Vasoactive Intestinal Peptide and Somatostatin Receptor Scintigraphy for Differential Diagnosis of Hepatic Carcinoid Metastasis

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We report a case of a hepatic carcinoid metastasis mimicking a hemangioma on ultrasound and on CT. Indium-111-DTPA-D-Phe-1-octreotide (111mIn-OCT) and 123I-vasoactive intestinal peptide (123I-VIP) receptor imaging suggested a carcinoid metastasis of the liver. The final diagnosis was established histopathologically. The differential diagnosis of liver lesions is discussed.

Key Words: liver carcinoid metastasis; iodine-123-vasoactive intestinal peptide; indium-111-DTPA-D-Phe-1-octreotide; hemangioma

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Despite recent advances, the differential diagnosis of focal liver lesions continues to present a diagnostic challenge, especially with ultrasound (US), computed tomography (CT) and magnetic resonance imaging (MR). The distinction between cavernous hemangiomas and hepatic metastases spread from endocrine tumors may be difficult as these metastatic lesions may be hypervascular and have similar signal intensity as hemangiomas (1-5). During the past few years, receptor-based radioligands, 111mIn-DTPA-D-Phe-1-octreotide (111mIn-OCT) and 123I-vasoactive intestinal peptide (123I-VIP), have been successfully used to localize primary endocrine tumors as well as metastatic liver lesions (6,7). We report a case of a carcinoid liver metastasis mimicking a hemangioma on US and CT, which could be correctly diagnosed by receptor imaging using 123I-VIP and 111mIn-OCT.

CASE REPORT

A 68-yr-old woman was admitted to the hospital in May 1995 suffering from increasing abdominal pain and clinical symptoms of an obstructive ileus. Surgery revealed a carcinoid tumor (1.5 cm) located in the small intestine with mesenterial lymph-node metastases as the underlying cause. The patient underwent partial resection of the small intestine. Histologic examination of the surgical specimen demonstrated complete removal of the local malignant tissue. Two weeks later, US revealed a hypechoic liver lesion in segment VI/VII (3.3 cm in diameter) considered to be suspicious for a hemangioma (Fig. 1). During routine follow-up, performed 4 mo after surgery, US of the liver repeatedly revealed the same lesion. Because of the patient's history and a slightly elevated urinary 5-hydroxy-indolacetic-acid (HIAA), further diagnostic work-up, including CT, was performed.

Despite the biochemical suspicion of a metastatic carcinoid tumor, CT also suggested a liver hemangioma in accordance with the sonographic finding, as the lesion showed the hypervascularization with nodular peripheral enhancement (Fig. 2). Receptor-based nuclear medicine imaging procedures were performed in October 1995 to evaluate the extent of the disease (6,7). Immediately after injection of 150 MBq 123I-VIP (1 µg; 300 pmol) dynamic studies of the abdomen and at 2 hr planar scintigraphy in anteroposterior view as well as SPECT of the liver were performed. A focally increased accumulation in the right liver lobe, corresponding to the US/CT lesion was demonstrable, indicating an increased expression of VIP receptors (7). Additionally, somatostatin receptor scanning (SST) performed with 130 MBq 111mIn-OCT (6) indicated an increased focal uptake in the right liver lobe at 6 and 24 hr after injection (Fig. 3). As an increased VIP/SST receptor expression was highly suspicious for metastatic liver spread (6,7) a CT-guided, fine-needle biopsy was performed, which revealed the diagnosis of a carcinoid metastasis. The solitary liver lesion was removed by surgery. Repeated SST receptor scintigraphy performed after surgical resection revealed no evidence for focal lesions.

DISCUSSION

Cavernous hemangiomas are the most common benign liver tumors (8,9). Most commonly, they are solitary, smaller than 3 cm and appear as a well-defined hypechoic mass on US (1). With the addition of SPECT, 99mTc-labeled red blood cell scintigraphy (99mTc-RBC) is very sensitive and highly specific for hemangiomas; however, false-negative 99mTc-RBC studies for hemangiomas have been reported (10,11). Using single-pass, contrast-enhanced CT, differentiation of cavernous hemangiomas from hepatic metastasis may be possible (12). The value of MR imaging of these tumors have also been well assessed (13-15). Since metastases from endocrine tumors may also have similar patterns in US, CT and MR imaging, the distinction between cavernous hemangiomas and hepatic me-
tastases can be difficult (2,4,5). Recently, $^{111}$In-OCT and $^{123}$I-VIP receptor scans were successfully applied for the localization of primary and metastatic carcinoid tumors, and they can be used for the staging procedure of neuroendocrine tumors (6,7). In our patient, the diagnosis of a hemangioma on US and CT was not convincing because of the patient’s history and the elevated HIAA. Iodine-123-VIP and $^{111}$In-OCT receptor scans demonstrated a focal lesion in the liver indicating VIP/SST receptor overexpression and thus metastatic liver spread (6,7). A carcinoid metastasis could be confirmed by histopathology. The scintigraphic results led to successful surgical resection of the tumor.

CONCLUSION

This case illustrates that carcinoid liver spread may mimick a hemangioma on US and CT. Additionally, $^{111}$In-OCT/$^{123}$I-VIP receptor scans are useful in the differential diagnosis of liver lesions in patients with neuroendocrine tumors.