec in hemangiomas, 1.25, 1.24×10^{-3}/mm^{2}sec in HCCs, 1.35, 1.85×10^{-3}/mm^{2}sec in metastases. On diffusion-weighted EPI, the ADCs of malignant tumors, hemangiomas, and cysts were significantly different (P<0.01; tukey). On diffusion-weighted SSFSE, significant differences existed among the ADCs (P<0.01 for cysts versus HCCs, P<0.01 for cysts versus metastases, P<0.01 for hemangiomas versus HCCs and P<0.05 for HCCs versus metastases; Tukey). The degree of distortion in peripheral lesions was higher on diffusion-weighted EPI than on diffusion-weighed SSFSE.

CONCLUSION: The combination of diffusion-weighted EPI and SSFSE is useful in the characterization of focal hepatic lesions. Diffusion-weighted SSFSE imaging has an advantage of few susceptibility artifacts compared with diffusion-weighted EPI in peripheral lesions of the liver.

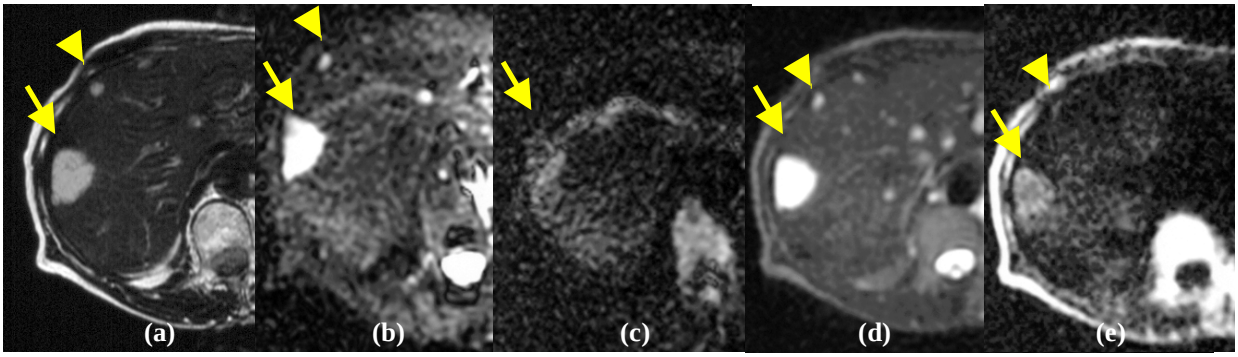

Figure 1. Liver hemangiomas in a 41-year woman. (a) T2-weighted fast spin-echo MR image shows two lesions (arrow and arrowhead) with markedly high signal intensity in the liver. (b) Echo-planar image (∞/90) with a low MPG (b=4 sec/mm^2) shows very hyperintense lesions (arrow and arrowhead). (c) Echo-planar image (∞/90) with a high MPG (b=1000 sec/mm^2) shows that the signal intensity of the lesion in the right lobe of the liver is markdly decreased (arrow). The lesion in the left lobe of the liver has complete disappeared. (d) SSFSE image (∞/92) with a low MPG (b=4 sec/mm^2) shows very hyperintense lesions (arrow and arrowhead). (e) SSFSE image (∞/92) with a high MPG (b=1000 sec/mm^2) shows that the signal intensity of the lesion in the right lobe of the liver is moderate decreased (arrow). The lesion in the left lobe of the liver has not disappeared. In peripheral region of livers, the degree of spatial distortion for these lesions was higher EPI than with SSFSE on diffusion-weighed imaging in the same b value.

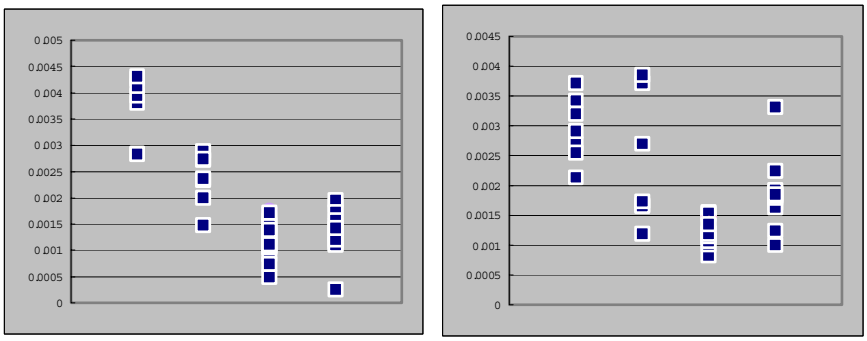

Figure 2. Scatter plots of ADC values of (A) cysts, (B) hemangiomas, (C) hepatocellular carcinomas, and (D) metastatic tumors on diffusion-weighed EPI and SSFSE. All malignat tumors show ADC of lower than 2.0×10^{-3}mm^2/sec on diffusion-weighted EPI. Use of a threshold ADC of 2.0×10^{-3}mm^2/sec would result in a 100% sensitivity and a 92.9% specificity for differentiation of malignant solid tumors from benign nonsolid lesions. All hepatocellular carcinomas shows ADC of lower than 1.6×10^{-3}mm^2/sec on diffusion-weighted SSFSE. Use of a threshold ADC value of 1.6×10^{-3}mm^2/sec would result in a 100% sensitivity and a 88.9% specificity for differentiation of hepatocellular carcinomas from the other hepatic lesions.