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Paget's Disease Mimicking Bone Metastases in Prostate Cancer Patient - A Case Report

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Abstract

Background. Prostate cancer is one of the most common diagnosed cancers in male globally. Bone metastases are one of the hallmarks of advanced stage prostate cancer. However, in some cases become difficult to distinguish metastatic lesions from benign lesions in some imaging techniques due to similar characteristics. Paget's Disease is an example in which bone lesions seems to mimicking osseous metastases. It requires a careful diagnostic and imaging modality to clarify these types of lesions in order to have the correct diagnose and stage of the disease.

Case report. This report presents a clinical case of a 76 -year-old man diagnosed with prostatic adenocarcinoma Gleason 6 (3+3). Initial MRI and bone scan indicated the probability of multiple bone metastasis being evident. Further imaging modalities were sought such as CT scan, which was negative for distant metastases. Taking into consideration all the clinical, pathological and imaging features of the disease, a PSMA PET/CT was performed to achieve a high level of certainty about the nature of these lesions and the staging of the disease. The latter result made a major impact on clinical and treatment decision for this patient, indicating that skeleton lesions may be associated with Paget's disease.

Conclusion. This case highlights the importance of utilizing modern, advanced imaging techniques to ensure an accurate diagnosis, which

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directly impacts disease staging and treatment planning. Correlating clinical symptoms and pathological findings with imaging results is crucial to selecting the most appropriate therapeutic approach. Differentiating accurately between Paget disease and bone metastases is vital to avoid misdiagnosis. In prostate cancer patients, such an error could result in the unjustified exclusion from curative treatment options or the initiation of unwarranted systemic therapy.

Keywords: bone metastases, Paget's disease, Prostate cancer, PSMA PET/CT.

INTRODUCTION

Benign and malignant diseases frequently involve the skeletal system, often presenting with suspicious radiologic features that make it difficult to determine the exact nature of the lesions and pose a challenge in their identification (1). It is of great clinical importance to distinguish radiologically of bone lesions between Paget's disease and secondary lesions from prostate cancer (2). The appearance in imaging studies as sclerotic lesions or mixed lytic-sclerotic of both diseases requires a well-defined differential diagnosis, from which the treatment strategy will be planned (3).

Paget's disease is a common metabolic bone disorder characterized by an accelerated rate of bone remodeling followed by the formation of disorganized woven bone by osteoblasts (4). The affected bones may become enlarged and deformed [4]. The skull, vertebrae, pelvis, sacrum, and lower extremities are the skeletal sites commonly involved in persons with Paget's disease (5). The benign nature of Paget's disease and its complications such as bone deformities, secondary osteoarthritis, pathologic fractures, and rarely, malignant transformation require timely recognition and monitoring (6). On the other hand, bone metastases from prostate cancer are a common and serious complications that require careful diagnosis and special treatments based on the patient's condition (7,8,9,10,11). Venous dissemination through Batson's plexus involves the axial skeleton especially the spine, pelvis, and ribs (12,13).

Considering similarities in demographics, anatomical distribution and radiologic appearance emphasizes the essential role of imaging modalities including plain radiography, computed tomography (CT), magnetic resonance imaging (MRI), bone scintigraphy, and positron emission tomography (PET), PSMA PET/CT to have an accurate differential diagnosis (14,15). Each modality has certain sensitivity and specificity assessing bone architecture, metabolic activity, and lesion distribution (16).

CASE REPORT

A 76-year-old male with no significant comorbidities and no family history of cancer presented in November 2024 with complaints of increased urinary frequency. On examination, his PSA level was elevated at 5.79 ng/ml. A histopathology report confirmed prostatic adenocarcinoma Gleason 6 (3+3), grade group I, with perineural invasion in the right prostate and 40% involvement on the left side. MRI findings suggested altered signal intensity in the iliac and ischial bones with both hypersignal and hypo signal on T1, probably secondary aspect. Additionally, bilateral inguinal lymph nodes were noted with a preserved fibrotic hilus, measuring up to 15 mm. In December 2024, a bone scintigraphy revealed increased osteotropic tracer fixation in the left humerus, lumbar vertebra L1, and left sacral vertebrae, with evidence of multiple bone metastases. However, a CT scan of the thorax and abdomen was negative for distant metastases. (Figures 1 a,b)

