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Gluteal Muscle Metastasis of Papillary Thyroid Cancer with Increased Somatostatin Receptor Expression in ^{68}Ga-DOTATATE PET/MRI

Papiller Tiroit Kanserinin Gluteal Kas Metastazında Artmış Somatostatin Ekspresyonunun ^{68}Ga-DOTATATE PET/MR Görüntüsü

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Abstract

A 56-year-old male patient underwent total thyroidectomy, and pathology revealed multicentric papillary thyroid cancer. His post-operative stimulated thyroglobulin value was >500 ng/mL. ^{18}F-fluorodeoxyglucose positron emission tomography (PET) computed tomography revealed hypermetabolic metastatic pulmonary nodules, cervical, and mediastinal lymph nodes. There was also a hypermetabolic lesion in the left gluteal muscle. Due to the patient's history of a pilonidal cyst in the same region, the possibility of an abscess was also considered, and due to the absence of radioactive iodine (RAI) uptake in the lesion, follow-up was deemed appropriate. During follow-up, as the patient progressed to RAI-refractory state, ^{68}Ga-DOTATATE PET/magnetic resonance imaging, which was done for radionuclide therapy planning, revealed heterogeneously increased uptake in the gluteal lesion. A subsequent biopsy confirmed the diagnosis of thyroid cancer metastasis.

Anahtar Kelimeler: PET/MRI, FDG, ^{68}Ga, DOTATATE, thyroid cancer, muscle, metastasis

Öz

Elli altı yaşında erkek hasta total tiroidektomi sonucunda multifokal papiller tiroid kanseri (PTK) tanısı almıştır. Postoperatif stimüle tiroglobulin değeri >500 ng/mL olarak ölçülmüş olup yapılan ^{18}F-florodeoksiglukoz pozitron emisyon tomografisi (PET) bilgisayarlı tomografi hipermetabolik metastatik pulmoner nodüller, servikal ve mediastinal lenf nodları saptanmıştır. Ayrıca sol gluteal bölgede kastahipermetabolik bir lezyon saptanmıştır. Aynı bölgede pilonidal kist öyküsü de olan hastada abse ihtimali de değerlendirilmiş olup lezyonda radyoaktif iyot (RAİ) tutulumu da olmaması üzerine takip uygun görülmüştür. RAİ refrakter duruma geçen hastaya yapılan ^{68}Ga-DOTATATE-PET/manyetik rezonans görüntülemesinde gluteal lezyonda heterojen artmış aktivite tutulumu gözlenmesiyle birlikte yapılan biyopsi PTK metastazı tanısını doğrulamıştır.

Anahtar Kelimeler: PET/MRI, FDG, ^{68}Ga DOTATATE, tiroit kanseri, kas, metastaz

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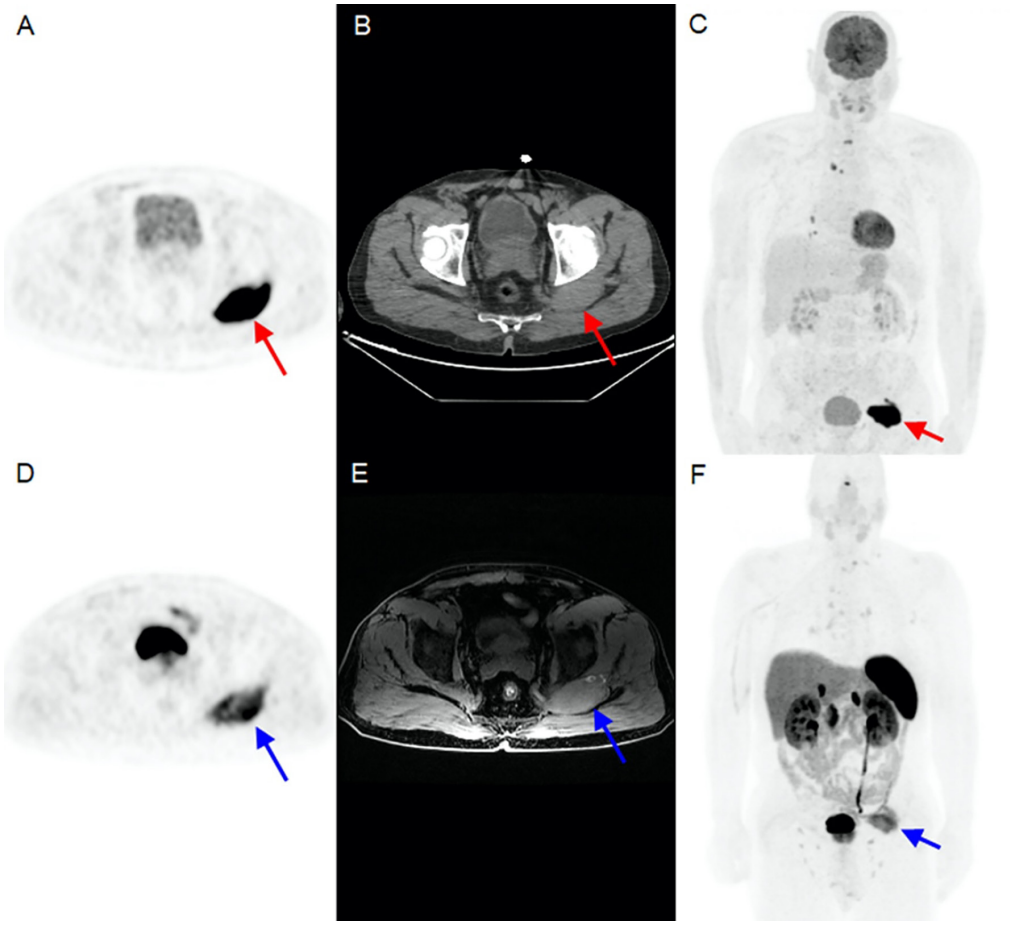

