

Synchronous osseous metastasis, degenerative changes, and incidental multifocal Paget's disease in a case of newly diagnosed prostatic carcinoma

ABSTRACT

Tc-99m methylene diphosphonate bone scintigraphy (bone scan) is a highly sensitive technique for the evaluation of osseous pathology. However, the nonspecificity of the method can present diagnostic challenges in differentiating benign from malignant processes. Often, Paget's disease and osseous metastasis can coexist in elderly patients. Therefore, it is important to accurately distinguish the two pathologies, as each has a different prognosis and impacts clinical management. Obtaining the appropriate clinical diagnosis often involves a combination of laboratory, radiographic, and clinical data. We present a case of newly diagnosed prostatic carcinoma presenting with synchronous osseous metastasis, degenerative changes, and incidental multifocal Paget's disease.

Keywords: Bone scintigraphy, osseous metastasis, Paget's disease, prostate carcinoma

INTRODUCTION

An 87-year-old male with prostate cancer and a prostate-specific antigen (PSA) of 21 was evaluated for osseous metastasis with bone scintigraphy. Bone scintigraphy demonstrated multiple areas of focal increased uptake, including the mid-cervical spine, T7-T8 vertebral bodies, left posterior 6th rib, and right iliac wing, concerning for osseous metastatic disease [Figure 1]. In addition, there was focal increased radiotracer uptake within the medial portion of the right clavicle, T11 vertebral body, medial compartment of the left knee, and the calvarium sparing the mandible, secondary to Paget's disease [Figures 2 and 3]. Of note, the image demonstrates the "Mickey Mouse sign" of the T11 vertebral body [Figure 2]. There was also mild increased heterogeneity throughout the thoracolumbar spine, secondary to degenerative changes.

CASE REPORT

An 87-year-old male was referred to urology after complaining of urinary incontinence with a PSA value of 14 that

subsequently rose to 21. The patient underwent magnetic resonance imaging which revealed findings concerning for malignancy. Biopsy revealed prostate cancer w/Gleason score of eight. To evaluate for metastatic disease, both computed tomography (CT) chest/abdomen/pelvis and bone scintigraphy were ordered. The CT report commented on a bony lesion in the right ileum with no lymphadenopathy. Bone scan showed diffuse uptake consistent with osseous metastatic disease, Paget's disease, and degenerative disease. Due to the increased sensitivity of the bone scan, the patient was able to be started on the appropriate medications and has responded well to therapy.

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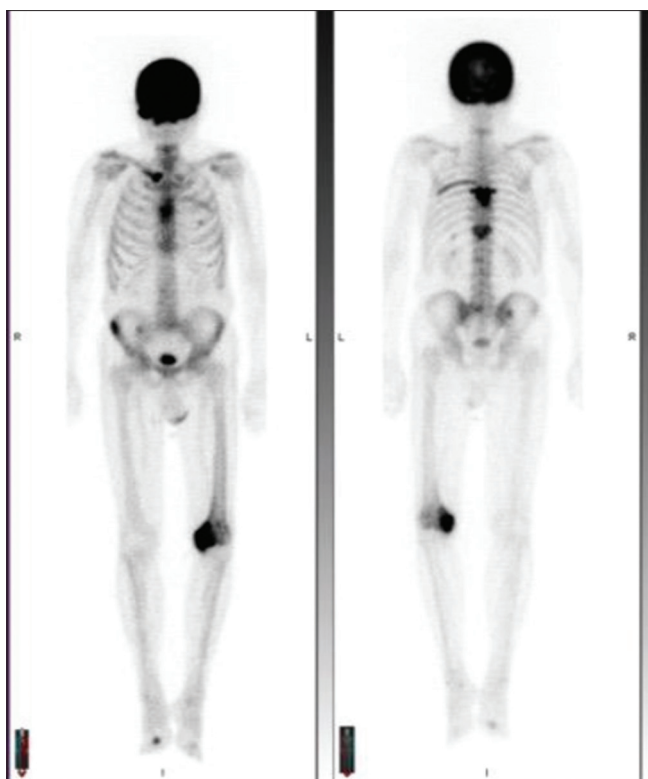


Figure 1: Diffuse areas of increased uptake including mid cervical spine, T7-T8 vertebral bodies, left posterior 6th rib and right iliac wing concerning for osseous metastatic disease

