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Solitary Osteolytic Bone Metastatic Lesion from Prostate Carcinoma: A Case Report

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Abstract

Prostate cancer is one of the most common cancers among males worldwide and a common cause of cancer related mortality in males. Bone metastasis from prostate cancer is common in advanced stage disease leading to major complications including severe bone pain and fractures. Here, we present a case of 79-year-old male newly diagnosed metastatic prostate cancer, with metastasis to the lungs, liver and lymph nodes, and a solitary osteolytic bone metastasis seen in bone scan. It is well known that osseous metastasis from prostate cancer is primarily sclerotic, although lytic bone metastasis is rare, but it can also be seen as in our case.

Keywords

Prostate Cancer, Osteolytic, Osseous Metastasis, Bone Scan

1. Introduction

Worldwide, prostate cancer is the second most frequent cancer, closely following lung cancer, and it's the 5th leading cause of death from cancer (after lung, liver, colorectum, and stomach cancer [1].

Prostate cancer is known to metastasize to lung and liver. However, the most common site of prostate cancer metastasis is the skeleton. The common site of bone metastasis from prostate cancer are the spine, long bones, skull and ribs. The bone lesions from prostate cancer are predominantly osteoblastic with osteolytic lesions seen in few rare cases. During metastatic bone disease, the interaction between tumor cells with osteoblasts and osteoclasts elicits an osteolytic, osteoblastic, or mixed bone response [2]. A purely osteolytic response is characterized by the destruction of normal bone attributable to the occurrence of osteoblast

inactivation as well as osteoclast recruitment and activation in the tumor-bone microenvironment. Osteolytic lesions are characterized by soft sections of damaged bone resulting from an osteolytic response that can cause bone pain and fractures [3].

Here, we present a case of 79 years old male newly diagnosed metastatic prostate cancer, with multiorgan metastasis and a solitary osteolytic bone lesion identified on bone scan from biopsy proven prostate adenocarcinoma.

2. Case Presentation

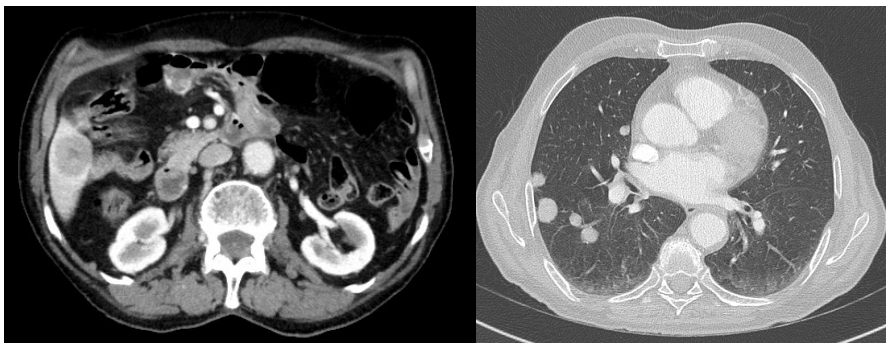
A 79-year-old man with past medical history of Type II diabetes mellitus and hypertension, presented to the emergency department with acute urinary retention, which was initially managed by bladder catheterization with complete decompression. During further history taking revealed, patient gave history of poor urinary stream and right thigh pain of more than 5 months duration. Digital rectal examination revealed an enlarged, hard, nodular prostate gland with evidence of median lobe hypertrophy.

On investigations: the prostate-specific antigen was 14.7 ng/ml (Normal: 0 - 4 ng/ml). Other laboratory tests were normal, with no evidence of anemia, leukopenia, thrombocytopenia or hypercalcemia. Renal function was normal.

Thoraco-abdominopelvic contrast CT scan with multiplanar reformats showed enlarged necrotic left common and external iliac lymphadenopathy, with multiple bilateral suspicious pulmonary nodules and a metastatic hepatic lesion in segment VI of the liver (Figure 1). Diffuse, circumferential, urinary bladder mural thickening, with hyper-enhancing mucosa and prostatomegaly were noted (Figure 2).

