



⁶⁸Ga Prostate-specific Membrane Antigen Uptake in Metastatic Medullary Thyroid Carcinoma

Metastatik Medüller Tiroid Kanseriinde ⁶⁸Ga Prostat-spesifik Membran Antijen Tutulumu

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Abstract

We present the case of a 58-year-old man with advanced medullary thyroid carcinoma who had a treatment history with different types of modalities. In the follow-up, the patient had rising calcitonin and CEA levels. Metastatic lymph nodes, liver, and bone metastases with varying degrees of uptake were detected on ¹⁸F-fluorodeoxyglucose (FDG) and ⁶⁸Ga-DOTATATE positron emission tomography/computed tomography (PET/CT). ⁶⁸Ga prostate-specific membrane antigen (PSMA) PET/CT was performed to explore whether the patient might have a chance for PSMA-targeted radionuclide therapy, and increased PSMA expression was noted in most of the metastatic lesions, even some of which have higher PSMA uptake than ¹⁸F-FDG and ⁶⁸Ga-DOTATATE.

Keywords: Medullary thyroid carcinoma, prostate-specific membrane antigen, PSMA, ¹⁸F-FDG, ⁶⁸Ga-DOTA, ⁶⁸Ga-PSMA

Öz

Farklı modalitelerle tedavi öyküsü olan 58 yaşında ileri evre medüller tiroid kanseri tanılı bir erkek hastayı sunuyoruz. Hastanın takiplerinde kalsitonin ve CEA düzeylerinde artış saptandı. Yapılan ¹⁸F-fluorodeoksiglukoz (FDG) ve ⁶⁸Ga-DOTATATE pozitron emisyon tomografisi/bilgisayarlı tomografi (PET/BT) görüntülemelerinde değişen derecelerde tutulum gösteren metastatik lenf nodları, karaciğer ve kemik metastazları tespit edildi. Hastanın prostat-spesifik membran antijeni (PSMA) hedefli radyonüklid tedavi şansı olup olmadığını araştırmak için yapılan ⁶⁸Ga-PSMA PET/BT görüntülemesinde metastatik lezyonlarda artmış PSMA ekspresyonu görülmekle birlikte bazı lezyonlarda ¹⁸F-FDG ve ⁶⁸Ga-DOTATATE'den daha yüksek aktivite tutulumu saptandı.

Anahtar kelimeler: Medüller tiroid kanseri, prostat spesifik membran antijeni, PSMA, ¹⁸F-FDG, ⁶⁸Ga-DOTA, ⁶⁸Ga-PSMA

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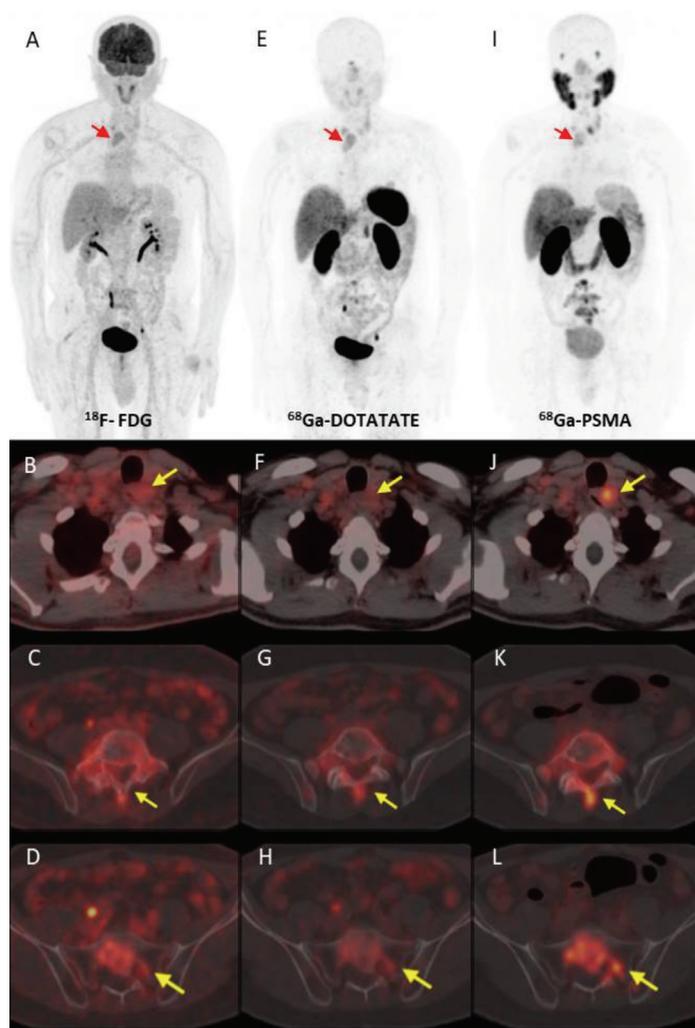


