Interesting Image

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Metabolically Silent Diffuse Hepatic Involvement in Multiple Myeloma: An ^{18}F-FDG-PET/CT Pitfall

Multipl Miyelomda Metabolik Olarak Sessiz Diffüz Hepatik Tutulum: ^{18}F-FDG- PET/BT'de Bir Tanısal Tuzak

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Abstract

Diffuse hepatic involvement in multiple myeloma is rare and may present a diagnostic challenge ^{18}F-fluorodeoxyglucose positron emission tomography/computed tomography (^{18}F-FDG PET/CT). We present the case of a 59-year-old man with a 3-year history of multiple myeloma who developed progressive hepatomegaly and perihepatic ascites. ^{18}F-FDG PET/CT demonstrated marked diffuse liver enlargement without any focal or diffuse hepatic ^{18}F-FDG uptake, while mild diffuse skeletal uptake suggested a globally ^{18}F-FDG-low myeloma phenotype. Given the discordance between severe morphological findings and the absence of hepatic metabolic activity, a liver biopsy was performed, which revealed diffuse sinusoidal infiltration by CD138-positive, lambda-restricted plasma cells and excluded hepatic amyloidosis. Following systemic therapy, hepatomegaly and ascites regressed, while hepatic ^{18}F-FDG uptake remained absent. Written informed consent for publication was obtained from the patient. This case highlights an important limitation of ^{18}F-FDG PET/CT in detecting diffuse hepatic myeloma and emphasizes the need for multimodal diagnostic integration.

Keywords: ^{18}F-FDG PET/CT, hepatic myeloma, diagnostic pitfall, multiple myeloma, hepatomegaly, liver biopsy

Öz

Multipl miyelomda diffüz hepatik tutulum nadirdir ve ^{18}F-florodeoksiglukoz pozitron emisyon tomografisi/bilgisayarlı tomografi (^{18}F-FDG PET/BT) tanısal güçlük oluşturabilir. Bu yazıda, üç yıldır multipl miyelom tanısı bulunan ve progresif hepatomegali ile perihepatik asit gelişen 59 yaşında bir erkek hasta sunulmaktadır. ^{18}F-FDG PET/BT'de karaciğerde belirgin diffüz büyüme izlenmesine karşın, fokal ya da diffüz hepatik ^{18}F-FDG tutulumu saptanmamış; iskelette izlenen hafif diffüz ^{18}F-FDG tutulumu ise global ^{18}F-FDG düşük bir miyelom fenotipini düşündürmüştür. Belirgin morfolojik bulgular ile hepatik metabolik aktivitenin yokluğu arasındaki uyumsuzluk nedeniyle karaciğer biyopsisi yapılmış ve CD138 pozitif, lambda ile sınırlı plazma hücrelerinin diffüz sinüzoidal infiltrasyonu saptanarak hepatik amiloidoz dışlanmıştır. Sistemik tedavi sonrası hepatomegali ve asitte gerileme izlenirken, hepatik ^{18}F-FDG tutulumu olmaması devam etmiştir. Yayın için hastadan yazılı bilgilendirilmiş onam alınmıştır. Bu olgu, diffüz hepatik miyelom tutulumunun saptanmasında ^{18}F-FDG PET/BT'nin önemli bir sınırlılığını ortaya koymakta ve tanıda multimodal yaklaşımın gerekliliğini vurgulamaktadır.

Anahtar Kelimeler: ^{18}F-FDG PET/BT, karaciğer miyelomu, tanı hatası, multipl miyelom, hepatomegali, karaciğer biyopsisi

