



Bone Marrow Necrosis with Underlying Skeletal Lymphoma Evaluated by ¹⁸F-FDG PET/CT and MRI

¹⁸F-FDG PET/BT ve MRG ile Saptanan Altta Yatan İskelet Lenfomasına Bağlı Kemik İliği Nekrozu

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Abstract

Bone marrow necrosis (BMN) is usually associated with malignancies and is characterized by multiple geographic signal abnormalities on magnetic resonance imaging (MRI). We report a 28-year-old female with BMN and underlying diffuse large B-cell lymphoma. Diffuse abnormal signal intensities through the vertebral column were demonstrated on her pretreatment MRI, and the diagnosis of BMN was challenging. Positron emission tomography/computed tomography (PET/CT) for lymphoma staging showed multiple decreased or absent ¹⁸F-fluorodeoxyglucose (¹⁸F-FDG) uptake within the vertebrae and pelvis. Marrow biopsy pathological examination showed lymphoma infiltration and massive necrosis. On the follow-up MRI obtained approximately 21 months after the PET/CT scan, multiple geographic abnormal signal intensities were detected within the vertebral column and were consistent with the areas of decreased ¹⁸F-FDG uptake on PET/CT. This case indicates that ¹⁸F-FDG PET/CT is helpful in the diagnosis of BMN with atypical MRI appearances.

Keywords: Bone marrow necrosis, lymphoma, ¹⁸F-FDG PET/CT, MRI

Öz

Kemik iliği nekrozu (KİN) genellikle malignitelerle ilişkilidir ve manyetik rezonans görüntüleme (MRG) çoklu bölgelerde sinyal anormallikleri ile karakterizedir. KİN'li ve altta yatan yaygın büyük B hücreli lenfomalı 28 yaşında bir kadın hasta sunulmaktadır. Tedavi öncesi MRG'de vertebral kolon boyunca yaygın anormal sinyal yoğunlukları gösterildi ve KİN tanısını koymak güçleşti. Lenfoma evrelemesi için yapılan pozitron emisyon tomografisi/bilgisayarlı tomografi (PET/BT), omurlarda ve pelviste birden fazla ¹⁸F-florodeoksiglukoz (¹⁸F-FDG) alımının azaldığı veya olmadığı bölgeleri gösterdi. Kemik iliği biyopsisinin patolojik incelemesinde lenfoma infiltrasyonu ve masif nekroz görüldü. PET/BT taramasından yaklaşık 21 ay sonra elde edilen takip MRG'de vertebral kolonda çok sayıda bölgede anormal sinyal yoğunluğu tespit edildi ve PET/BT'de ¹⁸F-FDG alımının azaldığı alanlarla uyumluydu. Bu olgu, ¹⁸F-FDG PET/BT'nin atipik MRG görünümü olan KİN'nin tanısında yardımcı olduğunu göstermektedir.

Anahtar kelimeler: Kemik iliği nekrozu, lenfoma, ¹⁸F-FDG PET/BT, MRG

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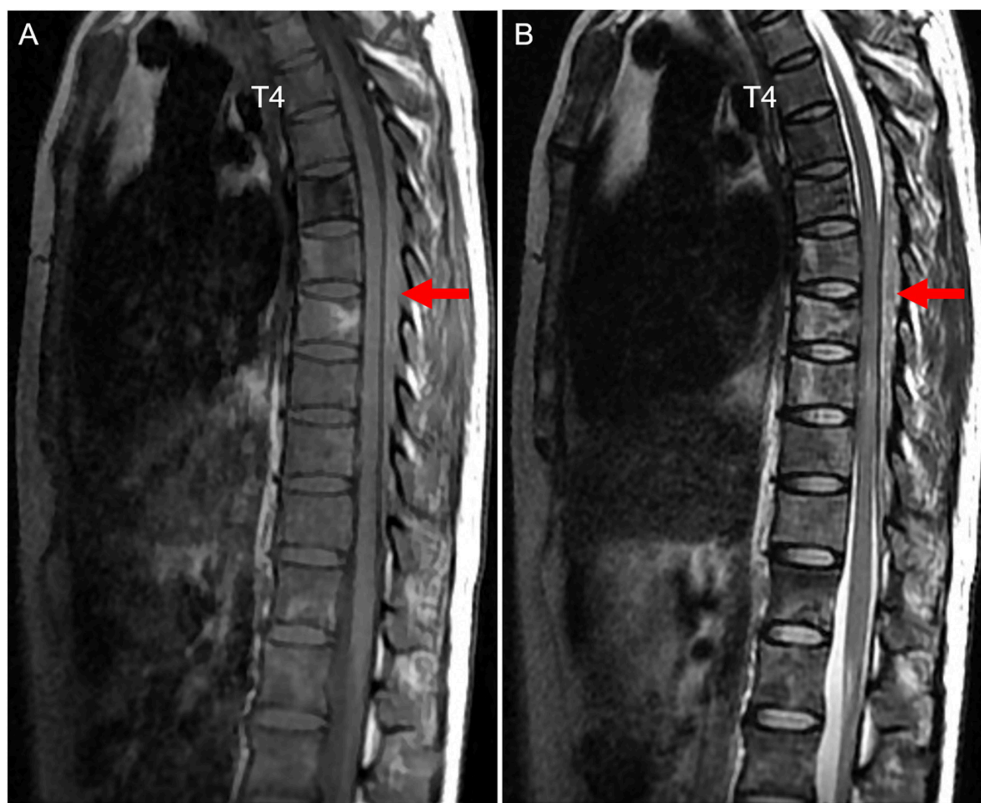


