

Gadoxetic Acid-Enhanced Magnetic Resonance Imaging for Evaluation of Borderline Hepatocellular Nodules in Cirrhotic Livers

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Objectives: To determine the pathologic nature of hypointense hepatocellular nodules in cirrhotic liver on hepatobiliary phase imaging (HBPI) of gadoxetic acid (Gd-EOB-DTPA, Primovist®)-enhanced magnetic resonance imaging (MRI) and to describe the chronological changes of their imaging features on follow-up MRI.

Materials and Methods: Thirty-nine cirrhotic patients with 62 nodules showing iso- or hypovascularity on dynamic phases and hypointensity on hepatobiliary phase images (HBPI) (≥ 1 cm in diameter) of gadoxetic acid-enhanced MRI, were enrolled in this study. During the follow-up period (≥ 12 months after the initial MRI), 28 nodules were histopathologically confirmed (group 1) and 40 nodules were repeatedly followed up on gadoxetic acid-enhanced MR examinations (group 2). Six nodules belonged to both groups. Two, clinically experienced radiologists reviewed in consensus the initial and follow-up MR images regarding interval size changes of the nodules and their signal intensities (SI) on unenhanced T1- and T2-weighted images, dynamic phase images, and HBPI. Two, liver pathologists reviewed the pathology slides of the 28 nodules, including the H&E staining and four kinds of immunochemical staining examinations including heat-shock protein 70, glypican-3, CD-34, and glycoprotein.

Results: In the group 1 patients with histopathologic confirmation ($n = 28$), 24 (85.7%) nodules were histopathologically confirmed as hepatocellular carcinomas (HCC) and four (14.3%) as high-grade dysplastic nodules (HGDN). In addition, in group 2 ($n = 40$) with the follow-up MR examinations, 31 (77.5%) nodules showed interval changes in at least one of the following three imaging features after 11.0 ± 3.7 months: increase of diameter by ≥ 3 mm ($n = 23$, 57.5%); arterialization ($n = 12$, 30.0%); and increase of T2 SI ($n = 15$, 37.5%). Sixteen (40.0%) nodules showed a change in only one feature, 11 (27.5%) showed change in two features, and four (10.0%) showed change in all three features.

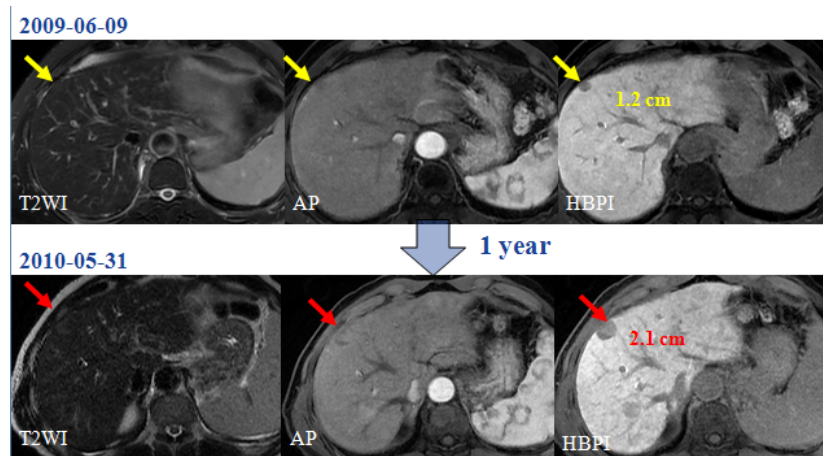


FIGURE 3. Gadoxetic acid-enhanced MR images of a hepatocellular nodule in a 61-year-old man with hepatitis B-related Child-Pugh class A liver cirrhosis. A-C: Initial MRI with administration of gadoxetic acid. The nodule (arrow) shows hypointensity on arterial phase image and on hepatobiliary phase image. D-F: Gadoxetic acid-enhanced MR images obtained 11.9 months after initial scan. The lesion (arrow) shows arterial enhancement, increased SI on T2WI and interval growth from 12.0 mm to 20.6 mm. Final pathology diagnosis after resection was grade I HCC.

Conclusion: Our study results demonstrate that a significant proportion of hypovascular and hypointense nodules (≥ 1 cm in diameter) seen on HBPI of gadoxetic acid-enhanced MRI in patients with liver cirrhosis, showed either malignant features on pathology (85.7%) or imaging features suggesting malignant changes (77.5%). Therefore, these are clinically significant lesions which must be closely followed or which require local ablation treatment.