



# Isolated Unilateral Ovarian Metastasis from Breast Cancer Demonstrated by $^{18}\text{F}$ -FDG PET/CT

$^{18}\text{F}$ -FDG PET/BT ile Gösterilen Meme Kanserinden Kaynaklanan İzole Tek Taraflı Over Metastazi

✉ Nur Aydınbelge Dizdar, ✉ Ebru Tatcı, ✉ Derya Çayır, ✉ Özlem Özmen

University of Health Sciences Türkiye, Ankara Etlik City Hospital, Clinic of Nuclear Medicine, Ankara, Türkiye

## Abstract

A 49-year-old premenopausal woman with a history of left modified radical mastectomy and axillary lymph node dissection for invasive lobular carcinoma three years ago, underwent  $^{18}\text{F}$ -fluorodeoxyglucose positron emission tomography/computed tomography ( $^{18}\text{F}$ -FDG PET/CT) due to gradually increasing CA15-9 and CEA levels during routine follow-up. Compared with previous  $^{18}\text{F}$ -FDG PET/CT images, the left ovary in the current images showed increased size and radiotracer uptake. Subsequently, total abdominal hysterectomy and bilateral salpingo-oophorectomy were performed, and histopathological evaluation confirmed unilateral metastasis in the left ovary due to primary breast cancer. Although rare, possible isolated ovarian metastasis should be considered in patients with breast cancer who have increased size and radiotracer uptake in ovarian tissue on follow-up  $^{18}\text{F}$ -FDG PET/CT scans.

**Keywords:** Breast carcinoma,  $^{18}\text{F}$ -FDG PET/CT, unilateral ovarian metastasis, isolated ovarian metastasis, ovarian uptake

## Öz

İnvaziv lobüler karsinom nedeniyle üç yıl önce sol modifiye radikal mastektomi ve aksiller lenf nodu diseksiyonu olan 49 yaşındaki premenopozal kadın hastaya rutin takipleri sırasında giderek artan CA15-9 ve CEA düzeyleri nedeniyle  $^{18}\text{F}$ -florodeoksiglukoz pozitron emisyon tomografisi/bilgisayarlı tomografinin ( $^{18}\text{F}$ -FDG PET/BT) çekildi. Önceki  $^{18}\text{F}$ -FDG PET/BT görüntüleri ile karşılaştırıldığında, sol overin boyutunda ve radyoaktivite tutulumunda artış görüldü. Daha sonra total abdominal histerektomi ve bilateral salpingo-ooferektomi uygulandı ve histopatolojik değerlendirme sadece sol overde primer meme kanserine bağlı tek taraflı metastazı doğruladı. Nadir görülmekle birlikte, takip  $^{18}\text{F}$ -FDG PET/BT taramalarında over dokusunun boyutunda ve radyotracer tutulumu artış olan meme kanseri hastalarında olası izole over metastazı ihtimali göz önünde bulundurulmalıdır.

**Anahtar Kelimeler:** Meme karsinomu,  $^{18}\text{F}$ -FDG PET/BT, tek taraflı over metastazı, izole over metastazı, over tutulumu

**Address for Correspondence:** Nur Aydınbelge Dizdar, University of Health Sciences Türkiye, Ankara Etlik City Hospital, Clinic of Nuclear Medicine, Ankara, Türkiye

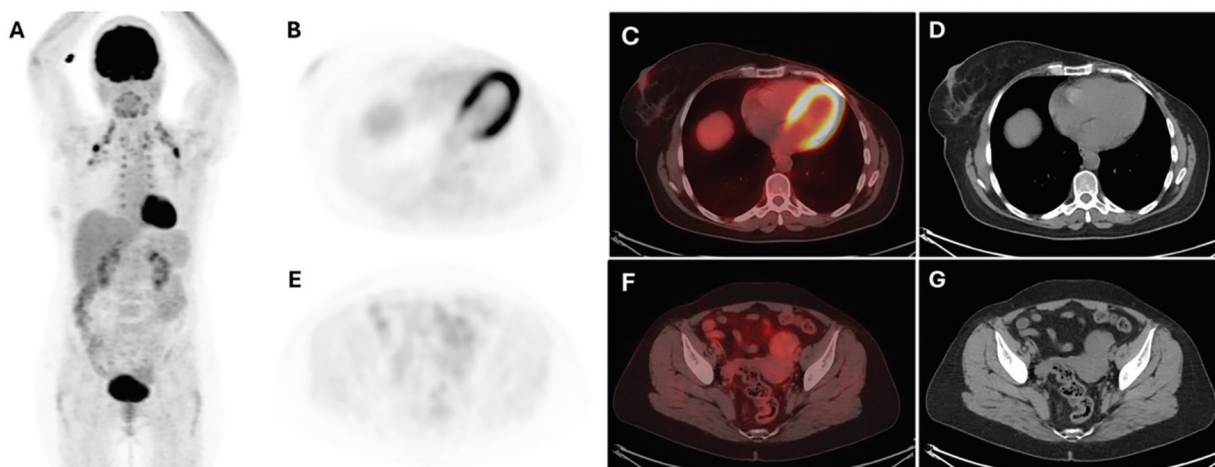
**E-mail:** fnuraydinbelge@gmail.com **ORCID ID:** orcid.org/0000-0002-9657-6906

