Case Report
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An Unusual Solitary Prostate Cancer Metastasis Detected by Gallium-68 Prostate-specific Membrane Antigen-labeled Positron Emission Tomography/Magnetic Resonance Imaging

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Abstract

The two most common sites of prostate cancer metastasis include the lymph nodes and bone. Solid-organ metastases usually occur in the lungs, liver, and brain. Prostate adenocarcinoma metastasis to the skin and subcutaneous cellular tissue occurs in <0.3% and are thus considered exceptional. Herein, we report a unique case of a pectoral subcutaneous metastasis as the first recurrence site after definitive local and systemic therapy for prostate cancer, which was identified by gallium-68 prostate-specific membrane antigen-labeled positron emission tomography/magnetic resonance imaging.
Keywords: Prostate cancer, metastasis, unusual, Ga-68 PSMA PET/MRI

Introduction

Prostate cancer is one of the most important health problems of males today. According to the 2018 GLOBOCAN data, prostate cancer is the second most common cancer in males but is the eighth in cancer-related deaths (1). The most frequent histologic type is adenocarcinoma. The two most common sites of metastasis include the lymph nodes and bone. Solid-organ metastases usually occur in the lungs, liver, and brain (2). Prostate adenocarcinoma metastasis to the skin and subcutaneous cellular tissue occurs in <0.3% and is thus considered exceptional (3). Herein, we report a unique case of a pectoral subcutaneous metastasis as the first recurrence site after definitive local and systemic therapy for prostate cancer, which was identified by Gallium-68 (Ga-68) prostate-specific membrane antigen (PSMA)-labeled positron emission tomography/magnetic resonance imaging (PET/MRI).

Case Report

A 66-year-old male patient had an International Society of Urological Pathology Grade 5 prostate adenocarcinoma with a prostate-specific antigen (PSA) level of 7 ng/mL. Ga-68 PSMA PET/MRI examination at the time of diagnosis did not reveal any systemic metastasis but showed right seminal vesicle invasion. The patient received neoadjuvant chemotherapy (six cycles of docetaxel) along with androgen ablation (after the third cycle of chemotherapy). Then, robot-assisted laparoscopic radical prostatectomy and lymph node dissection were performed. The pathological stage was pT3b N0. Surgical margins were negative, but the seminal vesicle invasion was confirmed. Androgen ablation was postoperatively stopped. Radiotherapy to prostatic bed and pelvis was planned at 6 months after continence was sufficiently achieved. Postoperative nadir PSA was 0 ng/mL at 1 month, which did not change during the follow-up. On postoperative 18 months, PSA recurred as 0.1 and 0.2 ng/mL in two consecutive tests, and immediately, a new Ga-68 PSMA-labeled PET/MRI examination was done. Only a 15×9 mm subcutaneous soft tissue nodule on the right pectoral region with increased Ga-68 PSMA uptake (SUV_{max}: 7.5) was detected on maximum intensity projection (MIP) image, axial T1-w, and fusion PET/MRI images (red arrows, Figure 1a, 1b, and 1c). Axial diffusion-weighted image (DWI, b: 1000) and apparent diffusion coefficient (ADC) map, which was performed

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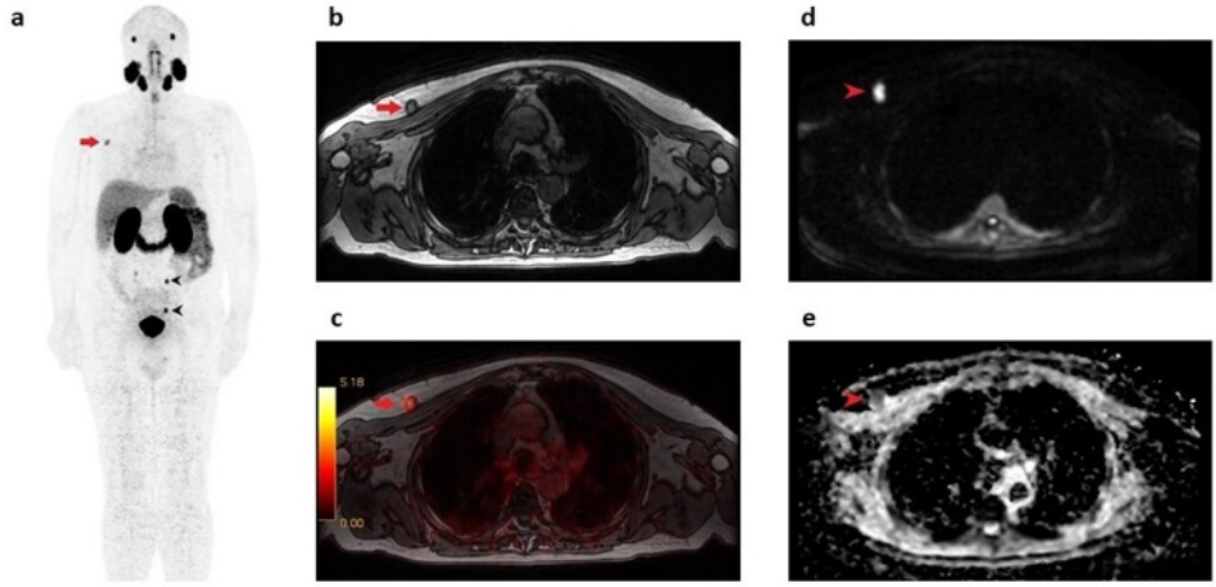

