



# Persistent $^{18}\text{F}$ -FDG Uptake in a Post-treatment Hodgkin's Lymphoma: Not Always Residual Disease

Hodgkin Lenfomada Tedavi Sonrası Kalıcı  $^{18}\text{F}$ -FDG Tutulumu: Her Zaman Rezidü Hastalık Değildir

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## Abstract

We report the case of a 31-year-old woman with osseous Hodgkin's lymphoma who underwent post-therapeutic  $^{18}\text{F}$ -fluorodeoxyglucose ( $^{18}\text{F}$ -FDG) positron emission tomography/computed tomography. The scan revealed a hypermetabolic lesion in the pubic symphysis and iliac crests, initially suggestive of residual disease. Multimodal evaluation, including  $^{99\text{m}}\text{Tc}$ -methoxy-isobutyl-isonitrile scintigraphy, laboratory tests revealed primary hyperparathyroidism, and biopsy confirmed a brown tumor. This case highlights the importance of integrating multimodal imaging and pathology to avoid misinterpretation of  $^{18}\text{F}$ -FDG-avid lesions.

**Keywords:** Hodgkin's lymphoma, brown tumor, primary hyperparathyroidism,  $^{18}\text{F}$ -FDG PET/CT,  $^{99\text{m}}\text{Tc}$ -MIBI scintigraphy

## Öz

Osseöz Hodgkin lenfoması olan 31 yaşındaki bir kadının, tedavi sonrası  $^{18}\text{F}$ -florodeoksiglukoz ( $^{18}\text{F}$ -FDG) pozitron emisyon tomografisi/bilgisayarlı tomografi (PET/BT) incelemesi sunulmaktadır. Görüntüleme pubik simfiz ve iliak krestlerde hipermetabolik bir lezyon saptanmış ve başlangıçta rezidüel hastalık olarak değerlendirilmiştir. Ancak  $^{99\text{m}}\text{Tc}$ -metoksi-izobütül-izonitril ( $^{99\text{m}}\text{Tc}$ -MIBI) sintigrafisi ve laboratuvar testlerini içeren multimodal değerlendirme sonucunda primer hiperparatiroidizm saptanmış, biyopsi ise kahverengi tümörü doğrulamıştır. Bu olgu,  $^{18}\text{F}$ -FDG tutulumu gösteren lezyonların yanlış yorumlanmasını önlemek için multimodal görüntüleme ve patolojik değerlendirmenin birlikte ele alınmasının önemini vurgulamaktadır.

**Anahtar kelimeler:** Hodgkin lenfoması, kahverengi tümör, primer hiperparatiroidizm,  $^{18}\text{F}$ -FDG PET/BT,  $^{99\text{m}}\text{Tc}$ -MIBI sintigrafisi

