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Treatment related focal nodular hyperplasia mimicking liver metastases

Maria Elena Laino, MD^{1,2}, Serena Monti, PhD³, David S. Klimstra, MD⁴, Laura H. Tang, MD, PhD⁴, and Lorenzo Mannelli, MD, PhD²

¹Department of Radiology, Catholic University of the Sacred Heart, 8 Largo Agostino Gemelli, Rome, IT

²Department of Radiology, Memorial Sloan Kettering Cancer Center, 1275 York Avenue, New York, NY, USA

³IRCCS SDN, Naples, Italy

⁴Department of Pathology, Memorial Sloan Kettering Cancer Center, 1275 York Avenue, New York, NY, USA

Abstract

A 7 years old patient with a stage 4 neuroblastoma underwent chemotherapy, surgery, myeloablative therapy, external beam radiotherapy, and Isoretinoin treatment. A post treatment magnetic resonance (MR) examination performed administering gadoteric acid as contrast agent showed two new hypervascular hepatic lesions, suspicious for metastases. A second MR imaging performed using a liver-specific contrast medium (Gd-EOB-DTPA) demonstrated that these lesions were consistent with treatment-related focal nodular hyperplasia.

Keywords

Treatment related FNH; magnetic resonance; Gd-EOB-DTPA – Eovist

Main Text:

A 7 years old patient was diagnosed a stage 4 neuroblastoma affecting the left adrenal mass with extension to multiple thoracic and abdominal lymph nodes and to the sphenoid bone, for which she was treated with chemotherapy, surgery, myeloablative therapy, external beam radiotherapy, and Isoretinoid therapy for three years.

Corresponding author (reprint requests should be sent to): Lorenzo Mannelli, M.D., PhD, Department of Radiology, Memorial Sloan Kettering Cancer Center, 1275 York Avenue, C276, New York, NY 10065, USA, Tel. 212-639-7293; Fax 212-794-4010, mannellilorenzo@yahoo.it.

Institution where work was performed:

Memorial Sloan-Kettering Cancer Center, Department of Radiology, 1275 York Avenue, New York, NY 10065, USA

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The authors have no conflict of interest to disclose.

Two years follow-up diagnostic imaging showed no evidence of disease. About three years after the beginning of therapies, a magnetic resonance (MR) performed administering gadoteric acid as intravenous contrast agent showed the presence of two new hypervascular hepatic lesions within segment 8 and 7. Her lab testing were within normal limits at that time.

These hepatic lesions were not visible at prior MR and at concurrent metaiodobenzylguanidine (MIBG) Single Photon Emission Computed Tomography and Computed Tomography (SPECT/CT) and 18F- fluorodeoxyglucose (FDG) Positron Emission Tomography and Computed Tomography (PET/CT) examinations. At this point, the differential diagnosis included hypervascular metastases and treatment related focal nodular hyperplasia (FNH), and less commonly hemangioma, adenoma or hepatocellular carcinoma (HCC).

A subsequent MR examination was performed administering a liver-specific contrast medium (gadolinium ethoxybenzyl diethylenetriamine pentaacetic acid - Gd-EOB-DTPA), for better characterization of the lesions (Figure 1).

That study showed rapid arterial enhancement, retention of the contrast agent during the hepatocyte phase and a characteristic hypointense central scar, consistent with treatment-related FNH.

Discussion

Although the etiology of FNH is unknown, in rare cases they have been shown to be related to cytoreductive chemotherapy, total body irradiation and high dose chemotherapy (1).

The reason is not clear, but some authors affirm that therapy-induced vascular injury could lead to venocclusive disease; subsequently, vascular recanalization and reperfusion of hepatic tissue might lead to hyperplastic hepatocyte proliferation (1).

In our case, Gd-EOB-DTPA was crucial for differentiating FNHs from hemangiomas, adenomas, hypervascular metastases or HCCs. Gd-EOB-DTPA is a liver-specific contrast agent with hepatobiliary excretion, and is transported into hepatocytes via the organic anion transporting polypeptides (OATPs) expressed on sinusoidal membranes (2).

FNH are composed by aggregate hyperplastic hepatocytes associated with malformed biliary ducts and this microscopic structure is responsible for the retention of Gd-EOB-DTPA during the hepatobiliary phase (2).

The other differential diagnoses considered in our patient were hemangioma, adenoma, metastases, and HCC, but were unlikely as these lesions do not accumulate Gd-EOB-DTPA and appear hypointense during the hepatobiliary phase (2, 3). A physiopathological explanation could be that metastases and hemangiomas lack of functioning hepatocytes (2) and adenomas lack of bile ductules (2, 3), while OATPs is typically inhibited in malignant liver lesions as HCC (2).

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Figure 1: MR examination performed by administering a hepatic specific contrast agent (Gd-EOB-DTPA). Axial post-contrast fat-sat T1-weighted image acquired during the arterial phase (A), showed the rapid enhancement of the lesions (white arrows), which confirmed their hypervascular origin. The lesions showed retention of the contrast agent during the delayed (B) and, most importantly, during the hepatobiliary phase (C), where they also showed a characteristic hypointense central scar, consistent with treatment-related FNH.