Figure 1. We present the case of a 58-year-old man with medullary thyroid carcinoma (MTC) who underwent total thyroidectomy and bilateral lymph node dissection 7 years ago. In the follow-up, different types of tyrosine kinase inhibitors (TKI) (sorafenib, vandetanib, sunitinib, and cabozantinib) and four cycles of ^{177}Lu -DOTATATE treatments were also administered because of the presence of metastatic disease. The patient had rising calcitonin (up to 15,622 pg/mL) and CEA levels (up to 727 ng/mL) while using TKI treatments. ^{18}F -fluorodeoxyglucose (^{18}F -FDG) and ^{68}Ga -DOTATATE positron emission tomography/computed tomography (PET/CT) were performed for restaging purposes. ^{18}F -FDG PET/CT imaging revealed metastatic conglomerated lymph nodes with mildly increased ^{18}F -FDG uptake in the right upper mediastinum [multiple intensity projection image (MIP) in A, red arrow] and in the left upper paraesophageal region (fused transaxial PET/CT view, arrow); B) as well as metastases in the liver parenchyma (not shown) and bones (i.e., the lumbar vertebrae and sacrum, shown images on C and D). The metastatic lymph nodes in the right upper mediastinum (MIP in E, red arrow) and bone metastases (G and H) also had mildly increased ^{68}Ga -DOTATATE levels, despite no uptake in the left metastatic paraesophageal lymph node (F) and liver metastases (not shown). Because of disease progression, we also performed ^{68}Ga prostate-specific membrane antigen (PSMA) PET/CT to explore whether the patient would be a candidate for PSMA-targeted radionuclide therapy. PSMA uptake was higher than that of ^{18}F -FDG and ^{68}Ga -DOTATATE in the metastatic lymph nodes in the left upper paraesophageal region (J) and bone metastases (K and L), whereas the metastatic lymph nodes in the right upper mediastinum (MIP in I, red arrow) had mild PSMA uptake and no discernible PSMA accumulation in the liver metastases (not shown). MTC is a rare neuroendocrine tumor with an unfavorable prognosis, and the management of the metastatic disease is complex (1). ^{18}F -FDG and ^{68}Ga -somatostatin receptor (SSTR) PET/CT are recommended for detecting recurrent or metastatic disease in MTC with 72.4% and 88.1% sensitivity, respectively (1,2). ^{68}Ga -SSTR PET/CT imaging demonstrates SSTR-avid lesions leading to targeted peptide receptor radionuclide therapy with radiolabeled somatostatin analogs, which are well-tolerated and possibly beneficial treatment alternatives in advanced MTC (3). It has also been shown that PSMA expression is present in some aggressive non-prostatic malignancies, including MTC as a biomarker of angiogenesis, and this observation suggests that PSMA-based radionuclide treatment might be beneficial (4,5,6,7). Moreover, ^{177}Lu -PSMA therapy has been reported in a few patients with non-MTC (8). In this case, because of the presence of progression with TKI treatment and higher uptake of some lesions on ^{68}Ga -PSMA PET/CT compared with ^{18}F -FDG and ^{68}Ga -DOTATATE, ^{177}Lu -PSMA could be considered as a palliative therapy. By presenting this particular case, we speculate that further studies related to the theranostic application of PSMA are needed in patients with MTC who have limited treatment options.

Ethics

Informed Consent: Informed consent was obtained from the patient.

Authorship Contributions

Surgical and Medical Practices: K.Ş., M.S.S., Concept: M.S.S., Design: M.S.S., K.S., Data Collection or Processing: K.Ş., A.K., C.G., Analysis or Interpretation: K.Ş., M.S.S., K.S., Literature Search: K.Ş., A.K., C.G., Writing: K.Ş., K.S.

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