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Immune Checkpoint Inhibitor-associated Periaortitis Detected on ^{18}F-FDG PET/CT: A Rare Case of Nivolumab Toxicity

^{18}F-FDG PET/BT'de Tespit Edilen İmmün Kontrol Noktası İnhibitörüyle İlişkili Periaortit: Nadir Bir Nivolumab Toksisitesi Olgusu

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Abstract

We report a case of a 64-year-old male with metastatic non-small-cell lung carcinoma who was undergoing neoadjuvant chemoimmunotherapy with cisplatin, pemetrexed, and nivolumab. Restaging ^{18}F-fluorodeoxyglucose positron emission tomography/computed tomography (^{18}F-FDG PET/CT) demonstrated segmental, linear ^{18}F-FDG uptake along the abdominal aortic wall with corresponding crescentic soft-tissue thickening. Differential diagnoses included intramural hematoma, focal aortitis, atherosclerotic plaque, and tumor thrombus. CT angiography revealed a mildly enhancing periaortic soft-tissue rim involving a 5 cm infrarenal aortic segment, consistent with isolated periaortitis, likely induced by immunotherapy. Steroid therapy was initiated. Follow-up ^{18}F-FDG PET/CT showed complete metabolic resolution, supporting an immune-related etiology. ^{18}F-FDG PET/CT played a crucial role in early recognition of this immune-related adverse event by sensitively detecting vascular inflammation and guiding further evaluation with CT angiography. Early PET-based detection enabled timely initiation of steroid therapy, preventing potential vascular complications.

Keywords: ^{18}F-FDG PET/CT, immune checkpoint inhibitors, periaortitis, immune-related adverse events, anti-programmed-death-receptor-1 (PD-1) antibody

Öz

Sisplatin, pemetrexed ve nivolumab neoadjuvan kemoimmünoterapisi gören metastatik küçük hücreli olmayan akciğer karsinomlu 64 yaşında bir erkek hastayı bildiriyoruz. Yeniden evreleme için yapılan ^{18}F-florodeoksiglukoz pozitron emisyon tomografisi/bilgisayarlı tomografi (^{18}F-FDG PET/BT), abdominal aort duvarı boyunca segmental, doğrusal ^{18}F-FDG tutulumu ve buna karşılık gelen hilal şeklinde yumuşak doku kalınlaşmasını gösterdi. Ayırıcı tanılar arasında intramural hematom, fokal aortit, aterosklerotik plak ve tümör trombüsü yer alıyordu. BT anjiyografi, muhtemelen immünoterapiye bağlı izole periaortit ile uyumlu, 5 cm'lik infrarenal aort segmentini içeren hafif kontrast tutan periaortik yumuşak doku kılıfını ortaya çıkardı. Steroid tedavisine başlandı. Takip amaçlı yapılan ^{18}F-FDG PET/BT incelemesi, metabolik sorunların tamamen ortadan kalktığını göstererek immün sistemle ilişkili bir etiyolojiyi destekledi. ^{18}F-FDG PET/BT, vasküler enflamasyonu hassas bir şekilde tespit ederek ve BT anjiyografi ile daha ileri değerlendirmeye rehberlik ederek, bu immün sistemle ilişkili advers olayın erken teşhisinde kritik bir rol oynadı. Erken PET tabanlı tespit, zamanında steroid tedavisine başlanmasını sağlayarak potansiyel vasküler komplikasyonları önledi.

Anahtar kelimeler: İmmün kontrol noktası inhibitörleri, periaortit, immün sistemle ilişkili advers olaylar

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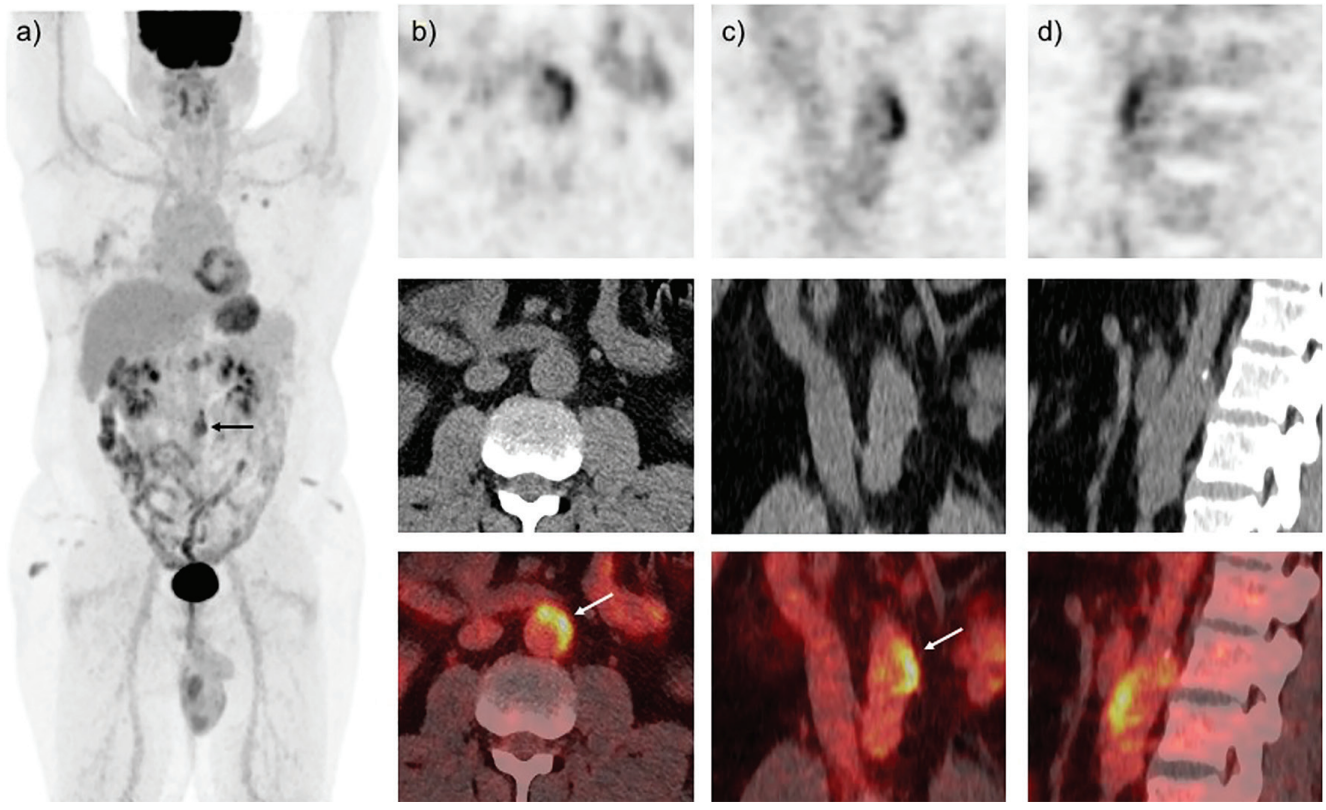

Figure 1. A 64-year-old male is a known case of metastatic non-small-cell lung carcinoma. On neoadjuvant chemoimmunotherapy with cisplatin/ pemetrexed/ nivolumab. ^{18}F-fluorodeoxyglucose positron emission tomography/computed tomography (^{18}F-FDG PET/CT) is performed for restaging. a) ^{18}F-FDG PET maximum intensity projection image and b-d) cross-sectional PET/CT images show segmental ^{18}F-FDG uptake in a continuous linear pattern of the abdominal aortic wall with maximum standard uptake values of 7.6, correlating to a crescentic soft-tissue thickening. Findings could represent an intramural hematoma, focal aortitis, or, less likely, an atherosclerotic plaque and tumor thrombus.

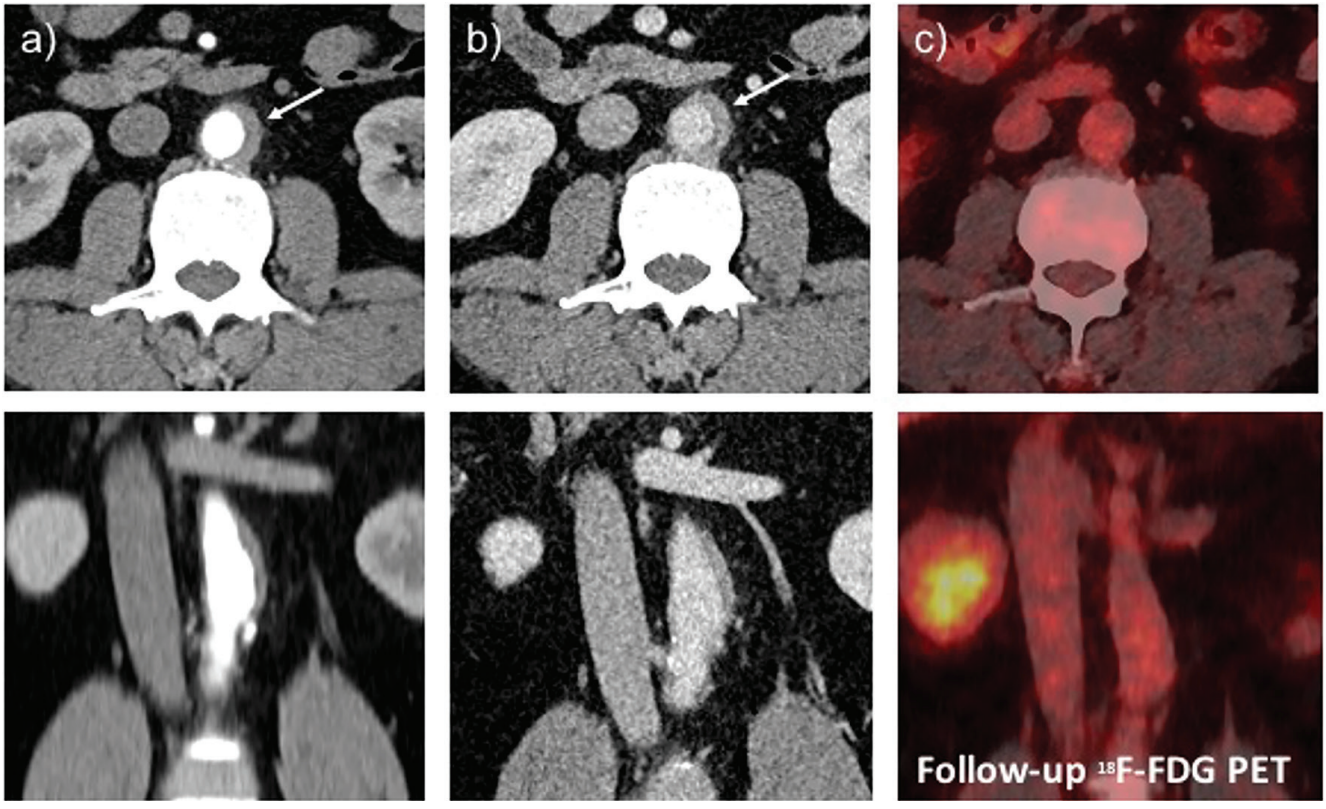

Figure 2. Computed tomography (CT) angiography in the a) arterial and b) delayed phases shows an irregular rim of soft-tissue density around the infra-renal portion of the abdominal aorta, which shows mild enhancement. Length of involvement is ~5 cm. Findings can suggest isolated periaortitis, likely induced by chemo-immunotherapy. The patient was started on steroids. c) Follow-up positron emission tomography (PET)/CT images show metabolic resolution of the previously seen eccentric uptake along the descending thoracic aorta. Immune checkpoint inhibitors (ICIs), including the PD-1 inhibitor nivolumab, have significantly improved outcomes in advanced malignancies such as non-small-cell lung carcinoma (1). However, when they remove inhibitory signals from T-cells, they may provoke a broad spectrum of immune-related adverse events (irAEs). While dermatologic, gastrointestinal, and endocrine toxicities are the most common, vascular irAEs particularly aortitis or periaortitis are increasingly recognized, but remain rare and potentially underdiagnosed. The pathophysiology is attributed to immune activation against vascular wall antigens, leading to T-cell-mediated inflammation, medial destruction, and soft-tissue thickening surrounding the vessel. The overall incidence of irAEs with either CTLA-4 or PD1/PDL1 inhibitors is approximately 15-30% (2).

^{18}F-fluorodeoxyglucose (^{18}F-FDG) PET is widely utilized for diagnostic staging and restaging, assessing disease extent, monitoring treatment response, and supporting prognostic evaluation (3,4). ^{18}F-FDG PET/CT serves not only as a tool for staging and treatment response assessment but also as a crucial modality for identifying clinically silent irAEs in patients undergoing chemoimmunotherapy (5,6). Recognizing these imaging patterns allows timely initiation of immunosuppressive therapy, helps prevent serious vascular complications, and supports the safer use of ICIs in oncology practice. This is particularly important in vascular irAEs, as untreated aortitis can progress to aneurysm formation, dissection, or even life-threatening rupture. Because clinical manifestations are often vague or absent, imaging becomes indispensable, and in this setting, ^{18}F-FDG PET/CT assumes a key diagnostic role. ^{18}F-FDG uptake corresponds to activated macrophages and lymphocytes within the inflamed aortic wall, allowing ^{18}F-FDG PET/CT to identify active vasculitis even before structural changes develop. Several case series and imaging reviews have highlighted the role ^{18}F-FDG PET/CT for detecting large-vessel inflammation in ICI-treated patients, outperforming contrast-enhanced CT when the inflammatory component is subtle and non-occlusive (7,8). This case highlights a rare but clinically significant presentation of nivolumab-induced periaortitis detected incidentally on ^{18}F-FDG PET/CT during routine restaging. The characteristic linear aortic wall uptake prompted further evaluation with CT angiography, enabling early diagnosis and timely initiation of corticosteroid therapy. Complete metabolic resolution on follow-up PET/CT confirmed the immune-mediated nature of the process. As the use of ICIs continues to expand, awareness of vascular irAEs and the role of ^{18}F-FDG PET/CT in their early detection is essential for preventing potentially serious complications.

Ethics

Informed consent: The consent was obtained for image use.

Footnotes

Authorship Contributions

Surgical and Medical Practices: S.U., S.P.N., Concept: S.U., N.A., Design: S.U., A.J., K.A.R., A.A.B., N.A., S.P.N., Data Collection or Processing: S.U., A.J., K.A.R., N.A., Analysis or Interpretation: S.U., K.A.R., S.P.N., Literature Search: S.U., Writing: S.U., S.P.N.

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