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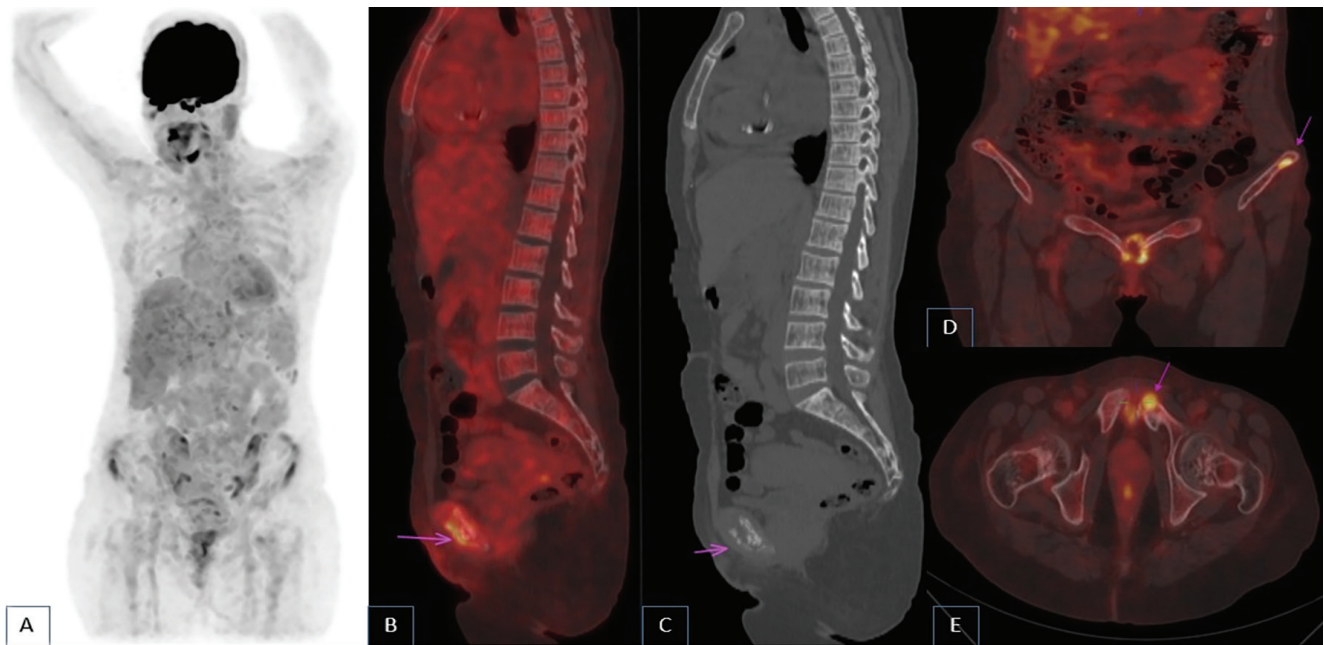
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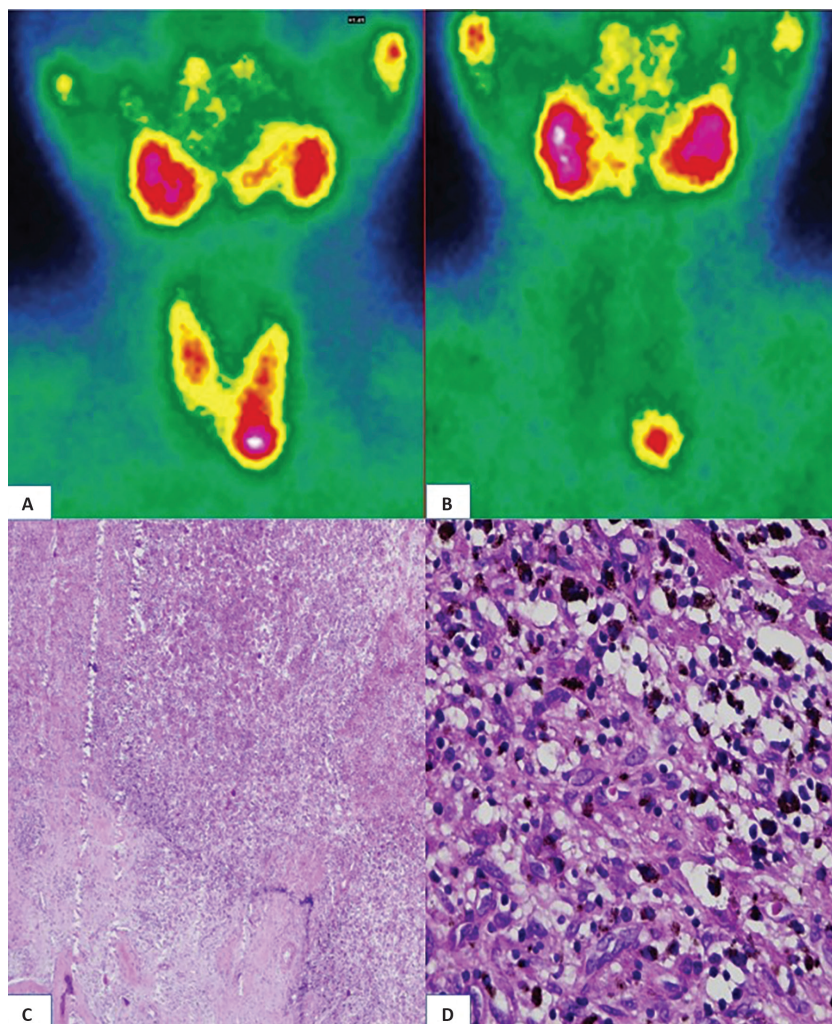
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**Figure 1.** A young woman being followed for stage IV osseous Hodgkin’s lymphoma was referred for post-therapeutic morpho-metabolic evaluation. A positron emission tomography/computed tomography scan using <sup>18</sup>F-fluorodeoxyglucose (<sup>18</sup>F-FDG) was performed, showing the physiological and pathological distribution of the radiopharmaceutical (maximum intensity projection; A). The examination demonstrated a complete metabolic response in the initial tumoral sites and a persistent focal uptake in the pubic symphysis and left iliac crest maximum standard uptake values of 4.6 (fusion and computed tomography images in sagittal projection and fusion images in coronal and axial projection; arrow; B, C, D, E). Further investigations were performed, as <sup>18</sup>F-FDG-avid benign bone lesions, including brown tumors, can mimic residual malignancy (1), particularly when the location is atypical for residual lymphoma.



