

PERIPHERAL LOW INTENSITY SIGN IN HEPATIC HEMANGIOMA: DIAGNOSTIC PITFALL IN HEPATOBILIARY PHASE OF Gd-EOB-DTPA ENHANCED MR IMAGING OF THE LIVER

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Purpose: The “peripheral washout sign” has been sometimes observed in the late phase of dynamic contrast-enhanced MR imaging (DCE-MRI) using purely extracellular Gd chelates, and has been considered as a specific sign of malignant hepatic tumors such as hepatic metastases and intrahepatic cholangiocarcinoma. However, in the hepatobiliary phase (HP) of Gd-EOB-DTPA enhanced MR imaging, the “peripheral low intensity sign” similar to peripheral washout sign was seen in not only liver metastases but also hepatic hemangiomas as a benign tumor. The aim of this study was to describe the presence of a peripheral low intensity sign in hepatic hemangioma in the HP of DCE-MRI obtained with Gd-EOB-DTPA, and to compare the frequency of this sign between hepatic hemangiomas and hepatic metastases.

Methods and Materials: Sixty-four patients with 51 hepatic hemangiomas (n=31 patients) and with 58 hepatic metastases (n=33 patients) underwent Gd-EOB-DTPA enhanced MR imaging using a 1.5-T scanner. In all hepatic hemangiomas, 41 lesions were typical type and 10 were high flow type. CE images were obtained before contrast injection, in the arterial phase (AP) at a fixed (25 s) or a modified (bolus timing technique) scan timing, in the portal phase (PP) at 70 s, in the equilibrium phase (EP) at 3 min, and in the hepatobiliary phase (HP) at 20 min, and HP images were qualitatively evaluated for the frequency of peripheral low intensity sign in hepatic hemangiomas and hepatic metastases. Peripheral low intensity sign was defined as band-like or spot-like low signal intensity in the peripheral region of the nodule relative to its center in HP, and was characterized using a four-point scale: A score of 0, no peripheral low intensity sign was seen; 1, peripheral low intensity sign was seen in less than one-third of a circumference; 2, peripheral low intensity sign was observed between one-third and two-thirds of a circumference; and 3, peripheral low intensity sign was demonstrated in more than two-thirds of a circumference.

Results: Peripheral low intensity sign was demonstrated in 24 (47%) of 51 hepatic hemangiomas while they were seen in 27 (47%) of 58 hepatic metastases. There was no significant difference in the visual score of peripheral low intensity sign between all hepatic hemangiomas (0.84 ± 1.03) and hepatic metastases (0.76 ± 0.92), indicating that the peripheral low intensity sign in hepatic hemangiomas is observed in a similar proportion to that of hepatic metastases. Whereas, among the 24 hepatic hemangiomas with peripheral low intensity sign, one lesion was high flow type (10%; 1/10 lesions) and 23 lesions were typical type (56%; 23/41 lesions). The visual score of peripheral low intensity sign in typical hemangiomas (1.02 ± 1.06) was significantly higher than that in high flow hemangiomas (0.10 ± 0.32) ($p = 0.008$). The size of tumors was significantly higher in typical hemangiomas (19.3 ± 12.4 mm) than in high flow hemangiomas (10.8 ± 2.98 mm) ($P = 0.019$).

Conclusions: Many hepatic hemangiomas, particularly in a typical type, show peripheral low intensity sign on HP (20min) after Gd-EOB-DTPA injection. Accordingly, radiologists should recognize that peripheral low intensity sign is not specific for malignant tumors, and can be seen even in hepatic hemangiomas on HP of DCE-MRI obtained using Gd-EOB-DTPA.

Figure 1. Liver metastasis from gastric carcinoma. On the 20 min HP image, this lesion has a peripheral low intensity sign (score 3) that is hypointense relative to the center of the lesion.



Figure 2. Hepatic hemangiomas. On the 20 min HP images, peripheral washout sign is evident in the typical hemangioma (a, score 3) but absent in the high flow hemangioma (b).