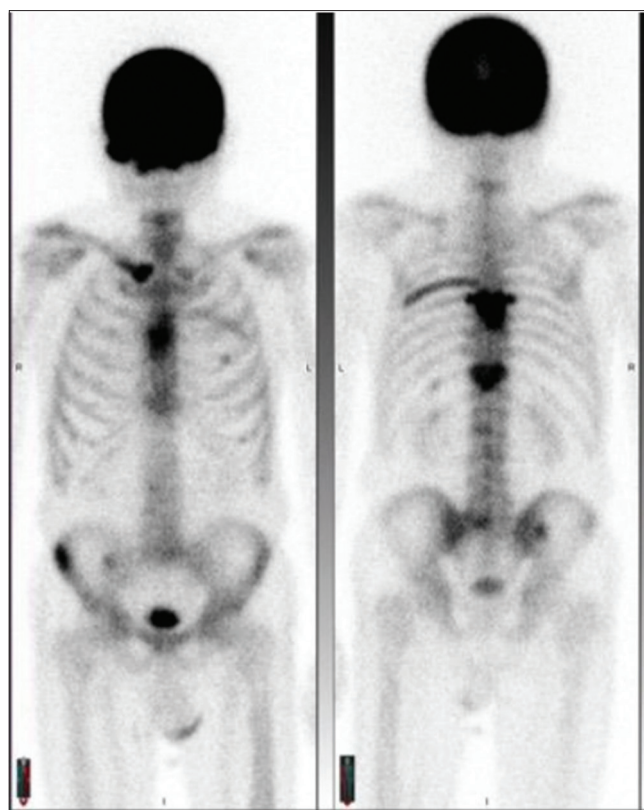


Figure 2: Increased radiotracer uptake in T11 vertebral body demonstrates Mickey Mouse sign

DISCUSSION

Both Paget's disease and skeletal metastases affect similar areas of the body and can present similarly on imaging. Bone scintigraphy has been shown to be the most sensitive method of detecting osseous metastases from prostate adenocarcinoma as well as detecting the increased vascularity and osteoblastic activity of Paget's disease.^[1,2] The lack of specificity in this modality often leaves room for radiologic interpretation. The differentiation between the two processes remains an important task to help guide clinical management, as up to 27% of bone scan abnormalities in patients with known cancer are due to benign causes.^[3] Correlation with radiography can help differentiate between metastases and Paget's disease as the latter demonstrates pathognomonic signs on CT.^[4] Classically, the lysis and sclerosis of bone in Paget's disease result in osteoporosis circumscripta and the cotton-wool sign of the skull.^[5] On scintigraphy, preferential tracer accumulation in certain areas such as inner table and diploe of the frontoparietal bones of the skull have been noted to resemble these radiographic signs.^[6] Another differentiating factor suggestive of Paget's disease is the presence of the "Mickey Mouse sign." This describes uptake in the vertebral body, posterior elements, and spinous processes and is more suggestive of Paget's than metastases, even in

patients with cancer.^[7] In this case, CT scan was used to corroborate the changes consistent with the Mickey Mouse sign were secondary to Paget's disease. On CT, mixed lytic and sclerotic changes along with enlargement of the posterior processes of the T11 vertebral body favor Paget's disease over metastasis [Figures 4-6]. Another way to differentiate between the two conditions is the evaluation of the intensity of tracer uptake. Paget's disease often demonstrates intense, well-demarcated, and evenly distributed uptake. Osseous metastatic disease, on the other hand, tends to present with random, amorphous lesions or patchy tracer uptake with effacement of the normal bone outlines.^[3] Paget's disease also tends to preserve anatomic details while metastatic disease tends to obscure anatomy.^[8]

In this case, the findings of osseous metastases and Paget's disease were confounded by underlying degenerative changes, which have classically been characterized as radiotracer uptake in weight-bearing regions, such as the thoracic and lumbar spine. This is a significant distinction as metastases have been found in 11% of areas with radiotracer uptake consistent with degenerative arthritis, per a case series of 579 scans of patients with known metastatic disease.^[3] In conclusion, bone scintigraphy is a sensitive, but nonspecific, method for detecting osseous metastatic disease. In the presented

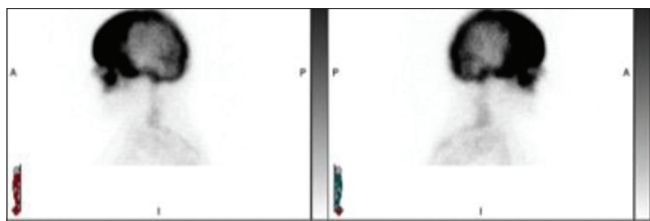


Figure 3: Uptake in calvarium sparing the mandible secondary to Paget's disease



Figure 5: Sagittal computed tomography image of the T11 vertebral body demonstrating enlargement of the posterior processes

case, bone scan was an invaluable resource in identifying key imaging features that elucidated differences between etiologies and directly impacted clinical management.

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Conflicts of interest

There are no conflicts of interest.

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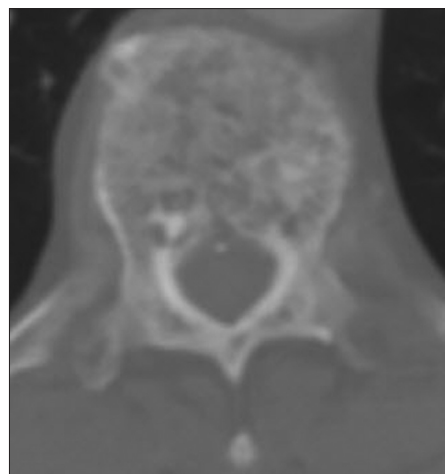


Figure 4: Axial computed tomography image of the T11 vertebral body demonstrating a mixed appearance of lytic and sclerotic regions



Figure 6: Coronal computed tomography image of the T11 vertebral body demonstrating changes consistent with Paget's disease

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