Intra-Individual Comparison Study of Gadolinium-and Resovist-Enhanced MR imaging for Detection and Characterization of Focal Liver Lesions

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Introduction

The results are controversial when compare the efficacy of gadolinium-enhanced MR imaging and superparamaganetic iron oxide (SPIO)-enhanced MR imaging for detection and characterization of focal liver lesions. This difference may be attributed to different kind of focal hepatic lesions and tumor size differences in those studies. We undertook this study to compare gadolinium-and resovist-enhanced MR imaging for detection and characterization of focal liver lesions in the same patient.

Methods

From November 2003 to July 2004, sixty-three patients (50 men and 13 women, aged 22~70years, mean 46 years) with focal hepatic lesions confirmed by ultrasound and CT have been examined at 1.5T GE MR system. The unenhanced MR images included FSE T2WI with fat saturation, a breath-hold T1WI (2D FSPGR) and out of phase sequence. For gadolinium-enhanced MR imaging, multiphase dynamic 3D FSPGR with fat-suppressed was obtained during suspended respiration (56 slices within 21sec, Gd-DTPA 0.2ml/kg, power injector 1.5~3.0ml/sec, scan delay time 18~25sec, axial and coronal scanning performed, and scan interval 5~10sec). 3D or 2D FSPGR with fat saturation was used in delayed scanning (6~10 minutes postinjection). The same patient underwent resovist-enhanced MR imaging 1 to 3 days later. The sequence protocol included FSE T2WI with fat saturation, a breath-hold T1WI (2D FSPGR), dynamic post-resovist 2D FSPGR (Resovist 1.4ml, bolus) and FSE T2WI with fat saturation (10 minutes postinjection). The gadolinium image set (unenhanced and gadolinium-enhanced MR images) and the resovist image set (unenhanced and resovist-enhanced MR images) were interpreted prospectively in a blinded fashion.

Results and Discussion

The gadolinium image set detected 159 focal liver lesions and the lesions included 85 HCCs and 11 DNs in 36 patients, 4 cholangiocarcinomas in 1 patient, 22 metastasis in 5 patients, 5 inflammatory lesions in 5 patients, 30 FNHs in 14 patients, 1 focal fatty liver in 1 patient and 1 hemangiomyolipoma in 1 patient. The resovist image set depicted 195 focal hepatic lesions and the lesions included 94 HCCs and 34 DNs in 36 patients, 4 cholangiocarcinoma in 1 patient, 26 metastasis in 5 patients, 5 inflammatory lesions in 5 patients, 30 FNHs in 14 patients, 1 focal fatty liver in 1patient and 1 hemagiomyolipoma in 1 patient.

The detection rate of the rsovist image set for solitary hepatic lesion was the same with that of the gadolinium image set. For multiple HCC, DNs and metastasis, the rsovist image set detected more lesions than that of the gadolinium image set ($P < 0.01$). The resovist image set diagnosed 32 DNs and 29 FNHs correctly. Hypervascular FNHs (9 FNHs in 9 patients) were diagnosed correctly with the gadolinium image set. Hypovascular FNHs (3 FNHs in 3 patients) , multiple FNHs (18 FNHs in 2 patients) and hypervascular DNs (4 DNs in 2 patients) were mistaken for malignant tumors by the gadolinium image set.

Results of this study indicate that overall lesion detection was significantly higher with the resovist image set than with the gadolinium image set. However, when HCCs, DNs and metastasis were excluded from the analysis, other focal liver lesions detection was not significantly different. Characterization of some hepatic lesions (DNs and FNHs) was obviously improved with the resovist image set than with the gadolinium image set

Conclusion

The resovist-enhanced MR imaging is superior to the gadolinium-enhanced MR imaging for HCCs and DNs detection, and characterization of DNs and FNHs.
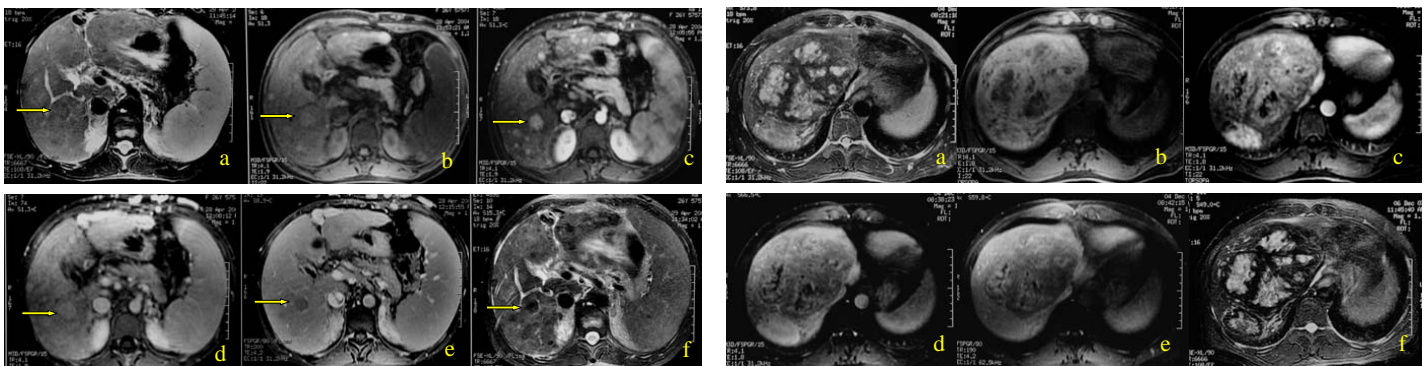
A-26-year old female with DN of right lobe (¼ ý ·) : (a) T2WI, (b) T1WI* with fat saturation, (c) Gd-DTPA arterial phase, (d) portal venous phase, (e)delayed phase, (f) Resovist-enhanced T2WI. The lesion was mistaken for small HCC by the gadolinium image set and diagnosed correctly by the resovist image set

A-22-year old male with pathologically proved multiple FNHs of right lobe: (a) T2WI, (b) T1WI* with fat saturation, (c) Gd-DTPA arterial phase, (d) portal venous phase, (e) delayed phase, (f) Resovist-enhanced T2WI. The lesions were mistaken for malignant tumor by the gadolinium image set and diagnosed correctly by the resovist image set

References

1.   Kim MJ, Kim JH, Chung JJ, et al.   Radiology   2003; 228: 719-726