

Focal Hepatic Lesion Detection and Discrimination of Benign Lesions and Malignant Lesions: T2-weighted Imaging versus Diffusion-weighted Imaging

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Introduction

Accurate detection and characterization of focal hepatic lesions are important for treatment planning for patients with malignant diseases such as hepatocellular carcinoma, cholangiocarcinoma, and metastases. For the detection and characterization of hepatic lesions, T1-weighted, T2-weighted, and dynamic enhanced MR imaging are frequently used. Diffusion-weighted (DW) MR imaging can characterize hepatic lesions by means of ADC calculations. Although there are many studies regarding the use of DW imaging for characterization of hepatic lesions, to our knowledge, few studies have evaluated the use of DW imaging for detection of hepatic lesions. The purpose of our study was to evaluate the value of diffusion-weighted MR imaging in detection and differentiation of benign hepatic lesions from malignant hepatic lesions.

Materials and Methods

Ninety seven lesions (51 malignant lesions and 46 benign lesions) were included in this retrospective study. Malignant lesions included 12 hepatocellular carcinomas, 26 metastases, and 13 intrahepatic cholangiocarcinomas. Benign lesions included 19 hemangiomas and 27 cysts. MRI protocol for the upper abdomen included T2-weighted images, in- and opposed-phase T1-weighted images, and dynamic T1-weighted images. Subsequently, diffusion-weighted MR images were obtained. Breath-hold fat-suppressed single-shot echo planar DW imaging was performed with the following parameters: 1338/66; b factors, 0, 50, and 800 sec/mm²; matrix, 112 x 88; field of view, 36 x 28 cm; two signal acquired; section thickness, 6mm; no section gap;

Two independent observers reviewed T2-weighted and DW (b values of 0, 50, and 800 sec/mm) images for detecting and characterizing hepatic lesions.

Results

Detection of the hepatic lesions: The detection rate of the hepatic lesions with T2-weighted images and DW images are listed in Table 1. For malignant hepatic lesions, DW imaging was a significantly higher detection rate than T2-weighted image. However, there was no significant difference between DW imaging and T2-weighted imaging in benign and all hepatic lesions.

Characterization of the hepatic lesions: The sensitivity, specificity, and accuracy for the differentiation of benign hepatic lesions and malignant lesions on T2-weighted images and combined T2-weighted and DW images are listed in Table 2. For both observers, there was no significant difference in sensitivity, specificity, and accuracy between the results obtained with the T2-weighted images and the results obtained with the combined T2-weighted and DW images.

Discussions

| Table 1. Detection rate of hepatic lesions on T2-weighted and DW Imaging | | | | | | | | | |
|--------------------------------------------------------------------------|--------------------|----------|-------|--------------------------|----------|--------|-----------------------|----------|------|
| Image | All lesions (n=97) | | | Malignant lesions (n=51) | | | Benign lesions (n=46) | | |
| | Leader 1 | Leader 2 | Mean | Leader 1 | Leader 2 | Mean | Leader 1 | Leader 2 | Mean |
| T2 | 79.4 | 73.2 | 75.8 | 62.7 | 51 | 56.9 | 97.8 | 95.7 | 96.7 |
| DW | 91.8 | 80.4 | 86 | 86.3 | 66.7 | 76.5 | 97.5 | 95.7 | 96.7 |
| P value | 0.05 > | 0.177 | 0.068 | 0.05 > | 0.108 | 0.05 > | 1 | 1 | 1 |

The results of this study indicate that DW imaging had a higher detection rate for malignant hepatic lesions than T2-weighted images. DW imaging can potentially used for detection malignant hepatic lesions such as hepatocellular carcinoma, metastases, and intrahepatic cholangiocarcinoma. However, there is no significant improvement with combined T2-weighted and DW images compared with T2-weighted image only for the differentiation of benign hepatic lesions from malignant hepatic lesions.

References

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2. Ichikawa T, Haradome H, Hachiya J, et al. AJR 1998;170:397-402
3. Nasu K, Kuroki Y, Nawano S, et al. Radiology 2006 ;239 :122-130

| Table 2. Discrimination of Benign Lesions and Malignant Lesions on T2-Weighted and DW Imaging | | | |
|-----------------------------------------------------------------------------------------------|----------|----------|------|
| Image | Leader 1 | Leader 2 | Mean |
| T2 | | | |
| Sensitivity | 95.7 | 89.1 | 92.4 |
| Specificity | 82.2 | 88.9 | 85.6 |
| Accuracy | 89 | 89 | 89 |
| T2 +DW | | | |
| Sensitivity | 95.7 | 91.3 | 93.5 |
| Specificity | 91.1 | 91.1 | 91.1 |
| Accuracy | 93.4 | 91.2 | 92.3 |

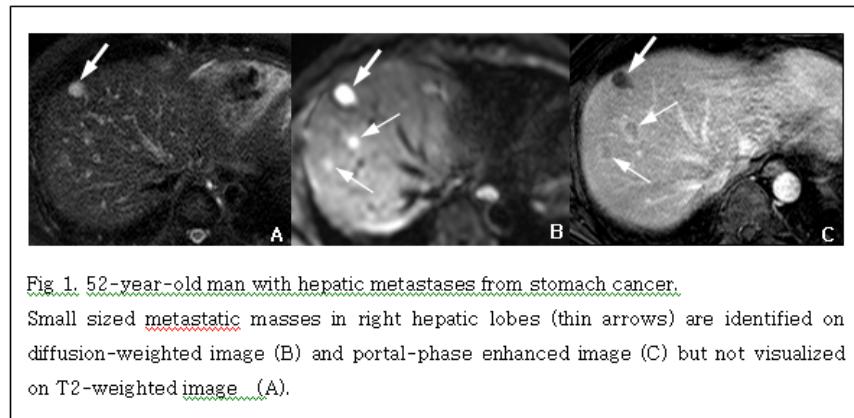


Fig 1. 52-year-old man with hepatic metastases from stomach cancer.

Small sized metastatic masses in right hepatic lobes (thin arrows) are identified on diffusion-weighted image (B) and portal-phase enhanced image (C) but not visualized on T2-weighted image (A).