SPIO-enhanced FLAIR Echo-planar Imaging in the Depiction of Hepatic Malignant Tumors: Comparison with T2-weighted Fast Spin-echo and T2*-weighted Fast Field-echo Imaging

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The suppression of signals from vessels and simple cysts can make identification of hepatic malignant tumors easier on superparamagnetic iron oxide (SPIO)-enhanced MRI. The purpose of this study was to compare accuracy of SPIO-enhanced fluid-attenuated inversion-recovery (FLAIR) echo-planar imaging with that of T2*-weighted fast field-echo (FFE) and T2-weighted fast spin-echo (FSE) imaging in the evaluation of hepatic malignant tumors.

Methods and Materials:

SPIO-enhanced MRI was performed using a 3-T system in 50 consecutive patients who were referred for evaluation of known or suspected hepatic tumors. Twenty-one patients were subsequently unsuitable for surgery because of disease extent or physical status. These patients were not included in this study. The final study group comprised 29 patients (15 men, 14 women; mean age, 70 years; age range, 42-85 years) who underwent surgical exploration with intraoperative ultrasonography. Of these 29 patients, 26 patients had focal hepatic lesions consisting of 44 cysts (mean size, 14.6 mm; range, 4-119 mm), 6 hemangiomas, 11 hepatocellular carcinomas (HCC), and 29 metastatic tumors. Before SPIO administration, T1-weighted FFE and T2-weighted FSE imaging were performed. After SPIO administration, FLAIR echo-planar, T2*-weighted FFE, and T2-weighted FSE MR examinations were performed. The unenhanced T1-weighted FFE and T2-weighted FSE images were reviewed with each SPIO-enhanced images to aid in lesion characterization.

Results:

FLAIR echo-planar, T2*-weighted FFE, and T2-weighted FSE sets visualized 9 of 11 HCCs (81.8 %). FLAIR echo-planar, T2*-weighted FFE, and T2-weighted FSE sets visualized 23 (79.3 %), 20 (69 %), and 21 (72.4 %) of 29 metastatic tumors, respectively. Hepatic cysts were visualized by FLAIR echo-planar, T2*-weighted FFE, and T2-weighted FSE sets in one (2.3 %), 8 (18.2 %), and 44 (100 %) of 44 lesions, respectively. Hemangiomas were visualized by FLAIR echo-planar, T2*-weighted FFE, and T2-weighted FSE sets in 6 (100 %), 4 (66.7 %), and 6 (100 %) of 6 lesions, respectively. FLAIR echo-planar, T2*-weighted FFE, and T2-weighted FSE sets also visualized 3 (27.3 %), 3 (27.3 %), and 5 (45.5 %) of 11 abnormal intense areas suspected of pseudolesions, respectively. The Az values of the composite ROC curves for hepatic malignant tumors of FLAIR echo-planar, T2*-weighted FFE, and T2-weighted FSE sets were 0.89, 0.85, 0.85, respectively. The accuracy for hepatic malignant tumors of FLAIR echo-planar, T2*-weighted FFE, and T2-weighted FSE sets were 91.1 %, 87.1 %, and 86.1 %, respectively (Table 1).

Conclusion:

SPIO-enhanced FLAIR echo-planar sequence is useful in the detection of hepatic malignant tumors because signals from vascular structures and simple cysts can be reduced.

Table 1. Sensitivity, specificity, accuracy, and Az value for hepatic malignant tumor of FLAIR EP, T2* FFE, and T2 FSE imaging

	Sensitivity	Specificity	Accuracy	Az
FLAIR EP	0.78 (31/40)	1.00 (61/61)	0.91 (92/101)	0.89
T2* FFE	0.70 (28/40)	0.98 (60/61)	0.87 (88/101)	0.85
T2 FSE	0.70 (28/40)	0.97 (59/61)	0.86 (87/101)	0.85