The patient underwent transrectal prostatic biopsy and TURP (Trans-urethral resection of the prostate), which showed tri-lobar enlargement of the prostate, and heavily trabeculated urinary bladder wall.

Prostatic tissue biopsy sample showed Prostatic acinar adenocarcinoma, with Gleason score (4 + 4) 8.



(a) (b)

Figure 1. CECT images of the chest and abdomen in axial cuts. (a) axial cut from the abdominal CT scan images with showed an enhancing lesion in segment VI of the liver (blue arrow) in keeping with metastatic deposit. (b) axial cut from CT chest images showed multiple metastatic right pulmonary nodules.

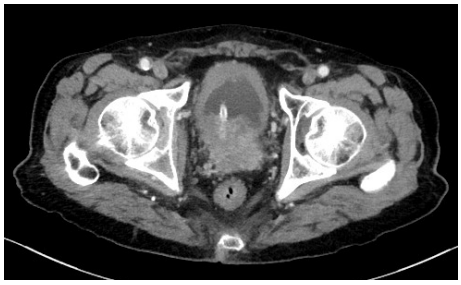


Figure 2. CECT scan of the pelvis in axial cuts. Enlarged prostate gland with abnormal heterogenous enhancement predominantly in the left peripheral zone associated with irregular wall thickening of the urinary bladder.

Bone scan requested as part of routine examination for disease staging.

The whole-body planar images showed focal increase radiotracer activity at the right side of the pelvis (**Figure 3**), which corresponds to an ill-defined lytic lesion with surrounding sclerotic changes in the SPECT CT images (**Figure 4**).

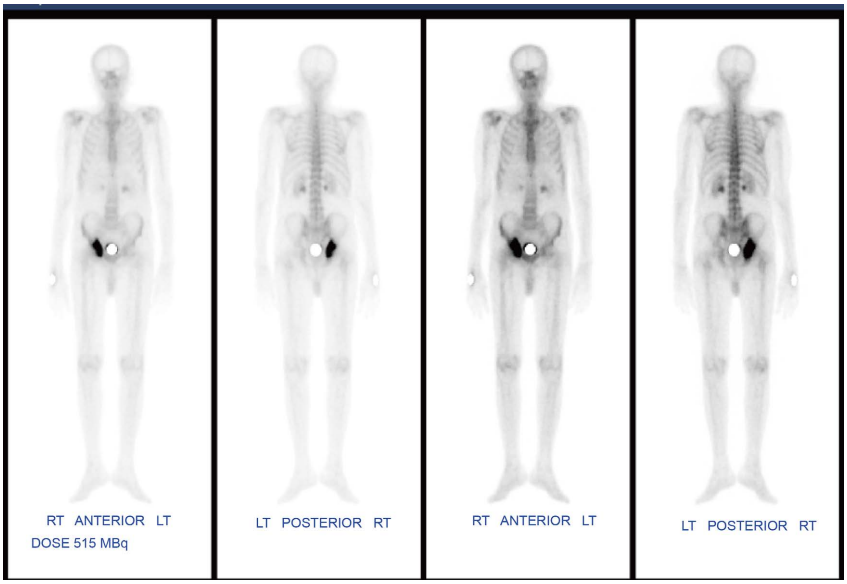
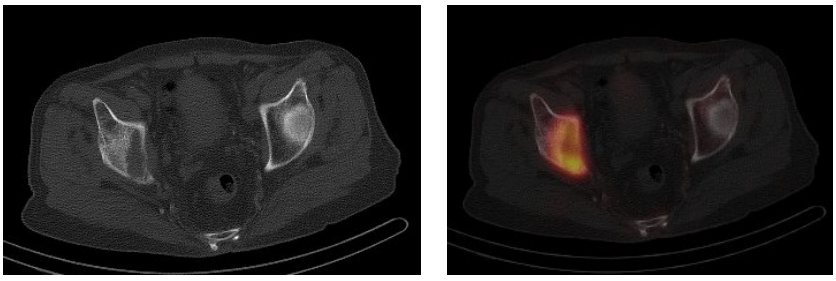
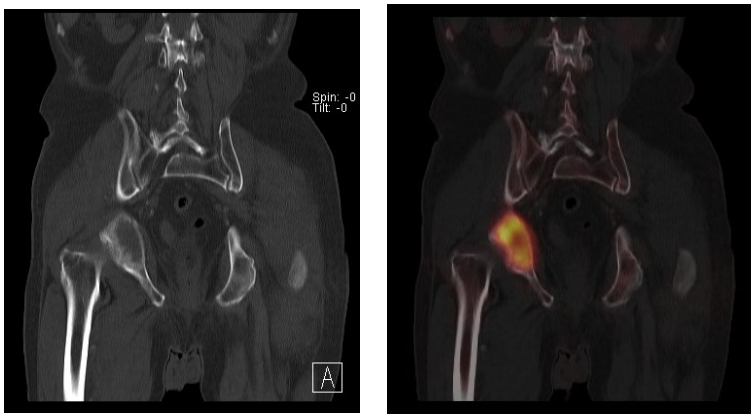


