

CASE REPORT

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PSMA-expressing, fluciclovine-negative vertebral hemangioma

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Abstract

Background False-positive findings in Prostate-Specific Membrane Antigen Positron Emission Tomography-Computed Tomography (PSMA PET-CT) can complicate accurate staging of prostate cancer, especially in cases such as vertebral hemangiomas, a benign lesion of the spinal column. These ambiguities may result in unnecessary biopsies in patients with prostate cancer when PSMA PET findings are inconclusive.

Case presentation We present the case of a 68-year-old male with prostate cancer who had a PSMA-expressing, fluciclovine-negative vertebral hemangioma.

Conclusion This case highlights the role of fluciclovine PET-CT in distinguishing benign vertebral hemangiomas from prostate cancer metastases, improving diagnostic accuracy specifically in positive cases of PSMA PET-CT.

Keywords PSMA PET-CT, Fluciclovine PET-CT, Vertebral hemangioma, Prostate cancer staging

Background

Considering the high PSMA expression in malignant prostate cells, PSMA PET imaging is an effective tool for detecting prostate cancer metastases [1, 2]. However, sometimes false-positive results occur, especially in benign lesions such as vertebral hemangiomas. These benign vascular lesions of the spine are incidental findings with characteristic radiologic features. These features include the “corduroy cloth” appearance on X-ray, “polka-dot” patterns on axial CT, and T1 hyperintensity on MRI [3, 4]. Atypical vertebral hemangiomas may lack these features, complicating diagnosis and potentially leading to unnecessary biopsies [3, 4].

Fluciclovine PET is a complementary imaging modality for the staging of prostate cancer. Fluciclovine PET

targets amino acid transporters overexpressed in malignant cells and enhances diagnostic specificity when PSMA PET findings are ambiguous [5, 6]. This case demonstrates the combined use of PSMA and fluciclovine PET to distinguish benign vertebral hemangiomas from malignant metastases, enhancing diagnostic precision.

Case presentation

A 68-year-old man with high-risk prostate cancer (Gleason score 4 + 5 = 9) underwent radical prostatectomy and androgen deprivation therapy. Baseline 99mTc-MDP bone scintigraphy (Fig. 1A) revealed no abnormal tracer uptake in the skeleton. A staging 18 F-fluciclovine PET/CT (Fig. 1B), 4 years prior, showed no abnormal skeletal uptake. A recent 18 F-PSMA PET/CT (figure C) demonstrated intense focal uptake in the L1 vertebral body, correlating with an unchanged geographic lytic lesion. Comparative imaging confirmed the lesion's stability over four years. It exhibited background avidity on fluciclovine PET and no uptake on 99mTc-MDP bone scintigraphy. Based on these findings and its geographic lytic

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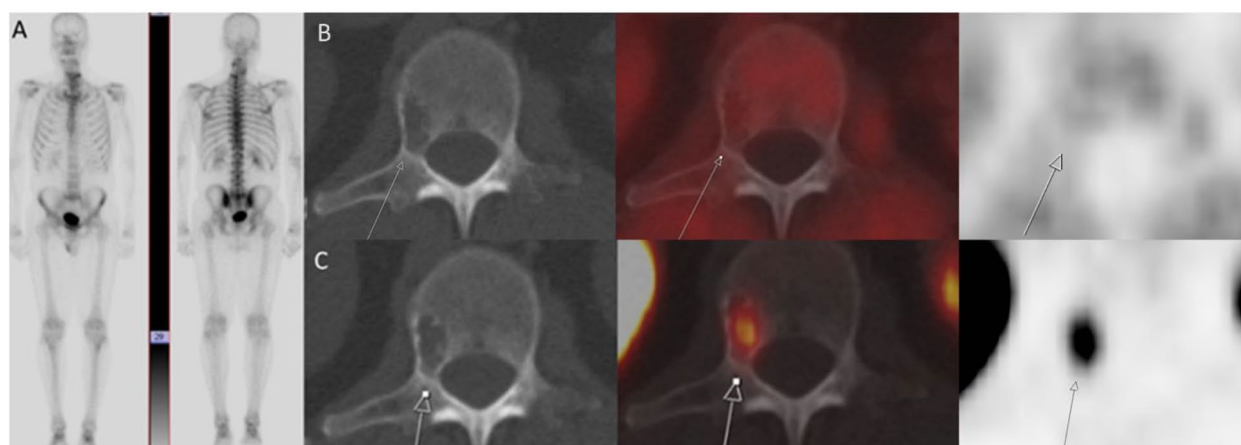


Fig. 1 **A:** 99mTc-MDP bone scintigraphy revealed no abnormal tracer uptake in the skeleton. **B:** 18 F-Fluciclovine PET, CT, and fused PET/CT images demonstrated no abnormal tracer uptake within the geographic lytic lesion at L1. **C:** PSMA PET, CT, and fused PET/CT images demonstrate the L1 lytic vertebral lesion, stable in size and appearance, while exhibiting intense avidity

appearance, the lesion was diagnosed as a vertebral hemangioma with increased 18 F-PSMA uptake but background fluciclovine avidity [6].

Conclusion

PSMA PET-CT has revolutionized prostate cancer imaging due to its high sensitivity, yet it is prone to false-positive findings in benign lesions such as vertebral hemangiomas [1, 2]. Atypical hemangiomas may mimic metastases, leading to unnecessary interventions. In this case, fluciclovine PET-CT confirmed the benign nature of the PSMA-expressing lesion. Studies have shown that fluciclovine PET offers superior specificity in differentiating malignant prostate lesions from benign conditions [5, 6]. Its targeted mechanism—focusing on amino acid transporters overexpressed in prostate cancer cells—avoids uptake in benign lesions.

When combined with PSMA PET, fluciclovine PET enhances diagnostic accuracy, reducing misdiagnosis, unnecessary biopsies, and healthcare costs. By integrating these modalities, clinicians can optimize staging and treatment planning, ensuring appropriate care for prostate cancer patients with ambiguous PSMA PET findings.

Whenever PSMA PET results are inconclusive, fluciclovine PET-CT can serve as a complementary modality. Its specificity in distinguishing benign vertebral hemangiomas from malignant metastases minimizes diagnostic uncertainty, unnecessary interventions, and healthcare costs. When PSMA PET findings are equivocal, fluciclovine PET-CT can be considered to improve prostate cancer staging accuracy.

Abbreviations

PSMA	Prostate-Specific Membrane Antigen
PET-CT	Positron Emission Tomography-Computed Tomography

99mTc-MDP Technetium-99 m Methylene Diphosphonate

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Authors contributions

AE: Data collection and manuscript writing, AHJ: Data collection, supervision, manuscript editing..

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Data availability

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Declaration

Ethics approval and consent to participate

Given the retrospective nature of this anonymized case study, ethics approval was waived.

Consent for publication

The patient provided written informed consent to publication of this report.

Competing interests

The authors declare no conflicts of interest.

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