Hepatobiliary Phase of Gadoxetic Acid-enhanced MRI in the Diagnosis of Hepatocellular Carcinoma in Patients with Impaired Liver Function

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Background: Gadoxetic acid accumulates in functioning hepatocytes during the hepatobiliary (HB) phase. Therefore, gadoxetic acid-enhanced MRI including HB phase improves detection of hepatocellular carcinoma (HCC). However, since the degree of liver enhancement in HB phase is known to be lower in patients with chronic liver dysfunction, diagnostic value of HB phase imaging of gadoxetic acid-enhanced MRI in the diagnosis of HCC might be expected to be lower in patients with impaired liver function.

Purpose: To evaluate the value of HB phase of gadoxetic acid-enhanced MRI in the diagnosis of HCC in patients with impaired liver function.

Methods and Materials: Fifty-eight patients with 75 HCCs underwent gadoxetic acid-enhanced MR examination. Thirty-eight patients (Group 1) had normal liver function, and the other 20 patients (Group 2) had impaired liver function. Two radiologists reviewed two sets of MR images of two groups: set 1, unenhanced and gadoxetic acid-enhanced dynamic images; set 2, additional HB phase and unenhanced and gadoxetic acid-enhanced dynamic images. Diagnostic accuracy for HCC was compared by using the area under the ROC curve (Az). Lesion-to-liver contrast-to-noise ratio (CNR) in equilibrium phase (5-minute delayed) and HB phase were calculated and compared using t-test.

Results: Az value increased with the addition of HB phase in both group 1 (0.962 to 0.998, p = 0.365) and group 2 (0.875 to 0.929, p = 0.202), but did not reach statistical significance. CNR on HB phase (-126.8 ± 66.1) was significantly lower than that of equilibrium phase (-87.4 ± 51.4, p < 0.001) regardless of patients’ liver function. However, CNR drop on HB phase of group 2 with impaired liver function (26.3 ± 22.0) was significantly lesser than that of group 1 with normal liver function (39.6 ± 27.5, p = 0.026).

Fig A-B. MR images of HCC in segment VI in 61-year-old man with normal liver function. At equilibrium phase (A) and hepatobiliary phase (B), CNR of HCC was -106.4 and -198.6 (CNR drop, 92.2), respectively.

Fig C-D. MR images of HCC in segment VIII in 60-year-old man with B-viral liver cirrhosis (Child-Pugh score 8). At equilibrium phase (C) and hepatobiliary phase (D), CNR of HCC was -46.6 and -70.7 (CNR drop, 24.1), respectively. CNR drop of patients with normal liver function was higher than that of patients with impaired liver function.

Conclusion: Hepatobiliary phase of gadoxetic acid-enhanced MR imaging may improve diagnosis of HCC even in patients with impaired liver function.