

Prostatic Malignancy Presenting with Diffuse Osteosclerosis: The Plain Radiographic Features and A Case Report

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Abstract:

Diffuse osteosclerosis (DO) in the setting of prostatic malignancy refers to widespread increase in bone hardening or increased density of bone caused by metastatic spread of prostate cancer to the bones. Prostate cancer commonly metastasizes to bone especially in advanced stages, causing disorganized bone formation and resulting in sclerotic areas on imaging, and commonly involving the spine, pelvis, ribs and femur. This is a seventy-year-old man who was referred from a peripheral health facility for plain radiographs of the cervical, thoracic, lumbar and sacral spines on account of severe pain involving the spine and other bones. He has an elevated serum prostatic specific antigen (PSA) level and elevated serum calcium level with ultrasonographic features of prostatic enlargement. The plain radiographs demonstrated widespread/diffuse sclerosis of the demonstrated cervical, thoracic, lumbar and sacral bones. Associated moderate-severe features of spondylosis involving the demonstrated bones were also noted. The clinical, laboratory and radiologic features prompted the diagnosis of diffuse osteosclerosis in a patient with prostatic malignancy. We present a case of a seventy-year-old man with features of prostatic malignancy and associated diffuse osteosclerosis (from osteoblastic deposits to bones) due to its peculiar presentation and to review the literature.

Keywords: prostate; diffuse osteosclerosis; malignancy; bone

Introduction

Prostate cancer most often times metastasizes to bone where it forms osteoblastic lesions through unknown mechanisms¹. Prostate cancer induces the formation of bone morphogenetic proteins (BMP), these are mediators of skeletal formation especially BMP-6 known for its role in prostate cancer bone osteosclerosis [1]. Prostate cancer is also suspected to have the possibility of resulting in high bone mineral density (BMD) even in the absence of typical localized findings on plain radiographs [2]. The bony changes in prostate cancer often lead to initial diagnosis, enabling treatment strategy and prognostic evaluation [3,4]. Prostate cancer frequently metastasizes to vertebrae and pelvis most often, where it causes predominantly osteoblastic lesions and local bone formation, and consequently affects quality of life and mortality^{3,4}. Some cases of prostatic malignancy do present with hypercalcemia, thereby affecting calcium metabolism and often associated with a poorer clinical outcome [3,5]. Disease manifestation in prostatic malignancy is solely dependent on interaction between invading tumor cells, bone-forming osteoblasts and bone resorbing osteoclast, mostly seen in patients with advanced disease leading to bone pain, fractures and increased mortality [6]. Prostate cancer cells from the gland have a high affinity for bone, about 90.1% of individuals who died from hematogenous spread of prostate

cancer were diagnosed with bone metastases, and often invade the bones of axial skeleton such as ribs, pelvis and spine where there is abundance of red marrow [6,7].

Case Report

This is a seventy-year-old man who was referred from a peripheral health facility for plain radiographs of the cervical, thoracic, lumbar and sacral spines on account of severe pain involving the spine and other bones. He has an elevated serum total and free prostatic specific antigen (PSA) level, elevated serum calcium level with ultrasonographic features of prostatic enlargement. Clinically the patient is conscious and alert, pale, anicteric, minimally dehydrated and in painful distress. The plain radiographs demonstrated widespread/diffuse sclerosis of the demonstrated cervical, thoracic, lumbar and sacral bones. Associated moderate-severe features of spondylosis involving the demonstrated bones were also noted (figures 1-3). The ultrasound of the abdomen and pelvis demonstrated enlarged prostate with a volume of about 125mls, with irregular outline and capsule and also showed heterogeneous echo pattern with ildefinition of the prostate-vesical interface raising a suspicion of prostatic malignancy. The clinical, laboratory and radiologic features prompted the diagnosis of diffuse osteosclerosis in a patient with prostatic malignancy. We present a

case of a seventy-year-old man with features of prostatic malignancy and associated diffuse osteosclerosis (from osteoblastic deposits to bones) due

to its peculiar presentation and to review the literature.



Figure 1: Plain radiographs of the cervical spine demonstrating straightening of the cervical lordosis, diffuse osteosclerosis involving the demonstrated bones with features of degenerative changes.

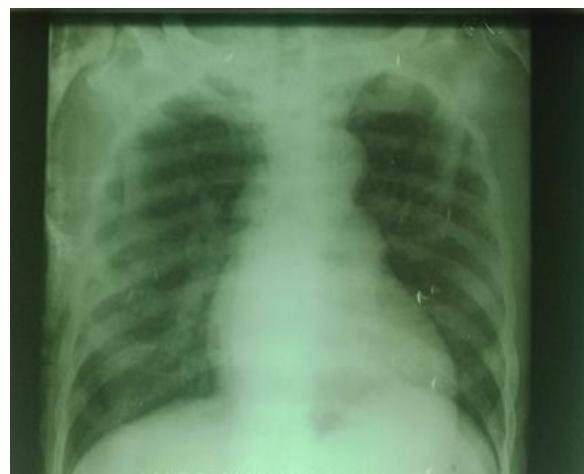


Figure 2: Plain radiograph of the chest in anterior-posterior projection demonstrating mild cardiac enlargement with aortic unfolding, hyperinflation of the lung fields most likely from emphysema with diffuse osteosclerosis of the thoracic cage and spine.



Figure 3: Plain radiographs of the thoracic, lumbar and sacral spine demonstrating diffuse sclerosis of the entire bones with moderate-severe degenerative changes of the thoraco-lumbo-sacral bones.

Discussion

Prostate cancer is the most common cancer in men and often the risk increases after the age of 50-years, and most of the cases are diagnosed at the age of 65-years [6,8]. The index case happens to be 70-year-old man, conforming to these literatures. Prostate cancer induces the formation of bone morphogenetic proteins (BMP), these are mediators of skeletal formation especially BMP-6 known for its role in prostate cancer bone osteosclerosis [1]. Similar mechanism may have occurred in the index case presenting with skeletal involvement, thereby conforming to this literature. In prostate cancer, when there is decrease in bone formation and increase in bone resorption, these will potentially favor an osteoblastic lesion [6]. The index case presented with osteoblastic lesions and most likely from the aforementioned phenomenon, thereby agreeing with this literature. Prostate cancer frequently metastasizes to vertebrae and pelvis most often, where it causes predominantly osteoblastic lesions and local bone formation, and consequently affects quality of life and mortality [3,4]. The index case had involvement of bones of axial skeleton and also osteoblastic lesions, thereby conforming to these literatures. Advanced prostate cancer does metastasize to bone by hematogenous spread and do have a high predilection for bone, and this showed a high mortality rate of more than 90% among patients who died of the advanced malignancy, the index case had affection of most bones of the body and most likely from hematogenous spread, thereby conforming to these literatures [6,9]. Patients with prostatic cancer and having bone involvement are often blacks with about 88% involvement, and usually do have fractures especially if on androgen deprivation therapy^{10,11}. The case under review happens to be black and also with bone involvement, though no fractures seen and currently not on androgen deprivation therapy. In prostatic malignancy, involvement of other organs apart from the bones may also occur and contributes to the morbidity of the disease and often seen with advanced disease [4,12,13]. The case under review has no associated involvement of other organs apart from the bones, thereby not conforming to these literatures.

Conclusion

Patients with prostatic cancer and presenting with diffuse osteosclerosis are in the advanced stage of the disease and therefore need prompt diagnosis which can be achieved by plain radiographs of the skeleton and laboratory work-up in order to institute adequate management to reduce associated morbidity and mortality.

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