CASE REPORT

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A Case of Hepatocellular Adenoma Mimicking Metastasis on Positron Emission Tomography/Computed Tomography: The Importance of Magnetic Resonance Imaging in Diagnosis

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ABSTRACT Hepatocellular adenoma is a rare benign liver lesion and occurs especially in women of reproductive age. Patients with hepatic adenomas are generally asymptomatic. Spontaneous rupture and malignant degeneration are the main complications. Hepatocellular adenomas are usually detected incidentally with imaging modalities. 18F-fluorodeoxyglucose positron emission tomography/computed tomography (18F-FDG PET/CT) reflects cellular glucose metabolism. 18F-FDG PET/CT is commonly used in diagnosis, cancer staging, and evaluation of treatment response. Hepatocellular adenoma showing FDG uptake on PET is seen rarely and it may be confused with malignant liver lesions. In this case report, we present a case of hepatocellular adenoma mimicking metastasis on PET/CT, the importance of magnetic resonance imaging in diagnosis, and subtypes of hepatic adenomas.

Keywords: Hepatocellular adenoma; positron emission tomography; magnetic resonance imaging

Hepatocellular adenoma is a rare benign liver neoplasm, common in women of reproductive age, with a history of oral contraceptive use.[1] Patients with hepatic adenomas are generally asymptomatic. Spontaneous rupture and malignant degeneration are the main complications. Imaging modalities are used for diagnosis. However, it may be difficult to distinguish hepatocellular adenomas from other benign or malignant liver lesions.[2] Ultrasonography, computed tomography (CT), and magnetic resonance imaging (MRI) can indicate the presence of hepatic adenoma, but the diagnosis must be confirmed histopathologically.

^{18}F-fluorodeoxyglucose positron emission tomography/CT (^{18}F-FDG PET/CT) reflects cellular glucose metabolism. PET scan is used in cancer staging, surveillance, and evaluation of treatment response. PET-avid hepatic adenoma is seen rarely and it may be confused with malignant liver lesions. In this case report, we present a case of hepatocellular adenoma mimicking metastasis on PET/CT in a patient with breast cancer and ultrasound and MRI findings of hepatocellular adenoma.

CASE REPORT

A thirty-nine-year-old female patient diagnosed with invasive ductal carcinoma underwent ^{18}F□FDG PET/CT PET/CT for cancer staging. A small hypermetabolic lesion [maximum standard uptake values (*SUVmax): 4.98*] was detected in segment 7 of the liver on PET/CT. The ratio of SUVmax of the hepatic lesion to that of normal parenchyma was approximately 2. The lesion was hypodense on the CT portion of the PET/CT scan (Figure 1). Serum tumor markers (cancer antigen 19-9, alpha-fetoprotein, and carcinoembryonic antigen) were negative. Firstly, it

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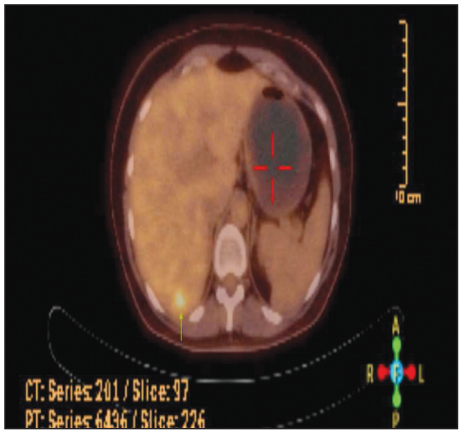

FIGURE 1: A hypermetabolic lesion (maximum standard uptake values: 4.98) in segment 7 of the liver on positron emission tomography/computed tomography.