**Received:** 07.04.2025 **Accepted:** 17.08.2025 **Epub:** 11.11.2025 **Publication Date:** 03.02.2026

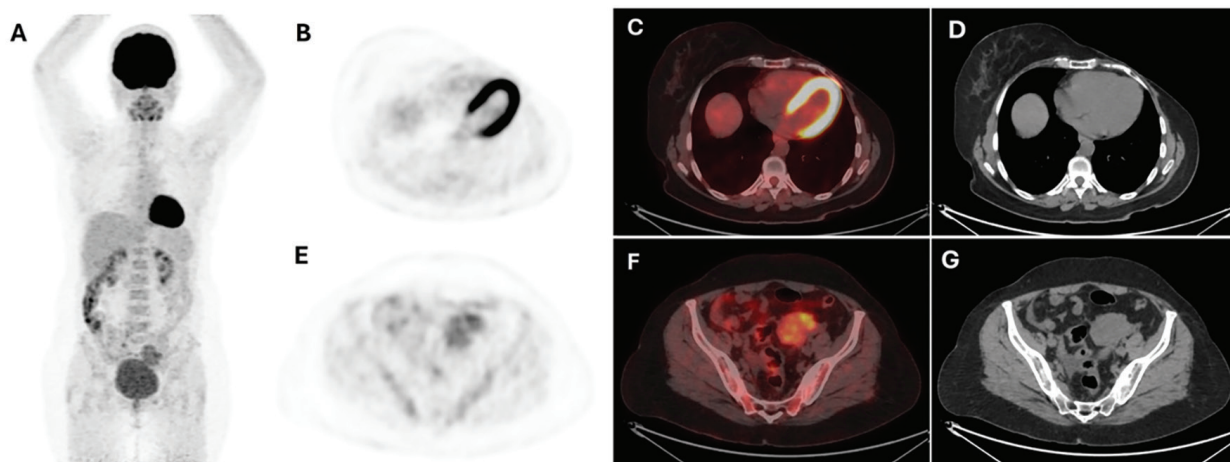
**Cite this article as:** Aydınbelge Dizdar N, Tatcı E, Çayır D, Özmen Ö. Isolated unilateral ovarian metastasis from breast cancer demonstrated by  $^{18}\text{F}$ -FDG PET/CT. Mol Imaging Radionucl Ther. 2026;35(1):55-57.



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**Figure 1.** A 49-year-old premenopausal woman with a history of left modified radical mastectomy and left axillary lymph node dissection for invasive lobular carcinoma after neoadjuvant chemotherapy has been treated with tamoxifen and adjuvant external radiotherapy.  $^{18}\text{F}$ -fluorodeoxyglucose positron emission tomography (PET)/computed tomography (CT) did not reveal pathologically increased radiotracer uptake, except for the radiotracer uptake in brown fat tissue observed in maximum intensity projection. The axial slices of the PET study (B), fused PET/CT (C), and CT (D) of the thoracic region showed no pathological activity involvement, which may be compatible with local recurrence of the primary malignant disease and/or metastatic processes. In the axial slices of the PET study (E), fused PET/CT (F), and CT (G), of the pelvic region, low radiotracer uptake soft tissue densities were observed in the left ovary region (maximum standard uptake values: 2.63). The endometrial curettage and smear test were reported to be incompatible with malignancy and metastatic disease. During two years of follow-up under-treatment, serum CA15-9 and CEA levels remained stable.



**Figure 2.** Afterwards,  $^{18}\text{F}$ -fluorodeoxyglucose positron emission tomography/computed tomography ( $^{18}\text{F}$ -FDG PET/CT) was performed due to the progressive increase in serum CA15-9 and CEA levels within a 6-month period (A-D). It demonstrated that only the left ovary showed an increased size and radiotracer uptake (maximum standard uptake values: 5.1) compared to previous  $^{18}\text{F}$ -FDG PET/CT images in the axial section of the PET study (E), fused PET/CT (F), and CT (G) of the pelvic region. Subsequently, the patient underwent total abdominal hysterectomy and bilateral salpingo-oophorectomy and the histopathological assessment revealed unilateral metastasis in the left ovary due to primary breast cancer (BC).

BC can frequently metastasize to bones, lungs, liver, and brain. However, invasive lobular carcinoma (ILC) has a greater tendency to metastasize to disseminated sites including the gastrointestinal (GI) tract, peritoneum, gynecological organs, skin, and adrenal glands (1). Among gynecologic organs, ovaries are the most frequently site of metastasis of BC (2). Tumors may metastasize to the ovaries through various routes, including direct, hematogenous, and lymphatic spread, as well as transcoelomic dissemination (3). Several studies have shown that GI tract (gastric, colon and rectum) tumors are the most common primary neoplasm metastasizing to the ovary, followed by uterine, BC, pancreatic cancer, lymphoma, malignant melanoma and others (3,4).

Ovarian metastasis from BC is more frequently seen in younger and premenopausal women. They are asymptomatic until they reach a certain size, so they are frequently associated with other poor prognostic factors such as the presence of other metastatic sites, large primary breast lesion size, inflammatory BC, lymph node involvement, advanced stage (stage III-IV), and bilateralism (5). Therefore, it is frequently associated with worse prognosis and outcomes, and a shorter 5-year survival rate (6). Isolated unilateral ovarian metastasis from ILC is extremely rare. Furthermore, ILC shows low FDG uptake, so  $^{18}\text{F}$ -FDG PET/CT may have a lower impact on systemic staging for ILC than for invasive ductal carcinoma (7). However, in this case,  $^{18}\text{F}$ -FDG PET/CT detected an isolated ovarian radiotracer uptake, raising suspicion of metastasis. This case report demonstrated that the presence of increased size and FDG uptake, merely in the isolated unilateral ovary, should be considered a potential indication of metastatic spread of BC.

## Ethics

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

## Footnotes

### Authorship Contributions

Surgical and Medical Practices: N.A.D., Concept: E.T., Design: D.Ç., Data Collection or Processing: Ö.Ö., Analysis or Interpretation: D.Ç., Ö.Ö., Literature Search: E.T., Writing: N.A.D.

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

**Financial Disclosure:** The authors declare that this study has received no financial support.

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