IMAGING CORNER

Lytic bony lesions on ^{18}F-FDG PET-CT versus ^{99m}Tc MDP bone scan

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Abstract

With rising incidence of breast carcinoma in Asian population, staging workup remains a crucial entity in disease management and outcome. Bone scintigraphy for detection of osteoblastic metastasis has remained a convenient choice. However, in the presence of underlying lytic bony lesions sensitivity of ^{99m}Tc-MDP bone scan is questionable when compared to ^{18}F-FDG PET-CT scan. We present a case that showed better sensitivity of ^{18}F-FDG PET-CT for picking up early lytic lesions for staging breast cancer.

Keywords: breast carcinoma, bone scan, ^{18}F-FDG PET-CT.

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A 39-year-old female with left breast invasive ductal carcinoma underwent bone scan (Figure 1 A&B) which demonstrated low degree of focal uptake in manubrium sterni, right humeral and femoral shafts suspicious for metastases. Staging CT scan (Figure 1 C&D) showed ill-defined osteolytic lesion in manubrium sterni and left sacral ala. ^{18}F-FDG PET-CT (Figure 1 E) done for further evaluation which showed multiple hypermetabolic osteolytic lesions in comparison to bone scan. Follow-up bone scan (Figure 2 A&B) after 7 months showed multiple new lesions in axial and appendicular skeleton which corresponds to sclerotic morphology of already existing lytic lesions upon subsequent CT scan (Figure 2 C-F). This represents flare phenomena suggestive of treatment response.

Osseous metastases in breast cancer can be osteolytic or osteoblastic. The literature is equivocal about whether FDG PET-CT or conventional imaging is superior for detection of bone metastases.[1-3] Bone scan demonstrates uptake in region of increased osteoblastic activity and blood perfusion.[4] Before reactive osteoblastic response to invading tumour cells, predominantly lytic lesions will be missed on bone scintigraphy.

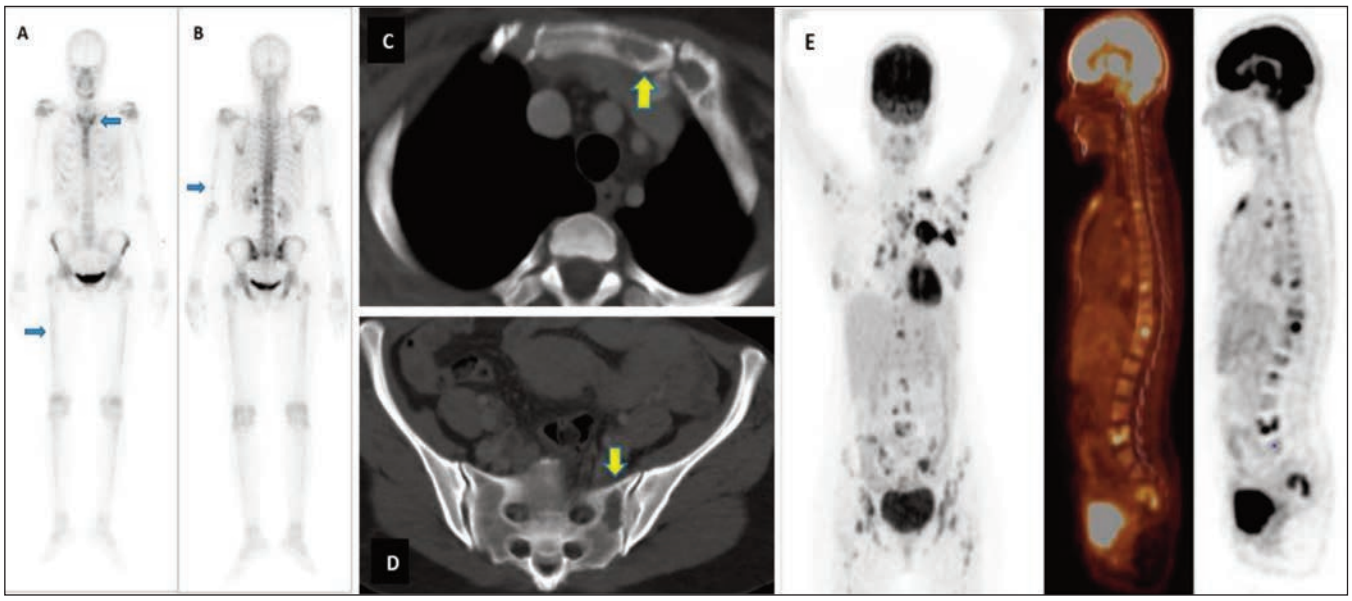

Figure-1: (A,B) Anterior and posterior views of skeletal scintigraphy demonstrate faint focal uptake in left lateral aspect of manubrium sterni, right humeral and femoral shafts (blue arrows). (C,D) Axial chest and pelvic views of staging CT scan show lytic lesions in left aspect of manubrium sterni and left sacrum (yellow arrows). (E) ^{18}F-FDG PET-CT: Maximum intensity projection view and sagittal images showed multiple FDG avid osseous metastatic deposits involving axial and appendicular skeleton.