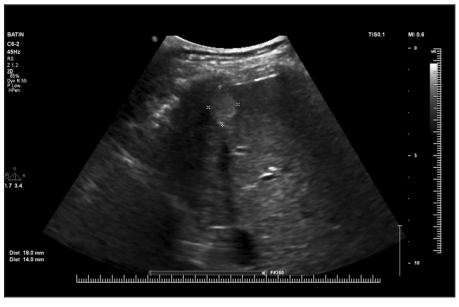

FIGURE 2: Hyperechogen liver lesion on sonographic examination.

was considered a metastatic lesion. The sonographic examination was performed first for lesion characterization. The lesion was hyperechogenic on ultrasound. (Figure 2). Contrast-enhanced MRI was performed for diagnosis. Intravenous extracellular contrast agent (gadoteric acid) was used as a contrast agent. The lesion showed arterial enhancement with washout through the portal venous on dynamic contrast-enhanced MRI (Figure 3). The hepatic lesion showed a signal drop in the out-of-phase sequence (Figure 4). Loss of signal intensity in the out-of-phase sequence indicated microscopic fat content. MRI findings of the lesion were consistent with hepatic adenoma. Hepatic lesion and breast cancer were operated on. The liver lesion was pathologically compatible with hepatocellular adenoma (Figure 5). Written informed consent was obtained from the patient in this case report.

DISCUSSION

Hepatic adenomas are uncommon benign epithelial tumors. They are especially seen in young women. Oral contraceptive use anabolic steroids, glycogen storage diseases, and obesity are risk factors. Adeno-

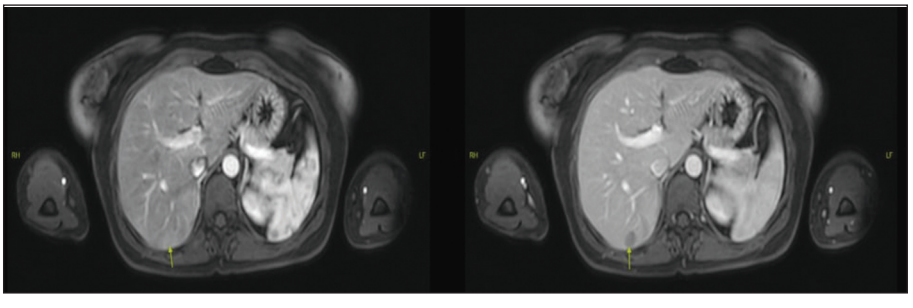

FIGURE 3: Arterial mild enhancement and venous washout on dynamic contrast-enhanced magnetic resonance imaging.

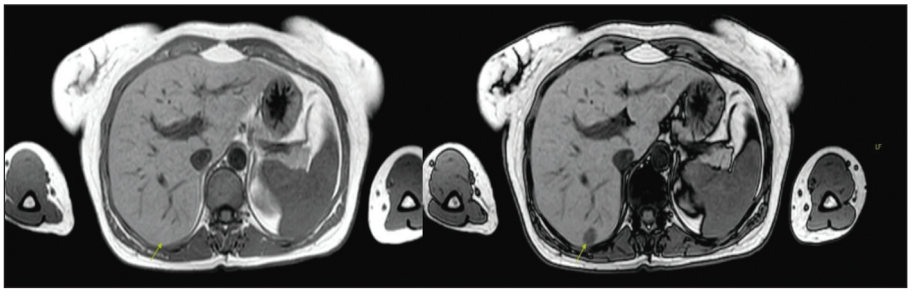

FIGURE 4: Loss of signal intensity in out-of-phase sequence.

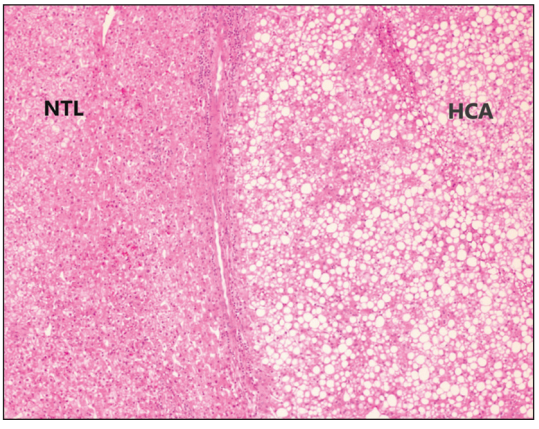

FIGURE 5: Highly steatotic, non-encapsulated hepatic adenoma.
NTL: Non-tumoural liver; HCA: Hepatocellular adenoma.