**Figure 2.** Laboratory tests revealed elevated parathyroid hormone (PTH) at 123 pg/mL, suggesting that primary hyperparathyroidism is the underlying cause of the bone abnormalities and  $^{18}\text{F}$ -fluorodeoxyglucose ( $^{18}\text{F}$ -FDG) uptake.  $^{99\text{m}}\text{Tc}$ -methoxy-isobutyl-isonitrile scintigraphy parathyroid scintigraphy was performed, revealing a persistent focal radiotracer uptake located in the inferior left thyroid lobe on both early and delayed planar images, consistent with a parathyroid adenoma (early images showing tracer uptake in both thyroid lobes and a focal area of increased activity inferior to the left thyroid lobe; A and delayed images demonstrating persistent focal uptake at the same site; B). Histopathological examination of the pubic symphysis biopsy revealed multinucleated giant cells with eosinophilic cytoplasm, intermingled with mononuclear cells and hemosiderin deposits, consistent with a brown tumor, confirming a benign process (low- and high-magnification microscopic sections showing a lobulated bone lesion; panels C and D). These findings underscore the importance of integrating metabolic imaging with biochemical and histological assessments to avoid misinterpretation of benign  $^{18}\text{F}$ -FDG-avid lesions during post-therapeutic lymphoma evaluation (2,3).

On  $^{18}\text{F}$ -FDG positron emission tomography/computed tomography, brown tumors may demonstrate intense metabolic activity and closely mimic malignant bone lesions. This increased  $^{18}\text{F}$ -FDG uptake reflects their high cellularity and increased osteoclastic activity, both of which are driven by excessive PTH stimulation. The resulting bone resorption leads to an accumulation of metabolically active fibroblasts and multinucleated giant cells with elevated glucose metabolism, explaining their strong  $^{18}\text{F}$ -FDG avidity. Similar diagnostic pitfalls have been reported, in which  $^{18}\text{F}$ -FDG-avid skeletal lesions were initially misinterpreted as metastases or giant-cell tumors before being correctly identified by biochemical assays and parathyroid scintigraphy (1,2). Although the coexistence of Hodgkin lymphoma and brown tumor is rare, previous reports have described benign  $^{18}\text{F}$ -FDG-avid bone lesions persisting after lymphoma remission, including giant cell tumor and fibrous dysplasia (4,5). Therefore, brown tumors and giant cell tumors should be considered in the differential diagnosis of  $^{18}\text{F}$ -FDG-avid bone lesions, particularly in the absence of biochemical or histopathological correlation.

## Ethics

**Informed Consent:** The informed consent was obtained from the patient.

## Footnotes

### Authorship Contributions

Concept: D.N., A.M., S.M., I.G., H.G., Design: D.N., A.M., S.M., I.G., H.G., Data Collection or Processing: D.N., Analysis or Interpretation: D.N., A.M., H.G., Literature Search: D.N., Writing: D.N.

**Conflict of Interest:** No conflicts of interest were declared by the authors.

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