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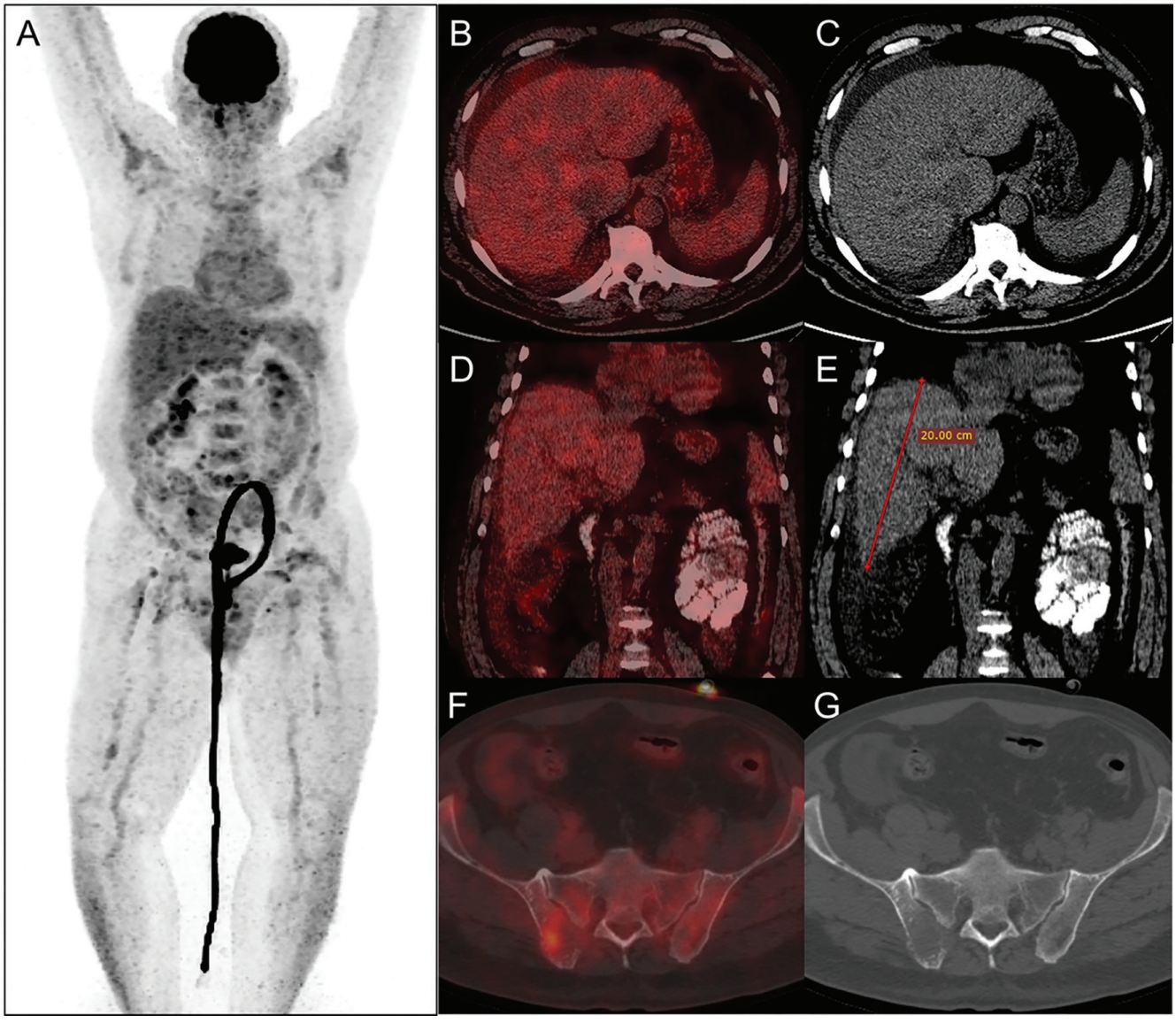

Figure 1. ^{18}F-fluorodeoxyglucose positron emission tomography/computed tomography (^{18}F-FDG PET/CT) findings in a 59-year-old male with a 3-year history of multiple myeloma who developed progressive hepatomegaly and perihepatic ascites 1A. Maximum-intensity projection image demonstrates marked hepatomegaly with no abnormal hepatic ^{18}F-FDG uptake 1B,C. Axial fused ^{18}F-FDG PET/CT and CT images show diffuse hepatic enlargement and mild parenchymal heterogeneity without abnormal metabolic activity 1D-E. Coronal fused ^{18}F-FDG PET/CT and CT images illustrate hepatomegaly with a craniocaudal measurement of approximately 20 cm 1F-G. Axial fused ^{18}F-FDG PET/CT and CT images at the pelvic level reveal mild-low ^{18}F-FDG-avid lytic lesions in the posterior iliac bones. Given the absence of focal hypermetabolic lesions and the low-grade, diffuse pattern of skeletal uptake, these findings are compatible with a globally ^{18}F-FDG -low myeloma phenotype rather than highly active focal disease (1,2).