Figure 1. ^{18}F-fluorodeoxyglucose-positron emission tomography (^{18}F-FDG PET) is beneficial in high-risk thyroid cancer patients who have increased thyroglobulin (Tg) levels (>10 ng/mL) for both metastasis detection and prognostication (1,2,3). ^{68}Ga-DOTATATE PET can also be performed for metastasis detection and for ^{177}Lu DOTATATE treatment planning (4,5,6). While cervical lymph nodes, lungs, and bones are the most common sites of metastasis, papillary thyroid carcinoma (PTC) can also metastasize to the brain, kidneys, liver, and adrenal glands (7). Skeletal muscle metastases are extremely rare (8). Our patient had a bilateral total thyroidectomy operation, and the pathology result revealed multicentric (R: 1.1, 0.3, 0.2 cm; L: 7 cm) PTC (follicular, oncocytic follicular, classical variants, and diffuse sclerosing variant containing tall cell areas) and 1/1 central lymph node metastasis. His post-operative stimulated Tg value was >500 ng/dL, and ^{18}F-FDG PET/computed tomography was performed to detect metastasis, which revealed cervical and mediastinal lymph nodes, and pulmonary metastases. Moreover, a 75x36x44 mm hypermetabolic lesion was detected inside the left gluteal muscle [maximum standardized uptake value (SUV_{max})=40.08]. After receiving a total of 750 mCi of radioactive iodine (RAI) therapy, the patient was considered RAI-refractory because of sustained high serum Tg levels. The gluteal lesion did not show radioiodine uptake. The patient underwent ^{68}Ga-DOTATATE PET for radionuclide therapy planning due to a state refractory to RAI. The gluteal lesion showed increased DOTATATE uptake (73x38x40 mm, SUV_{max}=10.43), which increased suspicion for the lesion. A biopsy was performed to rule out a second primary malignancy, and it confirmed thyroid cancer metastasis. Besides being extremely rare, this is the first report of a ^{68}Ga-DOTATATE PET/magnetic resonance imaging (MRI) of thyroid cancer muscle metastasis, to our knowledge. ^{18}F-FDG PET (A), computed tomography (B), and maximum intensity projection (MIP) (C) images of the patient showed a well-circumscribed left gluteal lesion, which had an intense FDG uptake (red arrows). ^{68}Ga-DOTATATE PET (D), T1-weighted MRI (E), and MIP (F) images showed heterogeneously increased ^{68}Ga-DOTATATE uptake (blue arrows).

