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Comparison of HBA and ECCM in HCC Diagnosis

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Hepatocellular carcinoma (HCC) is a unique malignancy that can be diagnosed noninvasively when it demonstrates classical imaging features in high-risk patients without the need for pathologic confirmation. HCC diagnostic criteria are originally derived from vascular profiles based on dynamic CT or MRI using extracellular contrast agent (ECA). Now, with widespread use of Gd-EOB-DTPA, imaging features on Gd-EOB-DTPA-MRI have been adopted by many organizations, including the Liver Reporting and Data System (LI-RADS), the American Association for the Study of Liver Disease (AASLD) and the European Association for the Study of the Liver (EASL).

There is a concern that although gadoxetic acid could contribute to increased sensitivity, this could be at a cost of losing specificity as non-HCC hypervascular hepatic tumors might be misclassified as HCC when using hypointensity on HBP or transitional phase (TP). Thus, according to LI-RADS and revised EASL guideline, when Gd-EOB-DTPA is used, "washout" refers to the portal venous phase prior to TP. In addition, gadoxetic acid is formulated in half the volume (0.1 mL/kg) containing a quarter of the concentration of gadolinium, it is difficult to catch the arterial bolus during the optimum late arterial phase for HCC detection. Further, motion artifacts that appear during the arterial phase of Gd-EOB-DTPA-MRI are problematic because arterial hyperenhancement is the most important factor for HCC diagnosis.

Based on our recent intraindividual comparison between ECA-MRI and Gd-EOB-DTPA-MRI, ECA-MRI showed better sensitivity and accuracy than Gd-EOB-DTPA-MRI for the diagnosis of HCC with LI-RADS LR-5. In addition, we achieved better diagnostic sensitivity and accuracy while achieving 100% specificity when applying a modified TP washout on Gd-EOB-DTPA-MRI and an illusional washout (isointensity with enhancing capsule) on ECA-MRI than we did with conventional criteria. Given diffusion restriction without targetoid appearance strongly indicates HCC in risk patients, we can apply diffusion restriction as an alternative to HBP hypointensity in ECA-MRI. Based on our recent work, modified criteria of ECA-MRI that uses diffusion restriction showed better sensitivity and accuracy than modified criteria of HBA-MRI applying hypointensity on TP or HBP, without significantly compromising the specificity compared with conventional EASL criteria of ECA- or HBA-MRI. The 2017 version of LI-RADS redefined the LR-M category for observations that reflect probable or definite malignancy but that are not specific to HCC. Targetoid appearance mostly presents as intrahepatic cholangiocarcinoma but may also be associated with combined hepatocellular-cholangiocarcinoma or atypical HCCs, which usually require additional confirmative diagnosis. If all targetoid lesions are allocated into the LR-M category regardless of whether or not other major features suggesting HCC exist, we might have to perform biopsy even in patients for whom it may be avoided. . Given the fact that enhancing capsule has a high specificity for HCC in high-risk patients, modified LI-RADS criterion prioritizing major features (enhancing capsule) over targetoid features could show superior sensitivity in HCC imaging diagnosis compared with conventional LI-RADS, while specificity was maintained.

Therefore, if institutional policy is to minimize the false-positive diagnosis of HCC by applying stringent HCC criteria, ECA-MRI is recommendable. In addition, we could achieve higher sensitivity without compromising specificity by applying illusional washout or non-targetoid diffusion restriction and modified LI-RADS criterion prioritizing major features (enhancing capsule) over targetoid features for diagnosing HCC classified LR-M.