Atypical Inside-Out Pattern of Hepatic Hemangiomas

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Case Report

A 45-year-old woman was admitted for evaluation of hepatic masses that were incidentally discovered during routine screening. Her liver function tests had normal findings and her test for hepatitis B antibody was positive. Abdominal sonography revealed two masses in segments II and VIII of the liver [3], measuring 3 cm and 2.5 cm in diameter, respectively (Figs. 1A and 1B). Both masses were well delineated and appeared hypoechoic with posterior acoustic enhancement; one mass had a central echogenic area and the other had a more focal central hyperechoicogenicity. Vascular flow signals were not detected on color Doppler sonography in or around the masses.

On dynamic CT, no significant enhancement was noted in the lesions during the early arterial phase, but gradual opacification from the center to the periphery (centrifugal direction) occurred during the portal and delayed venous phases. The edges of the lesions appeared unenhanced on 5-min delayed images.

The masses had low signal intensity on T1-weighted MR images and high signal intensity on T2-weighted MR images (Fig. 1C). Gadolinium-enhanced dynamic MR images (Figs. 1D–1G) revealed gradual centrifugal enhancement (except for the tumoral edges), similar to dynamic CT findings. Selective hepatic angiography revealed no definite evidence of tumor vascularity or staining or filling defect on either arterial or capillary phases.

99mTc-labeled RBC radionuclide images revealed no increased or decreased radioactivity in the liver on early dynamic images but revealed pooling of radiotracer in segments II and VIII on delayed images. Single-photon emission computed tomography (SPECT) showed increased uptake lesions at corresponding areas of the liver. Therefore, the two hepatic masses were radiologically confirmed as hemangiomas with atypical imaging findings.

Case 2

A 32-year-old man was admitted for evaluation of a hepatic mass that was discovered on abdominal sonography during a routine examination. A two-phase abdominal CT scan was obtained. The scan revealed a 2.5-cm lobulated mass in the boundary area between segments V and VIII [3]. The mass had low density with central enhancing foci on arterial phase images and centrifugal enhancement with a peripheral unenhanced portion on 5-min delayed images (Figs. 2A and 2B). The lesion had low signal intensity on T1-weighted MR images and high signal intensity on T2-weighted MR images (Figs. 2C and 2D). Dynamic MR images were obtained after gadopentetate dimeglumine injection; on these images, the lesion had a centrifugal enhancement pattern (Figs. 2E–2H). The peripheral rim portion remained unenhanced on images with up to a 5-min delay.

Discussion

The dynamic distribution of contrast material in the extracellular space (vascular and interstitial space) has been well documented [4]. After 1 min, 50% of contrast material moves from the vascular space to the interstitial space, and after 5 min, 80% moves. Equilibrium between the two spaces is attained in 2–5 min. After that, the contrast material returns to the vascular space [4]. Peripheral enhancement within 2 min of bolus injection is caused by the accumulation of contrast material in the vascular lakes [5]. The delayed enhancement of hemangiomas and some malignant neoplasms have different mechanisms. The delayed enhancement of
Fig. 1.—45-year-old woman with two cavernous hepatic hemangiomas. A and B, Sonographic images reveal 2.5-cm (arrow, A) and 3-cm (arrow, B) hypoechoic masses in segments VIII and II of liver. Note central echogenic area. C, T2-weighted MR image shows two masses with high-signal-intensity enhancement. D, Unenhanced T1-weighted MR image shows low signal intensity of each mass. E and F, Contrast-enhanced T1-weighted MR images reveal centrifugal enhancement in each mass. G, 10-min delayed image shows no enhancement in peripheral portion of each mass.
Fig. 2.—32-year-old man with hepatic mass at boundary area between segments V and VIII of liver.

A, Arterial phase dynamic CT scan shows central enhancing portion of low density mass.

B, On delayed image, mass shows more centrifugal enhancement with some peripheral unenhancing portions.

C and D, Mass has high signal intensity on T2-weighted MR image (C) and low signal intensity on T1-weighted MR image (D).

E–H, Dynamic MR images reveal centrifugal enhancement pattern of mass, which has peripheral unenhancing portion on 5-min delayed image (H).
Fibrosis of hepatic hemangiomas occurs commonly inside the bodies of tumors, beginning in the center and extending peripherally in variable degrees [5]. In our patients, the histologic findings of hemangiomas revealed a central area composed of numerous vascular spaces, which showed central echogenicity on sonography and early and prolonged enhancement on dynamic bolus CT. The peripheral portions of the lesions had a predominantly fibrous component and showed hypoechogenicity on sonography and delayed enhancement on dynamic CT.

Typical radiographic characteristics of hepatic hemangiomas are well established and extremely specific; however, intratumoral structural variation may cause unusual imaging features. More reports about the radiographic–histologic correlation of hepatic hemangiomas are needed to draw further conclusions.

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