BMH MEDICAL JOURNAL

BMH Med. J. 2023;10(2):47-49. **Images**

Osteosclerotic Metastasis to Thoracic Cage

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Keywords: osteosclerotic metastasis, carcinoma prostate

Introduction

Figure 1 and **Figure 2** show osteosclerotic (osteoblastic) lesions of the bones of the chest wall. Both patients were diagnosed to have prostatic malignancy and had undergone surgery and chemotherapy. After many years both of them presented with vague symptoms and on investigation found to be having osteoblastic secondaries of multiple bones.

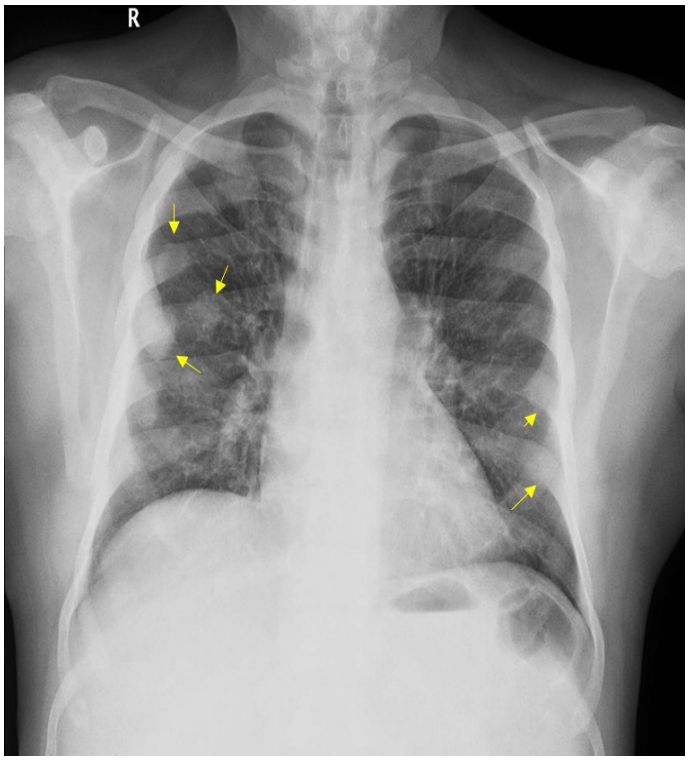

Figure 1: X-ray chest PA view showing multiple dense opacities on both sides (Yellow arrows).

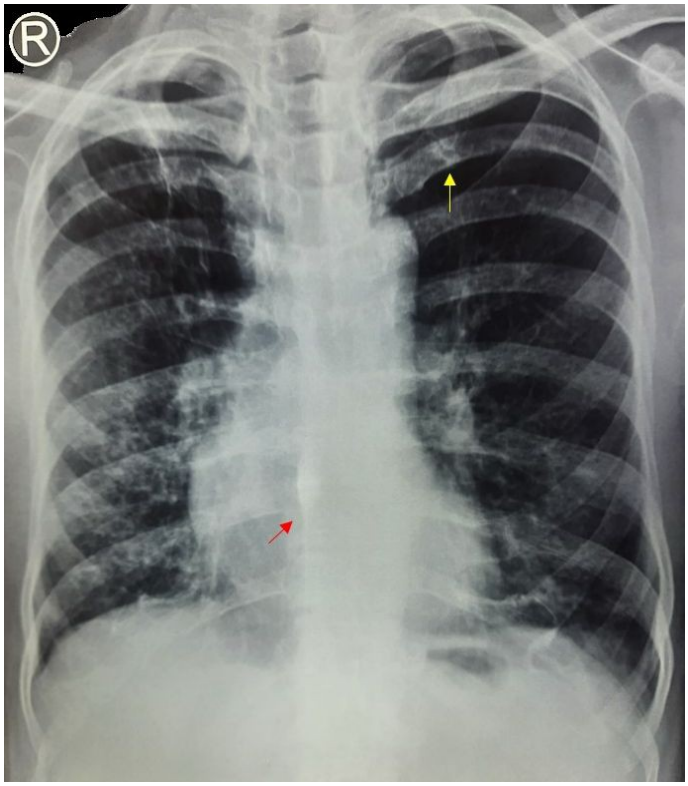

Figure 2: X-Ray Chest PA view showing fracture of posterior end of left fourth rib with bone sclerosis (Yellow arrow) and another area of density overlying D8 and D9 (Red Arrow).

