Co-existence of Paget's disease with prostate carcinoma: a case report

Clinical History:

80-year-old male patient with no previous comorbidities presented with lower urinary tract symptoms. The prostate gland was nodular and hard on examination. Initial laboratory work showed normal serum creatinine and raised serum PSA up to 4.2 ng/ml. Prostate volume was 35 ml, which make up PSA density of 0.12 ng/ml.

Imaging Findings:

Trans-rectal ultrasound demonstrated enlarged prostate gland with hypoechoic mass lesions involving the parenchyma, confirmed on biopsy as adenocarcinoma of prostate gland with Gleason grade 5, score 10. In MRI pelvis, findings in prostate gland were compatible with biopsy of prostatic carcinoma staged T3b, N1. In addition, multiple abnormal heterogenous signals on both T1 and T2 were seen in the pelvic bones predominantly involving the right iliac and ischiopubic bones. Mild increase in signal intensity was apparent on fat-suppressed sequence. Trabecular thickening, mild bony expansion without any cortical breach was also seen in the visualised bones. X-ray skull showed marked thickening of calvarium, widening of diploic spaces along with multiple ill-defined lesions showing cotton wool appearance. X-ray pelvis demonstrated increased bone density along with mixed sclerotic and lytic lesions predominantly involving right iliac, ischiopubic bones and right femur. Bone scan was performed which confirmed the diagnosis of Paget's disease.
Discussion:

In Asian countries, Paget's disease is rare unlike in Western countries. Metastatic prostate cancer appears to be the most common cause for osteoblastic lesions. Thus, Paget’s disease is likely to be of much concern [1]. These two entities can coexist in the same patient like in our case and can be distinguished on the basis of laboratory and imaging findings. Imaging bone disease in prostate carcinoma frequently involves a cascade of studies that start with Tc99m methylene diphosphonate (Tc99mMDP) bone scintigraphy, backed up by plain film correlation and followed by magnetic resonance imaging (MRI), computed tomography (CT) or even positron emission tomography (PET)/CT.[2]

Bone scintigraphy is a very sensitive investigation for patients with active Paget’s disease. In Paget's disease, the tracer uptake on scintigraphy is often intense and well-distributed in the affected skeleton with preserved anatomic configuration. In contrast, metastatic disease usually presents with random spotty tracer uptakes and obliterating the normal bony confines. If metastasis involves two areas of the same bone, the intervening bone usually appears normal on scintigraphy unlike the homogeneous tracer uptake seen in Paget’s disease. Plain radiography is usually useful in such case. [3]

The imaging findings that are specific to Paget's disease depend on the pathological stage of the disease. It is associated with a plethora of radiological signs. It is characterised by osteolysis followed by the osteoblastic phase and eventually marrow fibrosis. [4, 5, 6, 7] The osteoblastic phase can mimic sclerotic metastases of prostate carcinoma. However, bony expansion and thickening and coarsening of trabeculae typically present in Paget's disease is not seen in the skeletal metastases.

The exact role of MRI in the detection of Paget’s disease is less established. It is mostly utilised for the assessment of its complications, particularly fracture and sarcomatoid degeneration, in the neurological assessment of the disease e.g. for spinal cord compression or compression of cranial and spinal nerves. [5, 6, 7] In contrast, studies have shown that MRI outperforms not only bone scanning but also sequential workup that includes bone scanning followed by targeted radiography in detecting bone metastasis from prostate cancer. T1-weighted images can depict infiltration of the bone marrow by cancer cells before remodelling; bone scanning shows metastatic lesions only after osteoblastic changes have occurred. Furthermore, DWI can help find areas of increased cellularity due to metastatic deposits. [8]

All these characteristics helped us to reach our diagnosis to differentiate Paget's disease from prostate carcinoma skeletal metastases.

Written informed patient consent for publication has been obtained.

Differential Diagnosis List:  Prostate adenocarcinoma with co-existent Paget's disease of bones, Paget's disease, Metastatic disease

Final Diagnosis:  Prostate adenocarcinoma with co-existent Paget’s disease of bones

References:

Sonoda L, Balan KK (2013) ) Co-existent Paget’s Disease of the Bone, Prostate Carcinoma Skeletal Metastases
and Fracture on Skeletal Scintigraphy-Lessons to be learned. Mol Imaging Radionucl Ther Aug;22(2):63-5 (PMID: 24003400)
Figure 1

Description: X-ray skull AP view Origin: Department of Radiology, SIUT, Karachi, Pakistan
**Description:** X-ray skull lateral view, showing thickening of calvarium with widening of diploic spaces. There were multiple ill-defined mixed density lesions seen involving the skull. **Origin:** Department of Radiology, SIUT, Karachi Pakistan
Description: X-ray pelvis: cortical thickening and sclerosis of the iliopectineal and ischiopubic lines. These findings are asymmetric predominantly on the right side. Bony expansion with enlargement of the pubic rami and ischium is also seen. Origin: Department of Radiology, SIUT, Karachi Pakistan
Description: T2WI axial view, multiple lesions are seen in acetabulum, pubic bones and upper femori on both sides. Marrow shows heterogeneous signal intensity on T2WI, coarsening and thickening of trabeculae are also seen. Origin: Department of Radiology, Sindh Institute of Urology and Transplantation. Karachi. Pakistan
Description: T2WI axial view. It shows coarse trabeculations with slight expansion involving right ischiopubic ramus. Origin: Department of Radiology, Sindh Institute of Urology and Transplantation. Karachi. Pakistan
**Description:** Fat-suppressed sagittal image: Marrow shows heterogeneously high signals with predominant involvement of right hemipelvis and upper femur on the right side. Expansion is also seen involving the right ishiopubic ramus. (arrows) **Origin:** Department of Radiology, Sindh Institute of Urology and Transplantation. Karachi. Pakistan
Description: DWI MRI pelvis: It shows restriction in the prostate gland with extraprostatic extension on the right side. Iliac lymph node on the left side also shows restriction. Origin: Department of Radiology, Sindh Institute of Urology and Transplantation, Karachi, Pakistan
**Description:** Skeletal scintigraphy anterior and posterior views: Intense increase tracer uptake is seen in skull, right 3rd rib anteriorly, multiple dorsal lumbar vertebrae, pelvis and upper half of both femori.

**Origin:** Department of Radiology, Sindh Institute of Urology and Transplantation. Karachi, Pakistan
Figure 4

Description: These histopathological images demonstrate adenocarcinoma of prostate gland with Gleason grade 5, score 10. Origin: Department of Histopathology, Sindh Institute of Urology and Transplantation. Karachi. Pakistan