Solid hypervascular liver lesions: accurate identification of true benign lesions on delayed hepatobiliary phase MR imaging after gadobenate dimeglumine

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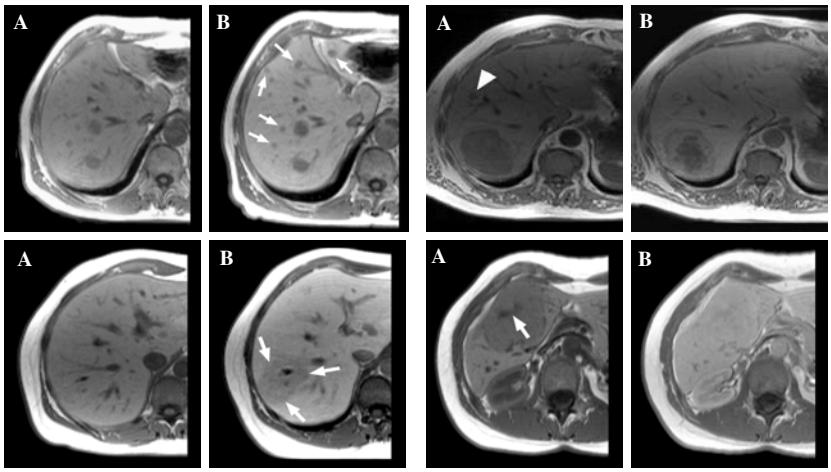
Purpose: To determine the value of hepatobiliary phase MR imaging after gadobenate dimeglumine (MultiHance, Gd-BOPTA; Bracco) for accurate differentiation of true benign hypervascular liver lesions from malignant or high risk liver lesions.

Methods: Retrospective assessment was performed of 454 patients with 790 lesions (268 focal nodular hyperplasia [FNH], 30 nodular regenerative hyperplasia [NRH], 118 hepatic adenoma/liver adenomatosis [HA/LA], 217 hepatocellular carcinomas [HCC], 11 fibrolamellar-HCC [FL-HCC], 26 peripheral cholangiocarcinomas [PCC], 17 capillary hemangiomas [CH], 100 hyper- or hypovascular metastases and 3 lymphomas) who underwent enhanced MR imaging with 0.05 mmol/kg gadobenate dimeglumine. Histological confirmation was available for all lesions except most FNH whose diagnosis was based on characteristic enhancement and two-year follow-up. Pre- and post-contrast T1-weighted images acquired during the dynamic (arterial, portal-venous, equilibrium) and delayed hepatobiliary (1-3h) phases were evaluated for lesion enhancement (hypo-, iso-, hyperintensity). Lesion enhancement was compared with histology findings and values for sensitivity, specificity, accuracy, PPV and NPV were determined.

Results: Typical lesion enhancement patterns were obtained on post-contrast dynamic MR imaging after bolus administration of gadobenate dimeglumine at a dose of 0.05 mmol/kg bodyweight. Thus, FNH, adenoma and most hypervascular HCC showed marked enhancement during the arterial phase which diminished during subsequent dynamic phases. On hepatobiliary phase imaging 96.6% of FNH, 100% of NRH, 5.6% of HA/LA, 21.8% of HCC and 2.7% of metastases appeared hyper- or isointense, whereas 3.4% of FNH, 94.4% of HA/LA, 78.2% of HCC, 100% of FL-HCC, 100% of PCC, 100% of CH and 97.2% of metastases appeared hypointense. Assuming delayed phase lesion iso/hyperintensity as indicating true lesion benignity (FNH/NRH) values for sensitivity, specificity, accuracy, PPV and NPV of 97.0%, 88.5%, 91.7%, 83.7% and 98.0%, respectively, were obtained for the identification of true benign lesions.



Clockwise from top left: multifocal HCC, metastasis from primary colorectal carcinoma, typical FNH, hepatic adenoma. T1-weighted images acquired pre-contrast (A) and during the delayed (1-3h) hepatobiliary phase after administration of 0.05 mmol/kg gadobenate dimeglumine (B). Note that whereas the HCC, metastasis and adenoma appear hypointense to the normal liver parenchyma on the hepatobiliary phase image, the FNH appears isontense with a central hypointense scar. Lesion hypointensity on delayed T1-weighted images reflects the lack of Gd-BOPTA uptake by the lesion relative to that occurring in normal functioning hepatocytes. Lesion iso- or hyperintensity on delayed T1-weighted images reflects uptake of Gd-BOPTA similar to that occurring in normal hepatocytes.

Conclusion: Hepatobiliary phase imaging after 0.05 mmol/kg gadobenate dimeglumine is highly accurate for distinguishing true benign focal liver lesions (FNH and NRH) from malignant lesions (HCC, FL-HCC, PCC, metastases) and lesions considered high risk (adenoma and adenomatosis). Lesion biopsy should be considered for all lesions appearing hypointense on delayed phase imaging after gadobenate dimeglumine.