According to the IMWG-endorsed Italian Myeloma Criteria for PET Use (IMPeTUs), the imaging findings were consistent with a low-^{18}F-FDG-avid myeloma phenotype. Bone marrow uptake demonstrated a Deauville score of 3 (BM3) with a mixed diffuse-focal pattern. Six lytic lesions were identified (L3 group), with the highest ^{18}F-FDG uptake at the iliac bone biopsy site [maximum standardized uptake value (SUV_{max}): 4.8], comparable to hepatic reference activity (SUV_{max}: 4.1). No paramedullary or extramedullary metabolically active disease was detected. Overall, the IMPeTUs profile was classified as BM3 Sp F2 L3. Bone marrow biopsy demonstrated marked plasma-cell infiltration (approximately 85% of marrow cellularity) with CD138 and MUM1 positivity and lambda light-chain restriction (kappa/lambda ratio 1/80), consistent with relapsed plasma cell myeloma.

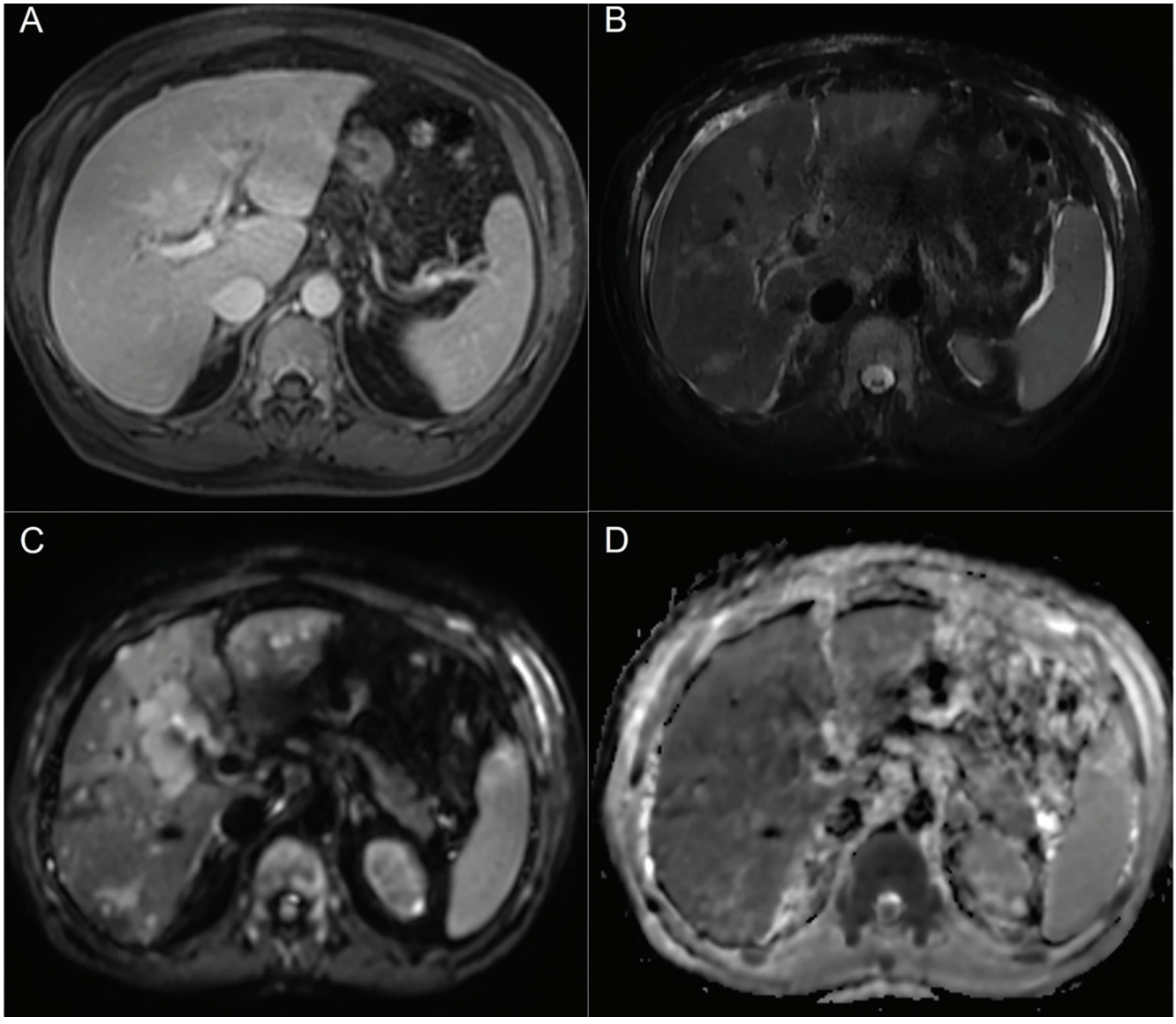

Figure 2. Liver magnetic resonance imaging demonstrating diffuse hepatic infiltration in multiple myeloma 2A. Axial contrast-enhanced T1-weighted image shows heterogeneous parenchymal enhancement without discrete focal lesion 2B. Axial T2-weighted image demonstrates hepatomegaly with heterogeneous, mildly increased parenchymal signal intensity without discrete focal lesions 2C. Diffusion-weighted image (b=800) shows heterogeneous parenchymal hyperintensity without discrete focal lesions 2D. Apparent diffusion coefficient map shows diffusely reduced signal intensity, supporting restricted diffusion in keeping with diffuse plasma-cell infiltration. As previously reported in the literature, magnetic resonance images findings of diffuse hepatic myeloma may be subtle and non-specific, often manifesting as heterogeneous parenchymal signal alterations without discrete mass formation (3,4).

Hepatic involvement in multiple myeloma is uncommon, and tumor-forming hepatic lesions are particularly rare. Reported histopathological patterns include extramedullary plasmacytoma, light-chain deposition disease, amyloidosis, and diffuse infiltrative forms such as sinusoidal plasma-cell infiltration, which may present radiologically as hepatomegaly with ascites in the absence of discrete focal lesions (3).

The striking discrepancy between severe hepatomegaly with ascites and complete absence of hepatic ^{18}F-fluorodeoxyglucose uptake prompted further diagnostic evaluation. Percutaneous liver biopsy demonstrated diffuse sinusoidal infiltration by plasma cells with strong CD138 expression and lambda light-chain restriction, confirming hepatic involvement by multiple myeloma. Congo red staining was negative, excluding hepatic amyloidosis (5,6).

