Small Hepatocellular Lesions in Cirrhosis: Differences in Contrast Enhancement Effects between Helical CT and MRI during Multiphasic Dynamic Imaging

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Purpose: Multiphasic contrast-enhanced helical CT and MR imaging have been widely used as accurate screening modalities for patients with cirrhosis and suspected hepatocellular carcinomas (HCCs). Arterial-phase contrast-enhanced MR imaging is especially important for the detection of hypervascular HCC. However, we have sometimes encountered small HCCs without "washout" effects on the late-phase MR imaging compared with late-phase CT, resulting in unsuccessful detection of HCCs on this phase of MR imaging. This fact may lead to overlooking hypovascular HCCs without early enhancement at multiphasic contrast-enhanced dynamic MR imaging. The purpose of this study was to evaluate the differences in contrast enhancement effects of small hepatocellular lesions in cirrhotic patients between helical CT and MR imaging during multiphasic contrast-enhanced dynamic imaging, and to determine the diagnostic value of MR imaging especially in assessing hypovascular hepatocellular lesions detected as low attenuated nodules at late-phase CT.

Materials and Methods: This study included 70 small hepatocellular lesions (HCC, dysplastic nodules) less than 3cm in diameter in 45 patients with chronic hepatitis or cirrhosis who underwent multiphasic (arterial, portal and late phase) contrast-enhanced dynamic helical CT and MR imaging. Contrast enhancement patterns of the lesion in the arterial phase and the late phase were evaluated by two radiologist experienced in liver MR imaging, and categorized as 5 grades (1=hypo, 2=slightly hypo, 3=iso, 4=slightly hyper, 5=hyper), compared with surrounding liver parenchyma.

Result: Forty-four (63%) of 70 lesions showed grade 4 or 5 enhancement on the arterial-phase CT, indicating hypervascular lesions. All of these lesions also showed hypervascularity on the arterial-phase MRI. Among these, 32 (73%) of 44 lesions showed grade 1 (n=12) or 2 (n=20) enhancement on the late-phase CT while 22 (50%) lesions showed grade 1 (n=10) or 2 (n=12) enhancement on the late-phase MRI, indicating less washout effects for hypervascular lesions on the late-phase MRI. Remaining 26 (37%) of 70 lesions showed grade 1,2,or 3 enhancement on the arterial-phase CT, indicating hypovascular lesions. Twenty-five (96%) of these 26 lesions showed grade 1 (n=12) or 2 (n=13) enhancement on the late-phase CT while 12 (46%) lesions showed grade 1 (n=3) or 2 (n=9) enhancement on the late-phase MRI. Grading scores of lesion enhancement on the late-phase images were significantly ($p<.001$) lower at CT than those at MRI (1.6 versus 2.4), indicating better washout effects for hypovascular lesions at late-phase CT. Although 13 hypovascular lesions were not detected (grade 3) on the arterial and late-phase MRI, 11 of these 13 lesions were visible on T1- or T2-weighted images.

Conclusion: Washout effects for small hepatocellular lesions at late-phase MRI was inferior to those at late-phase CT. Especially, hypovascular lesions demonstrated as low attenuated nodules at late-phase CT were often not seen at late-phase MRI, requiring careful evaluation of other sequences including precontrast T1 and T2-weighted MR images.

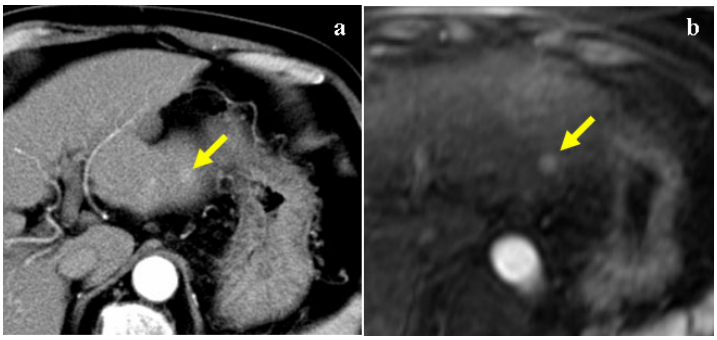

Fig.1 (a) Arterial-phase CT shows faint early enhancement of HCC (arrow). (b) Arterial-phase MR shows definitive early enhancement (arrow) compared with CT.

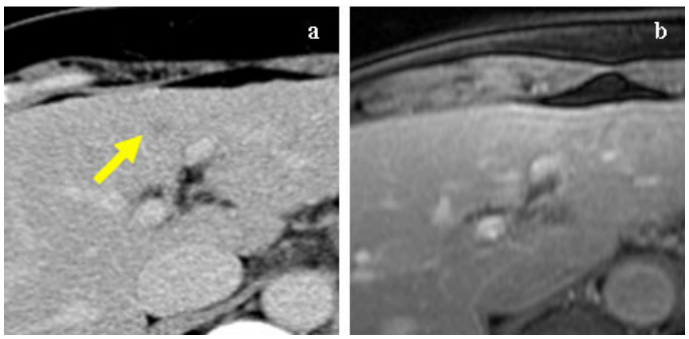

Fig.2 (a) Late-phase CT shows low attenuated hepatic lesion (arrow). (b) On the late-phase MR, the lesion is not demonstrated because of poor washout effects.