mas are generally solitary and most commonly seen in the right hepatic lobe and subcapsular area. Special clinical significance of hepatic adenomas is that they have the potential for life-threatening hemorrhage and malignant transformation.[3,4]

Hepatic adenomas are usually detected incidentally with imaging modalities. A hepatocellular adenoma is usually seen as a solitary, well-demarcated, heterogeneous mass on ultrasonography. Echogenicity is variable; hyperechoic (30%) or hypoechoic (20-40%) may be seen due to fat content.[5] The attenuation of hepatic adenoma on CT is variable, depending on hemorrhage or fat content. MRI findings; T1 iso-, to hypointense, T2 mildly hyperintense: 47-74%.[6] The presence of fat typically leads to loss of signal intensity in the out-of-phase sequence. On the dynamic post-contrast sequence, hepatic adenomas usually show homogeneous early arterial enhancement. On portal venous phase and delayed images, adenomas become nearly isointense with liver.[7] Hepatic adenomas usually appear hypointense on hepatobiliary phase.[8] In our case, hepatic lesion was hyperechogen on ultrasonography. The lesion showed arterial enhancement with washout through the portal venous on dynamic contrast-enhanced MRI. In addition, MRI demonstrated signal dropout in out-of-phase T1 imaging.

^{18}F-FDG PET/CT reflect the glucose metabolism of tissues. PET scan is used for diagnosis, staging, evaluation of response to treatment, and differentiating malignant from benign lesions. Common causes of false positive ^{18}F-FDG PET/CT scans are granulomatous disease, abscess, surgical changes, foreign body reaction, inflammation, and fat necosis e.g. PET-avid hepatic adenoma is seen rarely and it can be confused with malignancy. In our case, the hypermetabolic hepatic lesion on PET/CT was interpreted primarily as metastasis. However, ultrasound and MRI findings of the lesion were not compatible with metastasis. Loss of signal intensity in out-of-phase sequence indicated microscopic fat content. Fat-containing liver metastases generally arise from malignant germ cell tumors, liposarcomas, and clear cell renal cell carcinoma.[9] However, the primary tumor of our case was invasive ductal carcinoma. In addition, the enhancement pattern of the lesion was consistent with the hepatic adenoma. However, histopathology was required for a final diagnosis. Therefore, the patient's breast cancer and hepatic lesion were resected. Hepatic adenoma diagnosis was confirmed histopathologically.

There are four molecular phenotypes of hepatic adenoma; β-catenin activating, HNF-1α inactivation, inflammatory, and unclassified.[10] The most common subtype is inflammatory hepatic adenoma (35-50%). Inflammatory subtype is associated risk of hemorrhage (>30%) and malignant transformation (5-10%). The second most common group is HNF-1α inactivated adenomas. HNF-1α inactivated adenomas contain intracellular fat and this group of adenomas show a signal drop in out-of-phase sequence, just like this case.[11] PET-avid hepatic adenomas are HNF-1α inactivated adenomas. PET avid β-catenin or inflammatory hepatic adeoma has not been reported in the literature.[12] Glucose transporter 2 and hexokinase 4 expression and glucose-6-phosphate transporter 1 inactivation in HNF-1α inactivated adenomas is associated with increased FDG uptake.[13] The third group is β-catenin activating adenomas. β-catenin activating group has the highest malignancy potential.

As a result, specifically the HNF1-α subtype hepatocellular adenomas can cause false-positive PET-CT finding and they mimick metastasis. Histopathology may be required for definitive diagnosis. Hypermetabolic liver lesions on PET scan should be investigated with other imaging modalities, especially MRI.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Mustafa Yıldırım;* ***Design:*** *Mustafa Yıldırım;* ***Control/Supervision:*** *Mustafa Yıldırım;* ***Data Collection and/or Processing:*** *Mustafa Yıldırım, Özge Arslan Solmaz;* ***Analysis and/or Interpretation:*** *Mustafa Yıldırım, Özge Arslan Solmaz;* ***Literature Review:*** *Mustafa Yıldırım;* ***Writing the Article:*** *Mustafa Yıldırım;* ***Critical Review:*** *Mustafa Yıldırım;* ***Materials:****Mustafa Yıldırım, Özge Arslan Solmaz.*

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