Discussion

Skeletal metastasis are the most common malignant bone tumours and consequently should always be considered in the differential diagnosis of malignant lesions, particularly in older patients. Most metastatic lesions involve the axial skeleton (skull, spine and pelvis) as well as the proximal segments of long bones [1]. The lesions result from hematogenous spread of a malignancy. Tumor emboli get lodged in the axial skeleton through the vertebral venous plexus.

The incidence of metastases to bones varies with the type of primary neoplasm and the duration of disease. Some malignant tumours have a far greater propensity for osseous metastatic involvement than do others. Because of their frequency, cancers of the breast, lung and prostate are responsible for the majority of the bone metastases, although primary tumors of the kidney, small and large intestines, stomach and thyroid may also metastasize to bone. Carcinoma of the prostate causes nearly 60% of all bone metastases in men, whereas in women carcinoma of the breast is responsible for nearly 70% of all metastatic skeletal lesions [2].

Sclerotic or osteoblastic bone metastases are distant tumor deposits of a primary tumor within bone characterized by new bone deposition or new bone formation. Sclerotic bone metastases are less common than lytic bone metastases. The diagnosis is usually established by a combination of imaging and the known presence of a primary tumor that is associated with sclerotic bone metastases. Osteoblastic bone metastases are characterized by increased bone formation. However, the exact mechanism that leads to osteoblastic bone formation is not entirely explained. It is assumed that several tumor-derived growth factors increase osteoblast activity while osteoclast activity is restricted [1].

Most common primary tumour for osteoblastic (sclerotic) metastases in men are prostate cancer, seminoma, neurogenic tumours, carcinoid tumour and osteosarcoma. In women osteoblastic metastasis occurs mainly in breast cancer, uterine cancer, ovarian malignancies, neurogenic tumours, carcinoid tumour and osteosarcoma [1].

Radiographic features

Plain radiograph

Sclerotic bone metastases typically present as radiodense bone lesions that are round or nodular with relatively well-defined margins. Radiographs are specific but have low sensitivity.

Computed Tomography (CT)

CT can detect osteoblastic metastases with a higher sensitivity than plain radiographs and helps in the assessment of bones which are characterized by a small bone marrow cavity and a high amount of cortical bone such as the ribs. On CT sclerotic bone metastases typically present as hyperdense lesions, but display a lower density than bone islands. A mean CT attenuation threshold of 885 HU and a maximum attenuation threshold of 1060 HU have been found supportive in the differentiation of untreated osteoblastic and bone island in one study, but the exclusive use of attenuation values for the assessment of sclerotic bone lesions has been discouraged.

Magnetic resonance imaging (MRI)

MRI features high sensitivity and high specificity for the demonstration of bone metastases in general and for assessing the bone marrow. It can differentiate predominantly osteoblastic from osteolytic bone metastases as well as easily demonstrate and assess complications such as pathological fractures or spinal cord compression. A disadvantage of MRI is that the detection is poor in bones with a small marrow cavity such as the ribs and these bones are better investigated with CT.

Nuclear Imaging

Bone scintigraphy (99mTc MDP) is very sensitive for the detection of osteoblastic lesions providing information on osteoblastic activity but suffers from specificity with a false-positivity rate ranging up to 40%. Positron emission tomography (PET) features high sensitivity in the detection of bone metastases, especially 18 NaF-PET is suitable for the detection of sclerotic metastases since it shows tracer uptake in locations with osteoblastic activity and is more accurate than FDG-PET.

Conclusion

Osteoblastic lesions are easily detected in plain X Ray or higher imaging modalities. Knowing the nature of primary disease and its propensity to cause osteoblastic metastasis is the key factor for a correct diagnosis.

References

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