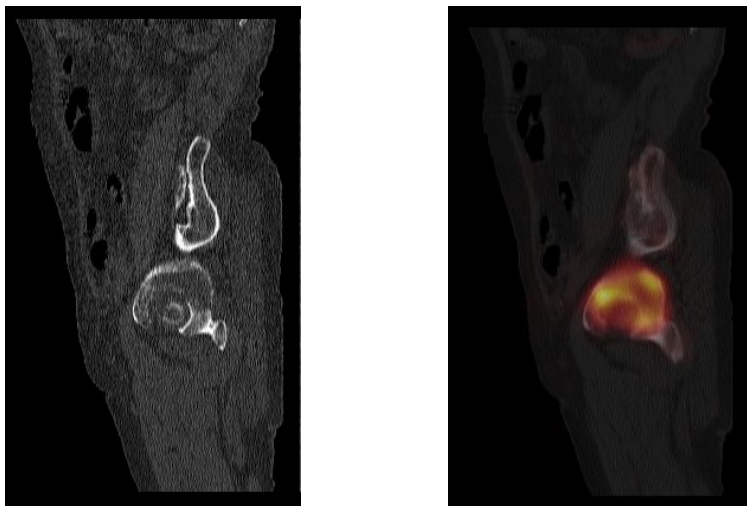
Figure 3. 99mTc-HDP whole body bone scintigraphy. Whole body planar images in the anterior and posterior views showed Focal and intense increase radiotracer activity at the right side of the pelvis/right hip region. No other focal abnormal radiotracer uptake seen in the skeleton.



(a)



(b)



(c)

Figure 4. Pelvic CT scan (bone window) and SPECT CT images of the pelvic bones. Spot views from the low dose non contrast CT images in bone window and SPECT CT images of the pelvis done for anatomical localization, in the transverse (a), coronal (b) and sagittal (c) projections demonstrate the focal increase radiotracer uptake seen in the whole-body bone scan images and SPECT images corresponding to an ill-defined expansile lytic lesion in the right acetabulum suggestive of a lytic metastatic bone lesion from known prostate cancer.

Patient was started on anti-androgenic medication; bicalutamide tablets (50 mg) for 30 days, along with Goserelin Acetate injections every 3 months (10.8 mg/1 syrunge).

Patient's PSA at presentation was 14.7 ng/ml and after two doses of Goserline injection it came down to 0.06 ng/ml.

Patient was not fit for Docetaxel therapy and he was put on monthly Denosumab injection 120 mg/1 syringe, and Abiraterone Acetate tablets (1000 mg OD), in addition to Prednisolone 5 mg BID. After 6 months of treatment his PSA dropped to 0.04 ng/ml.

He responded well to treatment and has been on regular follow-up in Urologic clinic since his diagnosis

3. Discussion

This patient presented with atypical manifestation of prostatic carcinoma, which is lytic bone metastasis. While bone metastasis is common in advanced prostatic carcinoma, they are predominantly sclerotic in nature. Lytic bone metastasis is rare, and is likely due to overproduction of parathyroid hormone related peptide by prostate cancer cells in vivo, as described by Rabbani *et al*. in 1999 [4]. Parathyroid hormone (PTH) is a hormone secreted by the parathyroid gland which plays an important role in bone remodeling. It stimulates bone resorption by osteoclasts indirectly through PTH binding receptors located on osteoblasts. PTH causes a net bone loss through an increased resorption process when administered in a continuous fashion, but a net bone gain through an enhanced formation process when administered intermittently [3].