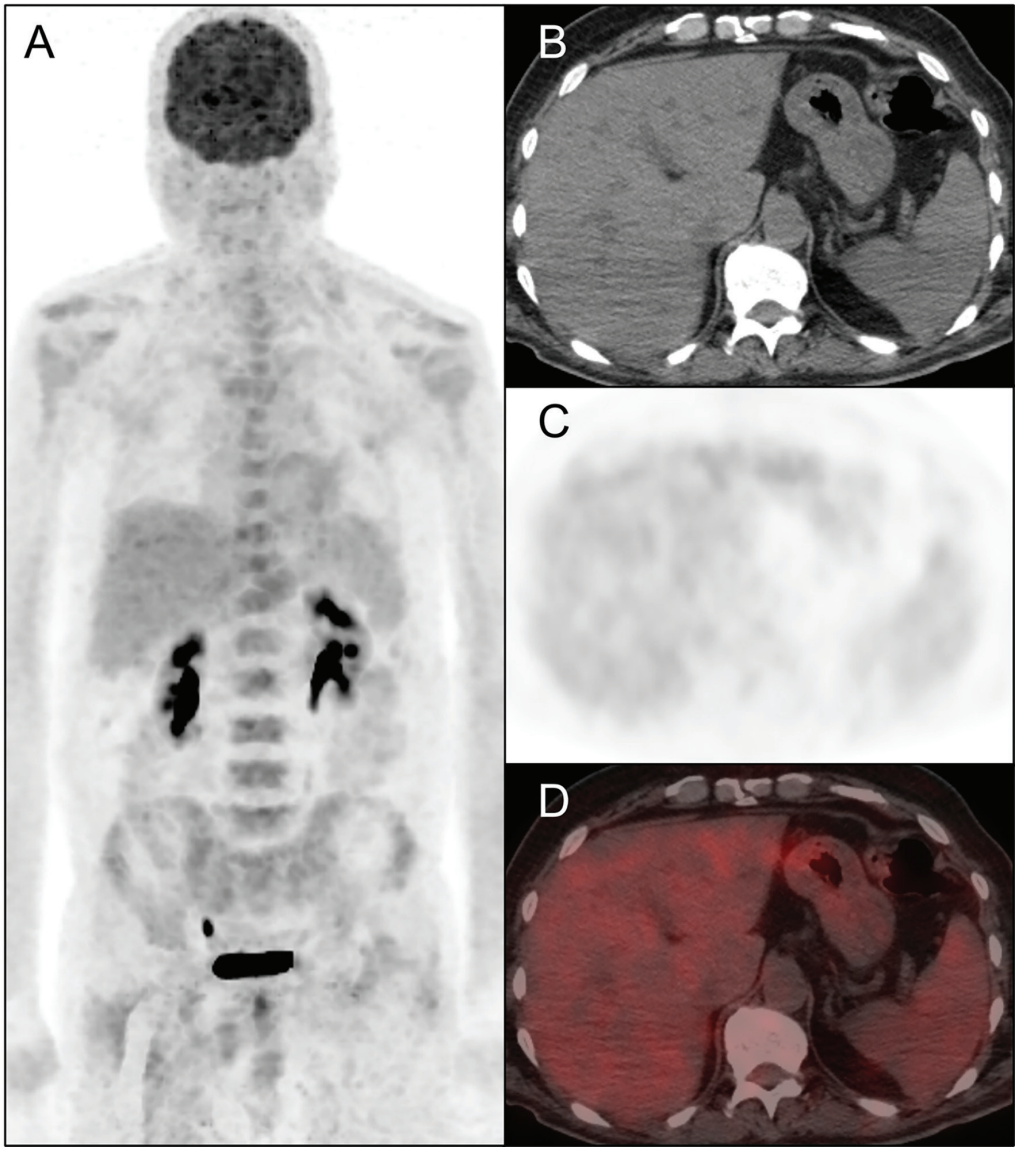

Figure 3. Follow-up [18]F-fluorodeoxyglucose positron emission tomography/computed tomography ([18]F-FDG PET/CT) findings after systemic therapy 3A. MIP image demonstrates interval decrease in diffuse skeletal [18]F-FDG uptake compared with baseline, with no newly emerged focal hypermetabolic lesions. Hepatic[18]F-FDG activity remains homogeneous and within physiological limits 3B. Axial low-dose CT image shows regression of hepatomegaly with improved hepatic contour and parenchymal homogeneity, with the craniocaudal liver length measuring approximately 15.6 cm 3C. Axial PET image at the hepatic level demonstrates persistently low-grade, diffuse [18]F-FDG uptake within the liver parenchyma, without abnormal focal activity. 3D. Axial fused [18]F-FDG PET/CT image confirms the absence of focal hepatic [18]F-FDG uptake and demonstrates interval improvement of hepatic findings following systemic therapy, in keeping with the observed clinical improvement.

Hepatic involvement in multiple myeloma is uncommon, with reported frequencies ranging from approximately 0.3-3%, and diffuse infiltrative patterns are far less frequently encountered than focal plasmacytomas. Histopathological manifestations include diffuse sinusoidal plasma-cell infiltration, light-chain deposition disease, amyloidosis, and less commonly tumor-forming lesions. This case illustrates a well-recognized but underappreciated limitation of [18]F-FDG PET/CT in detecting diffuse hepatic involvement; low [18]F-FDG avidity in such presentations has been proposed to relate to reduced hexokinase-2 expression and alternative metabolic pathways in certain plasma-cell phenotypes, as supported by prior translational and imaging studies rather than being directly demonstrated in the present case (7,8,9). In patients presenting with unexplained hepatomegaly and discordant metabolic imaging findings, histopathological confirmation remains essential. In this context, alternative PET tracers most notably CXCR4-targeted agents and, more recently, fluorocholine PET may provide complementary information in [18]F-FDG -low myeloma phenotypes (10,11,12).

Ethics

Informed Consent: Written informed consent for publication was obtained from the patient.

Footnotes

Authorship Contributions

Surgical and Medical Practices: S.B., Concept: S.B., E.A.İ., Design: S.B., M.O., E.A.İ., Data Collection or Processing: S.B., E.A.İ., Analysis or Interpretation: S.B., E.A.İ., Literature Search: M.O., E.A.İ., Writing: S.B., M.O., E.A.İ.

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