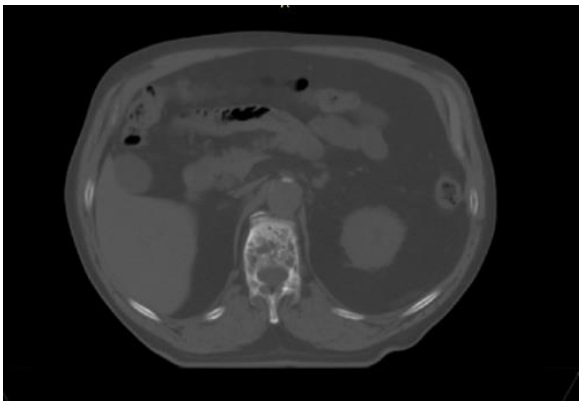

Figure 1a. CT simulation shows lesion nonspecific for bone metastasis

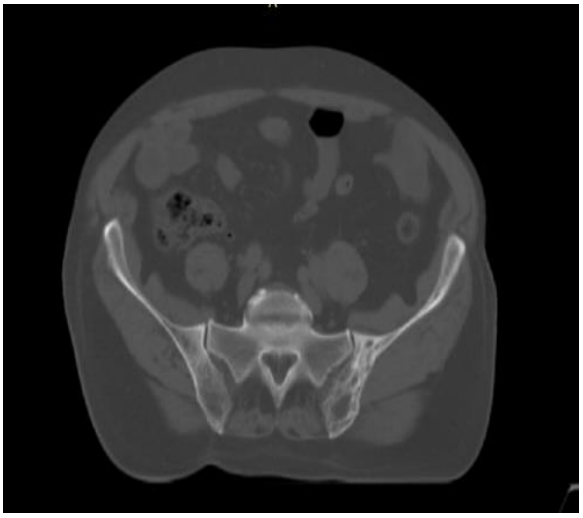

Figure 1b. Image at CT simulation

The patient also reported non-specific pain in the lower extremities. Given the findings, palliative radiotherapy was planned for the iliac and ischial bones, with the patient started on Bicalutamide (150 mg/day for 2 weeks), followed by Goserelin (10.8 mg every 12 weeks), and Bicalutamide 50mg/day ongoing and Ibandronic acid (50 mg/day). Calcium levels were at 9.6 mg/dl (8.8-10.5) and PSA level at 6.56 ng/ml (0.0-4.0). Despite initial concerns, a PSMA PET/CT scan was recommended for further clarification. The PSMA PET confirmed the presence of the primary prostate lesion but suggested that the skeletal lesions were more likely related to Paget's disease. (Figures 2a,b)

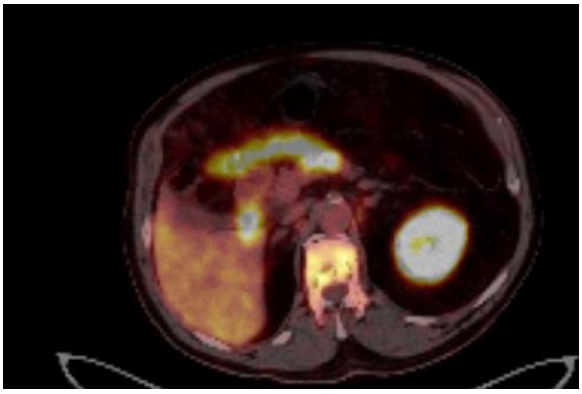

Figure 2a. PSMA PET image

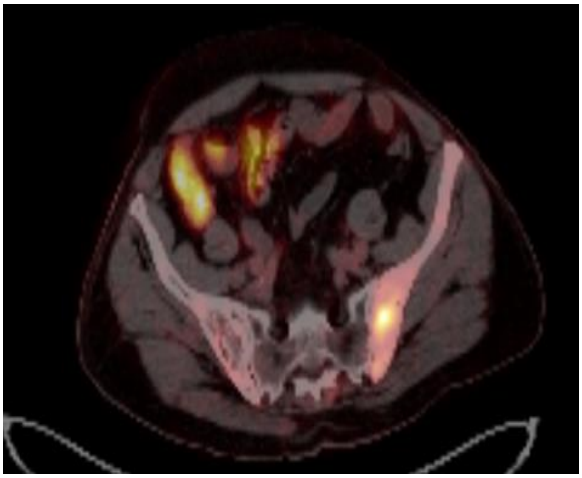

Figure2b. PSMA PET image

This new information, combined with the patient's low Gleason score and elevated PSA, led to a restaging of the cancer as low-risk prostate cancer. In February 2025, after discussion at a multidisciplinary team (MDT) meeting, the patient was presented with the options of active surveillance versus local radical radiotherapy. Due to the absence of an active surveillance protocol in our country, and following a thorough discussion, the decision was made to proceed

