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Keywords: Prostate Cancer Metastasis; PSMA PET-CT; PSMA Pitfall; Vertebral Irradiation; Radiation-Induced Lung Injuries



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PSMA PET-CT Imaging of Radiation-Induced Lung Injury from Vertebral Radiotherapy

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Absrtract: Radiation-induced lung injuries (RILI) are a notable complication of thoracic radiotherapy, significantly affecting the quality of life and prognosis for cancer patients. We present the case of a 68-year-old man with metastatic prostate cancer who underwent radiation therapy for a metastatic thoracic vertebral lesion identified with high uptake on a PET-PSMA scan. Four months later, a follow-up PET-PSMA scan indicated that the pathological uptake in the vertebra had resolved, but it also revealed a new lung consolidation with PSMA uptake. This case illustrates a potential pitfall in interpreting PSMA PET-CT findings, as the uptake in the lung lesion was due to RILI rather than malignancy, infection, or another form of pneumonia, highlighting the necessity for careful clinical correlation to avoid misdiagnosis and potentially inappropriate and unnecessary treatment.

Keywords: prostate cancer metastasis; PSMA PET-CT; PSMA Pitfall; vertebral irradiation; radiation-induced lung injuries

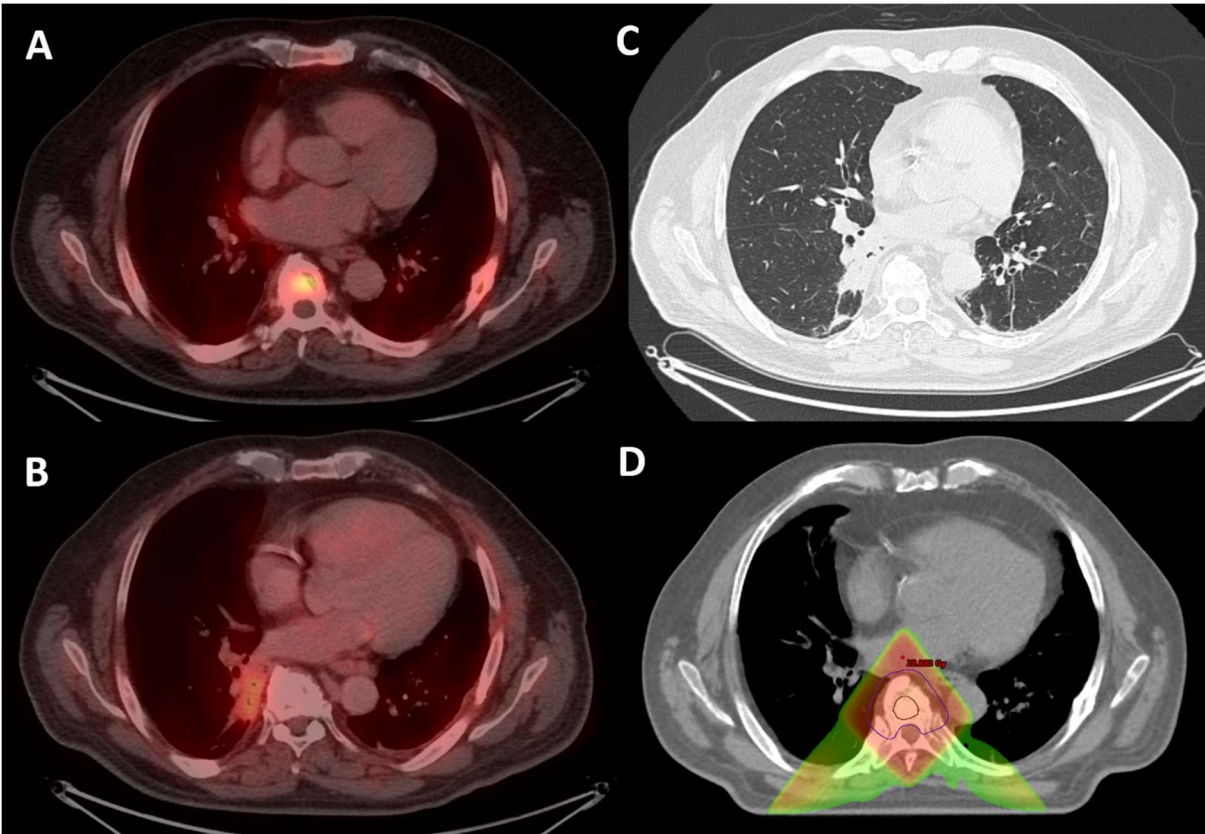


Figure 1. A 68-year-old male with metastatic castration-resistant prostate cancer had a partial response to Carboplatin and Taxotere and received palliative radiation-therapy, 20 Gy in 5 fractions, to a dorsal vertebral (D7) metastasis positive on 18F-PSMA PET-CT (figure A). PSA serum levels dropped from 65 to 0.06 ng/mL. Four months later, on routine follow-up, a 18F-PSMA PET-CT scan showed increased mild uptake (figure B) in a new paravertebral lung consolidation/mass measuring 4x2 cm in the right lower lobe (figure C).

Due to the short time interval between the two 18F-PSMA PET-CT scans, a new primary malignant lung lesion was improbable, as would be a new metastatic prostate lesion, when the PSA serum level was almost undetectable. Hence, the most reasonable diagnosis for the new lesion remains infection or inflammation as a PSMA PET misleading finding¹. Absence of pneumonia symptoms, normal inflammatory markers, directed us to check the radiation treatment planning (figure D) where the Inner circle represents Clinical Target Volume, outer circle the Planning Target Volume, the red rhombus corresponds the isodose lines 18.5-20.4 Gy, and finally the green triangle refers to absorbed 50% isodose lines, 10Gy, which overlap the new lung finding. Leading us to the most probable diagnosis of radiation pneumonitis².

Radiation-induced lung injuries (RILI) are a significant complication of thoracic radiotherapy, broadly discussed in the literature mainly as a result of radiation treatment to lungs lesions³. Our review of the literature indicates that this is the first report to highlight the pitfall of PSMA PET-CT uptake in RILI resulting from irradiation of vertebral metastasis. Early and accurate diagnosis of RILI is crucial to avoid misdiagnosis, unnecessary additional testing, and potentially inappropriate and unnecessary treatment.

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Consent to publish: All authors have read and agreed to the published version of the manuscript.

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