Case Report

All that Glitters on PSMA is Not a Lesion: An Unusual Artifact on PSMA PET/CT

Abstract

Nonspecific uptake of prostate-specific membrane antigen (PSMA) on PSMA positron-emission tomography/computed tomography (CT) is normally encountered in benign conditions, which is detected on morphological changes on CT component. However, having a site of uptake without any CT finding is a rare occurrence. We herewith report one such rare case of a 66-year-old male with metastatic prostatic adenocarcinoma, who demonstrated an incidental finding of intense focal PSMA uptake in the lung parenchyma.

Keywords: *Iatrogenic, prostate-specific membrane antigen, pulmonary embolism*

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Introduction

Prostate-specific membrane antigen (PSMA) positron-emission tomography/computed tomography (PET/CT) has now established its place as the modality of choice for diagnosis and staging of prostate cancer. Although the sensitivity and specificity of it are high for the detection of metastatic disease, PSMA has nonspecific expression in various normal structures and benign lesions.[1] Usually, the false-positive uptake findings are detected by morphological changes on CT. For characterization of lung abnormalities, CT scan does have better sensitivity than PET due to its inherent high spatial resolution.[2] On very rare occasions, it is seen that focal tracer uptake does not correspond with any abnormal changes on CT. We report this rare case of intense PSMA tracer uptake in lung parenchyma without any abnormal changes on CT scan.

Case Report

A 67-year-old male, with adenocarcinoma of the prostate, Gleason's score 9, had upfront metastatic nodal and skeletal lesions. He underwent bilateral orchiectomy and received six cycles of docetaxel. Treatment was completed in July 2017 and was then on abiraterone. In November 2020, the patient was referred for 68-Ga PSMA PET/CT for restaging in view of rising serum PSA. 2.5 mCi (92.5MBq) was injected intravenously by securing a 22G intravenous cannula and dedicated whole-body scan was acquired 40 min after injection. Maximum intensity projection [Figure 1a] revealed intense uptake in the primary prostatic site. Intense uptake was seen in the region of upper lobe right lung [Figure 1a – arrow] with few foci of low-grade uptake in regions of the middle and lower lobes of the right lung. The foci of low-grade uptake corresponded to infective changes in the lung parenchyma. On axial fused PET/CT images [Figure 1b,1c], intense focal uptake was considered as a metastatic nodule; however, there was no corresponding morphological lesion seen on axial CT [Figure 1d,1e] in lung window. Hence, this finding was considered artifactual.

Discussion

PSMA, a type II transmembrane protein, is encoded by folate hydrolyse 1 gene or glutamate carboxypeptidase II gene which is normally expressed in prostate and overexpressed prostatic cancer. Small molecules like PSMA 11 have been developed which bind to the extracellular site of transmembrane protein and are most commonly used for diagnostic purposes in a setting of biochemical recurrence and initial staging of prostate cancer.[3] CT component of PET CT hybrid imaging

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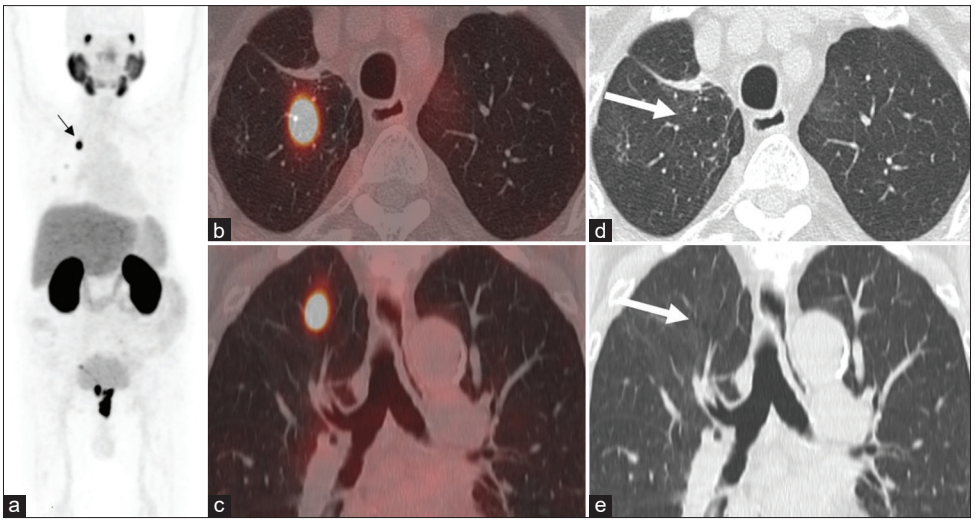

Figure 1: Maximum projection intensity (a) image shows intense focus of uptake in the right lung region, which corresponds to focal prostate-specific membrane antigen uptake on axial and coronal fused positron-emission tomography/computed tomography images (b and c); however, no morphological lesion is seen on axial and coronal computed tomography images (d and e) in lung window

serves two purposes, one of attenuation correction and second and most commonly it helps in morphological interpretations of metabolic activity seen on PET. It is a very common belief that focal intense uptake on functional imaging done in known cases of malignancy correlates with a metastatic lesion and now, it is a well-established fact that sensitivity of 68-Ga PSMA PET CT is superior to conventional anatomical imaging in the detection of metastatic disease.[4] However, very rarely, focal intense uptake of PSMA is encountered without any changes on correlative CT. Numerous case reports have been documented in literature with regard to similar scenarios on fluorodeoxyglucose PET CT which is the most commonly used tracer.[5] It is concluded that uptake of injected tracer in the lungs is due to the entrapment of platelet-rich clots in the pulmonary microcirculation which, in turn, concentrate it on activated platelets. These clots are formed at the site of injection due to endothelial injury caused by paravenous injection of tracer and then embolize to the lungs.[6] Other causes include abnormal peripheral venous system, hypercoagulopathies, and use of old intravenous cannulas.[7] We hypothesized that similar could be the mechanism for focal PSMA expression in lungs without any correlative CT scan change and we suppose this is the first case to be reported till now to the best of our knowledge. Thus, focal intense PSMA uptake with no morphological changes on CT represents a pitfall and although rarely encountered in practice, it should be kept in mind and documented correctly to avoid misinterpretation and wrong diagnosis.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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