The role of gadoxetic acid-enhanced MR imaging in characterizing atypical hepatocellular carcinoma in dynamic CT studies

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Purpose
The most recent recommendations by the American Association for the Study of Liver Diseases (AASLD) state that a diagnosis of HCC can be made if a mass larger than 1 cm shows typical features of HCC (hypervascularity in the arterial phase and washout in the venous/delayed phase) on CT or MR study. However, some HCCs, such as well-differentiated HCCs may present atypical features in dynamic studies. These atypical HCCs are diagnostically challenging in our daily practice.

Gadoxetic acid (Gd-EOB-DTPA) is a liver-specific MR imaging contrast medium with combined perfusion/hepaticocyte-selective properties and has been demonstrated to increase the detection of focal liver lesions and to provide differential diagnostic information. To the best of our knowledge, the efficacy of gadoxetic acid in characterizing atypical HCCs has yet to be properly elucidated. The purpose of this study was to evaluate the efficacy of GD-EOB-DTPA-enhanced hepatocyte-phase imaging in characterizing HCCs with atypical enhancing pattern in CT dynamic studies.

Materials and Methods
This study was approved by the institutional review board of our hospital. The inclusion criteria for atypical HCC enhancing tumors were: a) tumor size ≥1.0 cm; b) tumors showed atypical enhancing HCC pattern in dynamic studies; c) only the largest three tumors were enrolled for study with multiple nodules. 71 patients with 112 nodules were enrolled in this study. Clinical characteristics of the 71 patients are shown in Table 1. The evaluation of the 112 nodules with standard of reference revealed 33 DNs and 79 HCCs. All imaging results were independently analyzed using visual assessment by the two radiologists who were blinded to the clinical information and final diagnosis. Enhancing patterns in dynamic CT studies, tumor size, signal intensity on precontrast T1WI/T2WI, enhancement patterns among MR dynamic studies, and signal intensity on hepatocyte-phase imaging were determined.

Results
Excellent agreement of inter-observer agreement between the two reviewers was noted (Table 2). As shown in Table 3, tumor size, T2W hyperintensity, T1W hypointensity, atypical enhancing pattern in MR dynamic study and hypointensity on hepatocyte-phase image showed a significant difference between atypical HCCs and dysplastic nodules. The diagnostic performances of the MR characteristics were demonstrate in Table 4. Only one nodule showed a typical HCC enhancing profile in dynamic MR studies but hyperintensity in hepatocyte-phase imaging. The relationship between HCC histological grading and MR characteristics was shown in Table 5. Only 13 atypical enhancing HCCs in dynamic CT studies also showed atypical features in gadoxetic acid-enhanced hepatocyte-phase imaging.

Conclusion
Additional information for differential diagnosis and higher diagnostic performance were achieved using gadoxetic acid-enhanced hepatocyte-phase T1WI to characterize atypical HCCs from DNs. Use of a gadoxetic acid-enhanced MR study with hepatocyte-phase imaging instead of conventional gadolinium-enhanced MR study for high HCC risk patients with focal liver lesion showing atypical enhancing profile in a dynamic CT study is recommended.