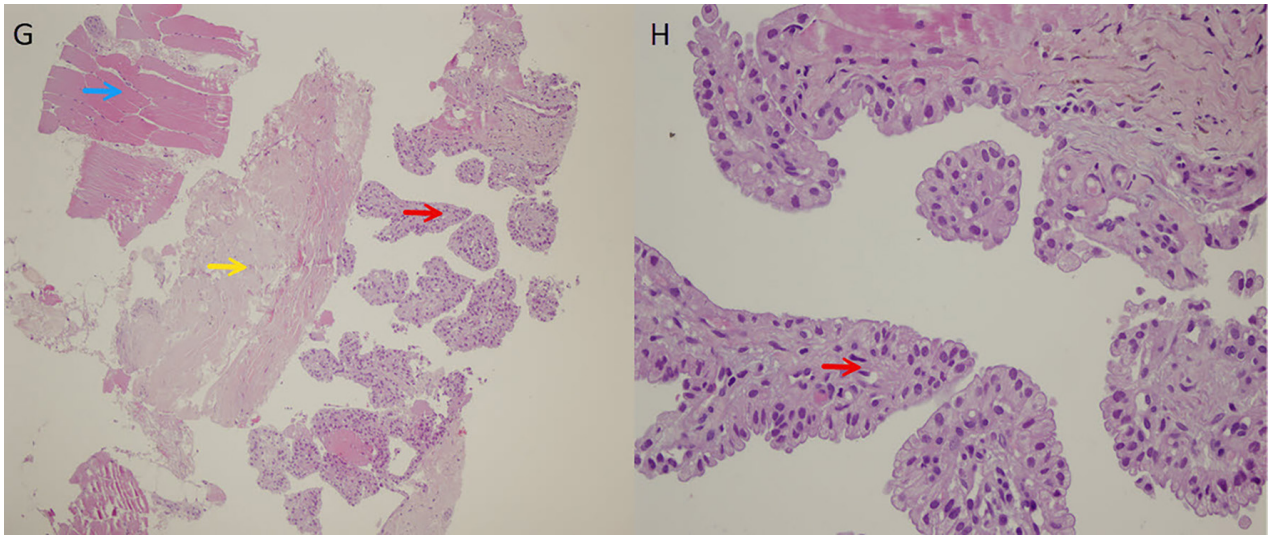

Figure 2. Biopsy histological image. Papillary thyroid carcinoma within skeletal muscle and collagenous tissue [H&E, x40 (G) and x400 (H) magnification], skeletal muscle tissue (blue arrow), collagenous fibrous tissue (yellow arrow), thyroid cancer cells (red arrows).

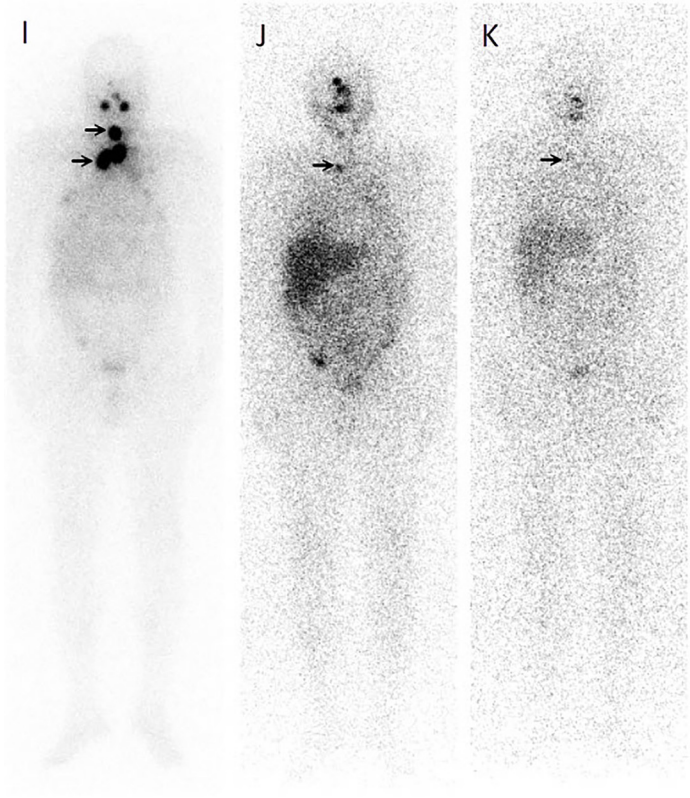

Figure 3. Post-RAI MIP images: the first 250 mCi image (I) shows thyroid bed and mediastinal lymph node uptake (black arrows). The second 250 mCi image (J) shows a lymph node uptake (black arrow). The third 250 mCi image (K) shows a more faint lymph node uptake (black arrow). The gluteal lesion did not show uptake.
RAI: Radioactive iodine, MIP: Maximum intensity projection

Ethics

Informed Consent: Informed consent was obtained from the patient for the use of their imaging data.

Footnotes

Authorship Contributions

Surgical and Medical Practices: A.K., Concept: A.K., S.A., L-U.B., M.Ö., S.S., K.S., H.B.S., Design: A.K., S.A., Data Collection or Processing: A.K., S.A., L-U.B., M.Ö., S.S., K.S., H.B.S., Analysis or Interpretation: A.K., S.A., L-U.B., M.Ö., S.S., K.S., H.B. S., Literature Search: A.K., Writing: A.K.

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

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