Evaluation of the accuracy of MultiHance™-enhanced MRI in the characterization of focal liver lesions


INTRODUCTION: An imaging procedure should be able not only to detect but also to at least distinguish between benign and malignant lesions. In recent years, the importance of this dual imaging goal has been highlighted by the recognition of an unexpectedly high prevalence of benign liver tumors in the adult population, in the vast majority of cases small cavernous hemangiomas and cysts, that do not require intervention (1). Several studies have consistently reported that the bolus administration of extracellular fluid agents coupled with dynamic imaging permits a better assessment of lesion hemodynamics, thus providing clues that are independent of and additive to those obtained by unenhanced MRI (2-4).

Gadobenate dimeglumine (MultiHance™, Gd-BOPTA) is a newly developed contrast agent recently marketed in Europe for liver imaging. It couples specific long-lasting enhancement of MR signal intensity in the liver parenchyma with plasma kinetics typical of non-specific extracellular fluid agents (5). Preliminary studies have shown that delayed (40-120 min post-dose), liver-specific imaging with 0.05 and 0.1 mmol/kg Gd-BOPTA significantly improves the detection of liver lesions in patients with known or suspected liver cancer (6).

The present study was conducted to assess the diagnostic accuracy of unenhanced and MultiHance™-enhanced MR imaging (both dynamic and delayed) in terms of lesion detection and characterization.

PATIENTS AND METHODS: The study was performed in 86 patients. A total of 149 lesions were detected of which 107 were assessed histologically. Identified lesions comprised hepatocellular carcinomas (n=38, of which 21 were present in cirrhotic livers), cholangiocellular carcinomas (n=11), metastases (n=42, of which 37 were of colo-rectal, 2 from breast cancer, 1 from gastric cancer and 2 of unknown primary origin), non Hodgkin lymphoma (n=1), malignant fibrous histiocytoma (n=1), hemangiomas (n=10), focal nodular hyperplasia (n=1) hepatocellular adenoma (n=1), benign hemangioendothelioma (n=1) and one malignant lesion of unclear histology. Histopathologic specimens were obtained by tumor resection in 41 patients and by ultrasonound-guided biopsy in 45 patients. MR images (T1- and T2-W SE and T1-W GRE) were acquired in the axial plane before and at 60-120 min after bolus (>1mL/s) intravenous administration of 0.05 mmol/kg MultiHance™. Dynamic imaging was performed using GRE sequences (TR: 45-150 ms, TE: 4-12 ms, flip angle: 45-75°, 1-2 NEX, matrix: 128-256 x 256) during the hepatic arterial phase (30-45 s following start of dosing), the portal venous phase (70-90 s), the equilibrium phase (2-4 min) and the delayed phase (>1mL/s) intravenous administration of 0.05 mmol/kg Gd-BOPTA significantly improves the detection of liver lesions in patients with known or suspected liver cancer (6).

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delayed scans. The blinded readers had to draw all lesions detected on liver maps and to define their nature (malignant/benign) and histotype. The primary efficacy end-point was the MR accuracy for lesion characterization (specific lesion histotype), calculated on the basis of histology findings. The sign test (exact equivalent of McNemar’s test) was used to test for a change from pre- to post-contrast images in agreement with histology. The secondary end-point was the sensitivity for the detection of individual lesions in the examined slices.

RESULTS: MultiHance™ increased the MR accuracy for lesion characterization (histotype diagnosis; table 1).

In terms of lesion detection, the sensitivity increased from 78.8% pre-contrast to 85.5% when dynamic images were added and up to 91.2% when all sequences including delayed imaging were considered.

Whereas an improved sensitivity for lesion detection was obtained adding delayed images to pre-contrast and dynamic image sets, delayed imaging did not add significant information in terms of lesion characterization. Dynamic scans, on the other hand, provided a statistically significant increase in the MR accuracy for lesion characterization.

CONCLUSION: MultiHance™ is a novel MR contrast agent with a dual role in liver imaging. The intravenous bolus administration of 0.05 mmol/kg MultiHance™ coupled with dynamic imaging improves the MR characterization of focal liver disease, while delayed (1-2 h) imaging may improve liver lesion detectability.

REFERENCES: