

Multimodality Imaging of Neuroendocrine Tumor with Cardiac Metastasis

Kardiyak Metastazlı Nöroendokrin Tümörün Multimodal Görüntülemesi

A 42-year-old man with a biopsy-proven neuroendocrine tumor (NET) presented with progressive dyspnea. Fluorodeoxyglucose (FDG) positron emission tomography (PET) demonstrated widespread metastatic disease with multifocal myocardial uptake, predominantly involving the left ventricle (Figure 1A). Transthoracic echocardiography (TTE) revealed multiple intramyocardial hyperechoic masses (Figure 1B, Video 1). Cardiac magnetic resonance imaging showed diffuse intramyocardial metastatic infiltration, with the largest lesion located in the basal anterolateral wall (Figure 1C). Left ventricular ejection fraction was preserved; however, global longitudinal strain (GLS) was reduced (Figure 1D). Combination chemotherapy with etoposide and cisplatin was initiated. Despite a marked reduction in myocardial FDG uptake on post-treatment FDG-PET (Figure 2A), follow-up echocardiography, including strain imaging, demonstrated persistence of intramyocardial hyperechoic masses and ongoing subclinical systolic dysfunction (Figures 2B-C, Video 2).

CASE IMAGE OLGU GÖRÜNTÜSÜ

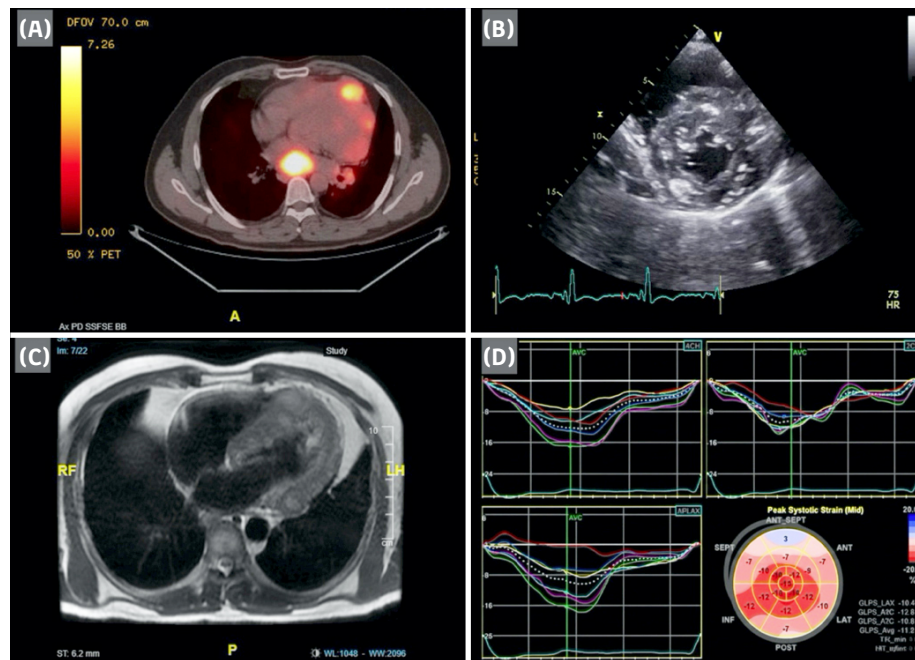


Figure 1. Pre-treatment multimodality imaging of cardiac metastases from a neuroendocrine tumor. (A) Baseline axial fused fluorodeoxyglucose positron emission tomography (FDG-PET) image demonstrating multifocal intense myocardial FDG uptake, predominantly involving the left ventricle. (B) Parasternal short-axis transthoracic echocardiography showing multiple intramyocardial hyperechoic masses. (C) Black-blood spin-echo cardiac magnetic resonance image revealing diffuse intramyocardial metastatic infiltration, most prominent in the basal anterolateral wall. (D) Baseline two-dimensional speckle-tracking analysis showing reduced myocardial tissue deformation, particularly in the basal anteroseptal region (global longitudinal strain: -11.2%).