Figure 1. A 28-year-old woman with a history of back pain for 5 months complained of pain aggravation, weakness in her legs, and dysuria for 2 weeks. She underwent a thoracic spine magnetic resonance imaging (MRI) scan. T1-weighted (A) and T2-weighted (B) images showing an epidural mass compressing the spinal cord (red arrows) and diffuse abnormal signal intensity through the vertebral column. The patient underwent surgical resection of the epidural lesion 5 days after the MRI scan, and diffuse large B-cell lymphoma was confirmed by postoperative histological examination. Nine days after the operation, she underwent an ^{18}F -fluorodeoxyglucose (^{18}F -FDG) positron emission tomography/computed tomography (PET/CT) scan for further evaluation.

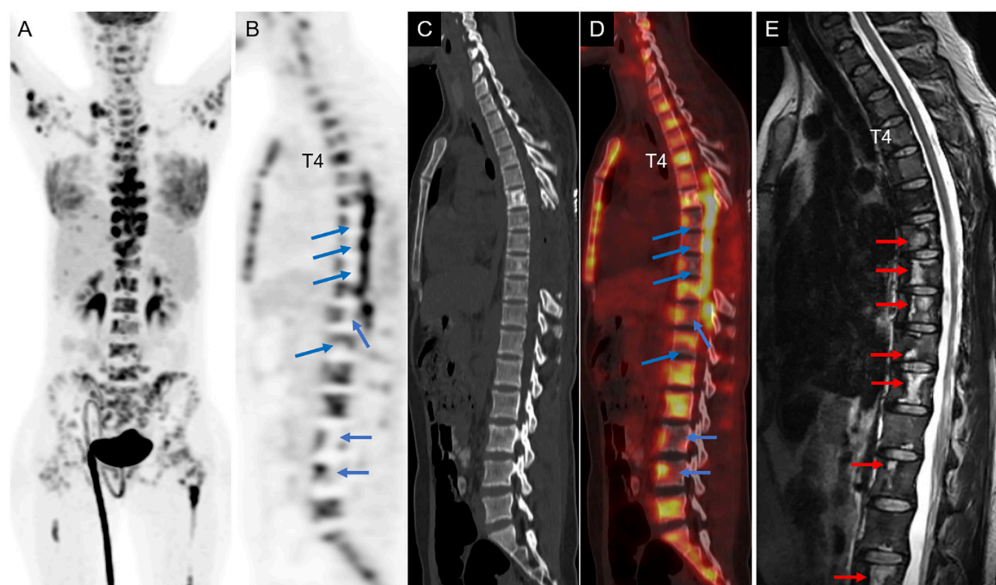


Figure 2. PET/CT images (A, maximum intensity projection; B, PET; C, CT; D, PET/CT) demonstrated diffuse lesions with increased ^{18}F -FDG uptake involving the skeleton, lymph nodes, bilateral breasts, liver, vertebral canal, etc. Multiple radioactive defects were also detected within the spine (blue arrows in B, D) and pelvis, whereas the corresponding CT scan did not show any obvious abnormality. The day after the PET/CT scan, bone marrow aspiration on the bilateral posterior iliac crest was performed, and dry taps were obtained. Marrow biopsy pathological examination showed lymphoma infiltration and massive necrosis. She underwent chemotherapy and autologous stem cell transplantation, achieved a complete response, and has remained relapse-free. On the T2-weighted MRI images (E) obtained approximately 21 months after the PET/CT scan, multiple geographic abnormal (central high with peripheral low) signal intensities were detected within the vertebral column (red arrows) and were consistent with the areas of decreased ^{18}F -FDG uptake on PET/CT. Bone marrow necrosis (BMN) was considered according to marrow pathology and MRI findings and was assumed to be secondary to the marrow involvement of lymphoma.

BMN is caused by microcirculation failure (1) and is characterized as necrosis of myeloid tissue and medullary stroma. BMN is usually associated with malignancies and mainly involves the spine and pelvis (1). It can lead to bone pain, fever, and fatigue (2). Sulfur colloid marrow scan was once thought to be useful in the diagnosis and assessment of the extent of BMN (3,4,5). Later, BMN was more commonly evaluated by MRI with its characteristic geographic signal abnormalities: central hyperintensity without enhancement surrounded by a peripheral band of hypointense signal (6,7). However, the diagnosis of BMN may be challenging based on MRI because MRI appearances may vary at different stages of BMN and may be influenced by the underlying marrow composition. As shown in this study, typical geographic signal abnormalities were not obvious on preoperative MRI. However, BMN should be suspected based on PET/CT findings of decreased or absent ^{18}F -FDG uptake in multiple vertebrae (8). The case indicates that PET/CT is complementary to MRI in the early diagnosis of BMN.

Ethics

Informed Consent: The written informed consent has been obtained from the patient.

Authorship Contributions

Surgical and Medical Practices: L.S., Concept: W.Z., Design: W.Z., Data Collection or Processing: L.S., H.L., Analysis or Interpretation: L.S., W.Z., Literature Search: L.S., H.L., Writing: L.S.

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

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