Agheli *et al*. reported a similar case of solitary osteolytic lesion of the right hip in a patient with prostate carcinoma [5]. Rajendiran *et al*. in 2011 reported a case of patient presented with diffuse osteolytic bone metastases and PSA of 7242 ng/ml [6]. In addition to the reported cases in Literature [5] [7], Cheville *et al*. found that 16.4% of osseous bone metastasis from prostate cancer were lytic and 12.7% were mixed [8].

Despite the prevalence of this disease presentation and the high medical relevance of bone metastases, the mechanisms underlying the formation of metastases to the bone and the understanding of what drives the osteotropism exhibited by prostate tumours remain to be fully elucidated [9]. The accumulated evidence postulated that growth factors are signaling molecules, which support the events involving the tumor and the bone microenvironment during prostate cancer metastases. These growth factors directly increased tumor cell proliferation as well as engage bone stromal cells via stimulation of osteogenesis and osteoclastogenesis (bone matrix turnover), thus promoting metastatic activities [3].

Patients suspected to have prostate cancer from the history will have digital rectal examination by urologists and blood tests including prostate specific antigen (PSA) which is the gold standard, followed by imaging studies.

Magnetic resonance imaging (MRI) and transrectal ultrasound (TRUS) guided biopsy are usually first to be done for confirmation. Bone scintigraphy is done to evaluate for bone metastasis. Abnormal increase in radiotracer uptake is seen in both lytic and sclerotic metastases, although a purely lytic lesion can appear as an area of reduced radiotracer uptake.

11 Choline PET/CT can be used for evaluation of bone metastasis in patients with prostate cancer. In prostatic bone metastases, the measured maximum standard uptake value is higher in osteolytic lesions than osteoblastic lesions [10].

The most useful investigation used nowadays for assessing whether the disease and its metastasis, especially bone metastasis, are active or not is the 68-Ga-PSMA PET/CT, which is also considered a very helpful measure in evaluating the response to treatment. The size of the bone lesions is difficult to be evaluated and might not be affected even after treatment; and hence, assessment of lesions'

activity plays an important role in solving this matter, which explains the importance of 68-Ga-PSMA PET/CT.

In addition to its' effect in morbidity (usually resulting in severe bone pain and fractures), bone metastasis has also prognostic impact in these patients. The survival rate for patients with prostatic cancer is significantly reduced if bone metastases are present. It was reported that the 3- and 5-year survival rate for prostate cancer patients with bone metastases was 47.70 and 32.42%, respectively, in comparison to 98.43 and 97.28% in patients without bone metastases [11].

Normally, bone is remodeled via osteoclasts, which control resorption, and osteoblasts, which control ossification. Interruption of normal homeostasis by metastatic bone lesions results in osteoblastic, osteolytic, or mixed lesions: osteoblastic lesions result from decreased osteoclast activity, and osteolytic lesions are due to stimulation of osteoclast activity and decreased osteoblastic activity [12].

Once bone metastasis is established, the current treatment is designed to be palliative and not curative which aims to decrease tumor burden, prevent further progression and metastasis of tumor cells, and alleviate tumor associated bone pathologies (such as fracture and pain) [13].

4. Conclusion

Bone metastasis from prostate cancer is common in advanced stage and is usually osteoblastic. However osteolytic metastasis either single or multifocal can present but it is a rare entity. These lesions might not express tracer uptake in bone scintigraphy due to osteoclastic activity predominance; however, the high turnover in the bone lesion will stimulate osteoblastic activity as well, resulting in high tracer uptake. Early detection of bone metastasis is essential not only for disease staging but also for management and therapy options as well as being an important prognostic factor in prostate cancer patients. Lots of new tracers are being used nowadays for assessing bone lesions (especially for prostate bone metastasis) and further more advanced procedures might be present in future.

Patient Consent

The patient provided informed consent for publication of our case report.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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