Uğur Nadir Karakulak¹

Damla Yalçinkaya Öner²

Necla Özer¹

¹Department of Cardiology, Hacettepe University Faculty of Medicine, Ankara, Türkiye
²Department of Cardiology, Karaman Training and Research Hospital, Karaman, Türkiye

Corresponding author:

Uğur Nadir Karakulak
✉ ukarakulak@gmail.com

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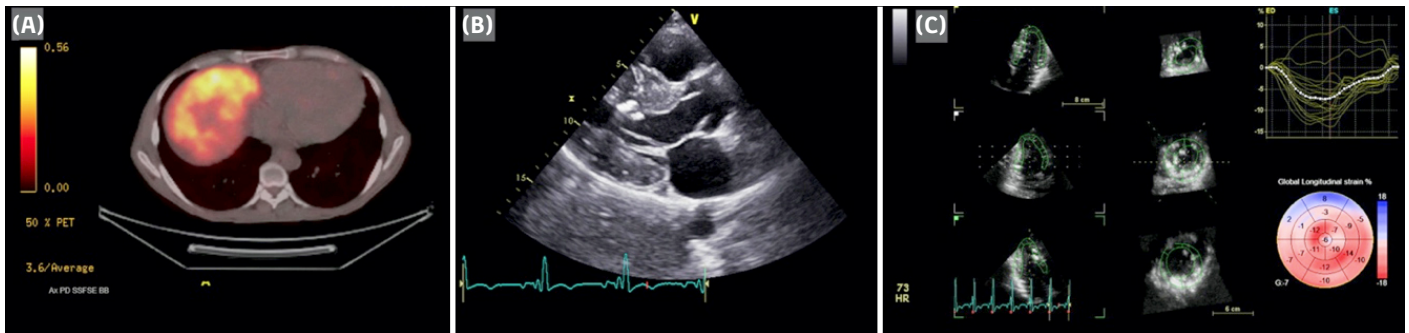


Figure 2. Post-treatment anatomic and metabolic response of cardiac metastases. (A) Follow-up axial fused fluorodeoxyglucose positron emission tomography (FDG-PET) image demonstrating marked reduction in myocardial FDG uptake, consistent with significant metabolic regression. (B) Follow-up parasternal long-axis transthoracic echocardiography showing persistence of intramyocardial hyperechoic masses despite therapy. (C) Follow-up speckle-tracking echocardiography with bull's-eye representation demonstrating persistently reduced global longitudinal strain (-7.0%), indicating ongoing mechanical dysfunction.

This case illustrates that myocardial metastases from NET may persist morphologically despite metabolic remission. Furthermore, echocardiography including strain imaging may substantially underestimate treatment response, whereas FDG-PET serves as a robust marker of therapeutic efficacy in cardiac metastatic disease.

The detection of cardiac involvement in NET requires a high index of clinical suspicion and recognition of specific imaging "red flags." Based on multimodality imaging, the following features should alert clinicians to potential myocardial metastasis:

- **On TTE:** The presence of multiple, round, well-defined hyperechoic masses within the myocardium.
- **On magnetic resonance imaging (MRI):** Diffuse intramyocardial metastatic infiltration, similar to TTE, particularly involving the left ventricular walls.
- **On positron emission tomography (PET) imaging:** Multifocal and intense myocardial FDG uptake, serving as a robust metabolic indicator of metastatic disease in patients with known NET.

Management of cardiac metastasis from NET is primarily dictated by tumor grade and the extent of systemic involvement. Because cardiac metastases frequently coexist with widespread systemic disease, systemic therapy remains the cornerstone of management. In poorly differentiated or aggressive NETs, combination chemotherapy regimens such as etoposide and cisplatin are commonly employed. Surgical resection may be

considered for solitary or symptomatic cardiac lesions but is often limited by the multifocal nature of the infiltration.

Ethics Committee Approval: This is a single case image, and therefore ethics committee approval was not required in accordance with institutional policies.

Informed Consent: Detailed information was given to the patient regarding the possible contribution of the case report to the literature. The patient gave written and verbal consent for the publication of the case image.

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Video 1. Parasternal short-axis transthoracic echocardiography showing multiple intramyocardial hyperechoic masses.

Video 2. Follow-up parasternal long-axis transthoracic echocardiography demonstrating persistence of intramyocardial hyperechoic masses despite therapy.