with local radiotherapy. The patient underwent VMAT (Volumetric Modulated Arc Therapy) with a dose of 70.2 Gy in 26 fractions. The patient experienced acute toxicity with increased urinary frequency and dysuria but reported no gastrointestinal toxicity. Follow-up is ongoing to assess the patient's response to treatment.

DISCUSSION

Paget disease of bone (PDB) is a chronic skeletal disorder characterized by disorganized bone remodeling, leading to bone enlargement and structural weakness. It most commonly affects the pelvis, spine, femur, and skull. Prostate cancer frequently metastasizes to bone, with skeletal involvement often being osteoblastic. This overlapping predilection for skeletal sites and radiologic similarities can result in diagnostic confusion between PDB and bone metastases (17,18).

The radiologic appearances of Paget disease can resemble sclerotic or mixed lytic-sclerotic metastases seen in advanced prostate cancer. Pagetic lesions typically show cortical thickening, trabecular coarsening, and bone expansion. In contrast, prostate cancer metastases are often multifocal, sclerotic, and lack bone enlargement. However, early or monostotic Paget disease may be indistinguishable from metastasis on plain radiographs or bone scans, especially in the elderly, where both conditions can coexist (19).

Bone scintigraphy using technetium-99m methylene diphosphonate (99mTc-MDP) often demonstrates increased uptake in both conditions. However, Paget disease tends to show intense, well-demarcated uptake corresponding to classic sites, often in a contiguous pattern. Metastases, by contrast, typically appear as multiple focal areas of increased activity, often asymmetric. Still, bone scans are non-specific, and further evaluation with MRI, CT, or PET/CT is often necessary to differentiate the two entities (20,21). MRI can provide more detailed anatomical information. Paget disease usually shows a thickened cortex and preserved fatty marrow signal, whereas metastases often replace marrow fat with low T1 signal intensity and may be associated with soft tissue masses. FDG-PET/CT may also be useful, though FDG uptake in Paget disease can be elevated, leading to potential misdiagnosis (17,19,20).

A definitive diagnosis may sometimes require biopsy, especially in cases of isolated lesions in patients with known malignancy where treatment decisions (e.g., initiation of systemic therapy) depend on accurate staging.

In equivocal cases—especially solitary lesions in patients with known malignancy—histopathological confirmation via biopsy may be necessary to establish the diagnosis and guide appropriate treatment decisions (22).

This case illustrates the vital role of precise diagnostic assessment in the staging of prostate cancer, especially when differentiating true bone metastases from benign conditions like Paget's disease. Despite the patient's low Gleason score and only moderately elevated PSA, bone

scintigraphy revealed multiple suspicious skeletal lesions that were initially interpreted as metastatic. This led to the initiation of systemic therapy and plans for palliative radiotherapy. However, further evaluation with PSMA PET/CT—a more advanced molecular imaging modality—identified no metastatic spread and instead indicated findings consistent with Paget's disease. This discovery led to a significant change in clinical management, preventing unnecessary treatment and allowing for accurate restaging and appropriate local therapy.

CONCLUSION

The case highlights the potential for misinterpretation with conventional imaging and the clinical value of PSMA PET in clarifying ambiguous findings in patients with low-risk prostate cancer. This case underscores the importance of thorough and multi-step diagnostic processes, as well as the necessity of ongoing reassessment in the management of prostate cancer, especially when initial imaging findings could be misleading. Multidisciplinary team involvement and patient-centered decision-making played critical roles in guiding appropriate treatment in a setting with limited active surveillance options.

Correct differentiation between Paget disease and metastasis is critical to avoid overtreatment or inappropriate staging. In prostate cancer patients, misinterpreting Paget disease as bone metastases could result in the inappropriate exclusion from curative therapies or unnecessary systemic treatment.

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