Improved detection of hypervascularized liver lesions using dynamic contrast-enhanced T1w-3D-fs-GRE with multiple arterial subphases

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Target audience: Clinical radiologists

Purpose: Dynamic contrast-enhanced T1w-3D-fs-GRE with multi-arterial volumetric interpolated breath-hold examination (multi-arterial VIBE) allows for the acquistion of five arterial subphases during a single breath-hold. The aim of this study was to assess the diagnostic performance of multi-arterial VIBE at the detection of focal liver lesions.

Methods: Patients (n=25, 13 female, 12 male, median age 62 years) with known focal liver lesions were consecutively included in this prospective study. The examination was performed with the hepatobiliary-specific contrast agent Gd-EOB-DTPA (Primovist, Bayer HealthCare, Leverkusen, Germany) and an 18-channel body array at a 3 Tesla MRI suite (Magnetom Skyra, Siemens Healthcare, Erlangen, Germany). Five dynamic arterial phases with a temporal resolution of 2.6 s were acquired using a T1w-3D-fs-GRE sequence. The fourth of the five arterial subphases was considered the equivalent of a standard hepatic arterial phase. Two independent readers judged the diagnostic value of the five dynamic arterial phases at the detection of focal liver lesions comparing them to the standard hepatic arterial phase. The complete examination protocol, including a single shot turbo-spin echo sequence (T2 HASTE), a portal venous, a delayed and a hepatobiliary phase, served as gold standard for lesion detection.

Results: Patients with hepatic metastases (n=15), HCC (n=5), FNH (n=2), hemangioma, CCC, and biliary cystadenocarcinoma (each n=1) were examined. In 83 %, one of the five dynamic hepatic arterial phases was considered to have a better arterial parenchyma contrast than the standard hepatic arterial phase. While 38 % of all lesions were detected in the standard hepatic arterial phase, 71 % were detected in the best phase of the multi-arterial VIBE. Multi-arterial VIBE demonstrated a superior detection of hypervascularized lesions (29 % of all cases: FNH and hypervascular metastases) with a lesion detection rate of 100 %.

Discussion: Compared to the standard hepatic arterial phase, multi-arterial VIBE demonstrated greater diagnostic accuracy at the detection of hypervascularized focal liver lesions.

Conclusions: Acquisition of multiple arterial subphases adds dynamic information on arterial vasculature and therefore may be helpful for the differential diagnosis of focal liver lesions.