Figure 1a,b,c,d,e. Ga-68 PSMA PET/MRI image

PSMA: Prostate-specific membrane antigen, PET: Positron emission tomography, MRI: Magnetic resonance imaging

in the same imaging session with PET/MRI, also revealed increased signal and diffusion restriction on this lesion (red arrowheads, Figure 1d and 1e). On the MIP image, urinary activities were also seen in the left ureter (black arrowheads, Figure 1a). The nodule was excised, and the pathological examination revealed a well-capsulated adenocarcinoma metastasis with negative surgical margins in the subcutaneous fat tissue. Since then, the patient was followed with a 0-ng/mL PSA level and without disease evidence. This article was written by taking informed consent form from the patient.

Discussion

PSMA ligand PET/computed tomography (CT) or PET/MRI has high sensitivity and specificity for prostate cancer staging (4). Furthermore, Ga-68-labeled PSMA PET imaging demonstrated a higher detection rate of 45% in patients with biochemical recurrence (BR) and PSA values of 0.2-0.49 ng/mL compared with the other conventional imaging methods (5). Previous studies (6,7,8) reported 47% and 57% detection rates for patients with PSA values of ≤0.2 ng/mL and 0.2-0.5 ng/mL after radical prostatectomy. PET/MRI showed higher detection rates in patients with BR compared to the PET/CT due to the additional diagnostic value of MRI with superior soft tissue contrast. A recent study (9) revealed that Ga-68 PSMA PET/MRI showed PSMA-positive lesions in 65% of patients with a PSA level of 0.2-0.5 ng/mL. Recurrent lesions are mostly located in the prostatic bed, lymph nodes, and bones.

Ga-68 PSMA PET/MRI was performed in our reported case with BR after radical prostatectomy. Only a subcutaneous soft tissue nodule on the right pectoral region with increased Ga-68 PSMA uptake on PET, increased signal intensity on DWI, and diffused restriction on ADC map was detected. According to the proposed structured reporting system for PSMA PET imaging, PSMA-RADS Version 1.0 (10), the lesion detected on PSMA PET/MRI was considered as PSMA-RADS-3C because of the intense uptake but highly atypical localization for prostate cancer. Additionally, excisional biopsy to confirm diagnosis histologically was performed, and pathological examination revealed prostatic adenocarcinoma metastasis. The subcutaneous dissemination of prostate cancer is a rare and unusual metastatic site. Previous case reports have reported patients with skin and subcutaneous metastases from small cell carcinoma of the prostate (11,12), but our case did not have neuroendocrine differentiation. Subcutaneous metastasis may be seen in patients in advanced stages and terminal phases (13), but unusual as the first and only site.

Considering its higher sensitivity and specificity, whole-body Ga-68 PSMA-labeled PET/MRI contributes to the diagnostic work-up and restaging of patients with BR during prostatic bed evaluation, as well as in atypically located metastatic lesion detection.

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Ethics

Informed Consent: This article was written by taking informed consent form from the patient.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Supervision: L.Ö.A., Concept: T.S.S., Design: R.T.A., Data Collection or Processing: U.A., S.Ç., Analysis or Interpretation: U.A., S.Ç., Literature Search: U.A., Writing: S.Ç.

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