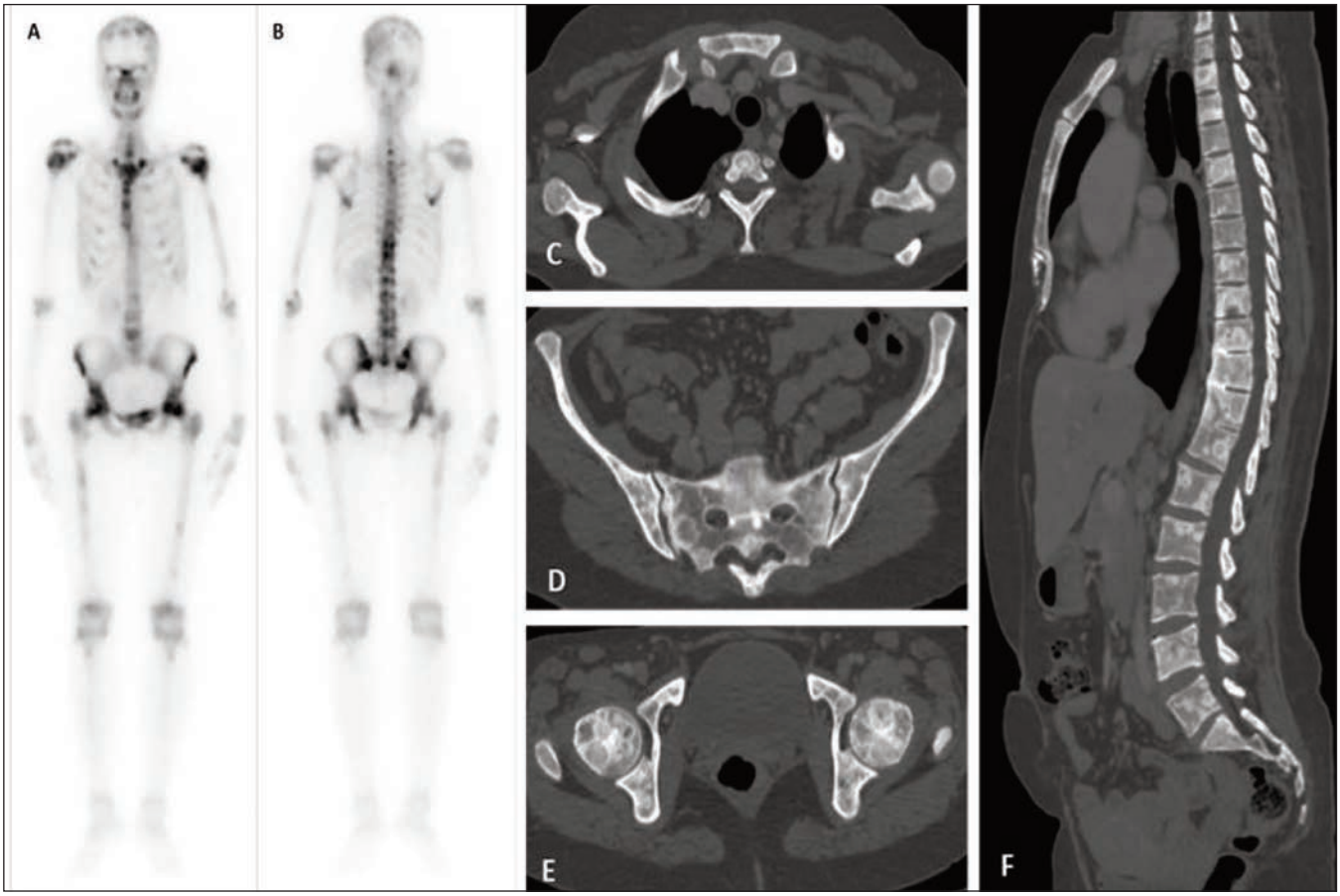

Figure-2: (A, B) Anterior and posterior views of follow-up bone scan acquired after 7 months demonstrate increase in the number and intensity of osteoblastic lesions in manubrium, right humeral and bilateral femoral lesions. On correlation with subsequent CT scan at multiple levels (C-F), there is sclerosis of pre-existing lytic lesions seen on prior PET-CT suggesting treatment response (flare phenomena).

FDG PET-CT demonstrates increased glucose metabolism in bone metastases regardless of osteolytic or osteoblastic response, increasing the sensitivity. PET-CT is superior to skeletal scintigraphy in terms of spatial resolution, with acquisition of tomographic images. It also gives sensitive information about treatment response and disease prognosis.[5] Bone scan and CT are commonly the first step in staging for breast cancer. FDG PET-CT should be advised in high-risk patients, for further evaluation of indeterminate osseous findings, which could lead to changes in pharmacotherapy and help prevent adverse skeletal-related events.

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