

Superscan caused by renal osteodystrophy: Observed on 18F FDG PET/CT scan

Sir,

Superscans have been described in variety of conditions such as metastatic disease, metabolic bone disease, and myeloproliferative disorders. We describe a rare case of superscan from metabolic bone disease/renal osteodystrophy observed on F-18 fluorodeoxyglucose (FDG) positron emission tomography/computed tomography (PET/CT) scan. A 35-year-old woman patient with history of human immunodeficiency virus (HIV), end stage renal disease, and recently diagnosed with breast carcinoma had undergone neoadjuvant chemotherapy followed by mastectomy with sentinel lymph node dissection and adjuvant chemoradiation. The patient has been in remission for the last 10 years of follow-up visits. She was subjected to F-18 FDG PET/CT scan and Tc-99m methylene diphosphonate (MDP) bone scan 2 weeks apart for initial staging workup of locally advanced ductal carcinoma of the right breast. Whole body F-18 FDG PET/CT scan [Figure 1a and b] apart from radiotracer uptake in the primary neoplasm in the right breast, demonstrated diffusely increased FDG uptake in the osseous structure without any abnormalities on corresponding CT scan and absence of radiotracer excretion in the kidneys and urinary bladder. Subsequent Tc99m MDP bone scan [Figure 2] demonstrated classic findings of super scan of diffuse, uniform radiotracer uptake in the axial and appendicular skeleton, faint visualization of soft tissue, and absence of radiotracer excretion in the kidneys and urinary bladder.^[1] As both bone scan and F-18 FDG PET/CT scan demonstrated diffuse uniform radiotracer uptake in osseous structure indicative of metabolic bone disease rather than patchy, heterogeneous radiotracer uptake observed with skeletal metastasis and corresponding CT scan images being unremarkable, skeletal metastasis was felt less likely.

The characteristics findings of “superscan” on bone scan of increased skeletal radiotracer uptake relative to soft tissues and absent or faint genitourinary tract activity are often seen in patients with renal osteodystrophy.^[2-4] The super scan on 18FDG PET/CT with increased skeletal radiotracer uptake has been observed in poorly differentiated renaladenocarcinoma, in gastric malignancy, squamous cell carcinoma of the lung, small cell lung cancer, and metastatic primitive neuroectodermal tumor (PNET) of kidney.^[5-9] In described cases of superscan from osseous metastasis, the pattern of skeletal uptake is multiple scattered heterogeneous lesions throughout the skeleton. In our patient, diffuse uniform FDG uptake was noted in axial and visualized portion of appendicular skeleton without any abnormality on corresponding CT scan images, likely attributed to renal osteodystrophy in a patient with ESRD. Renal osteodystrophy (ROD) is a collective

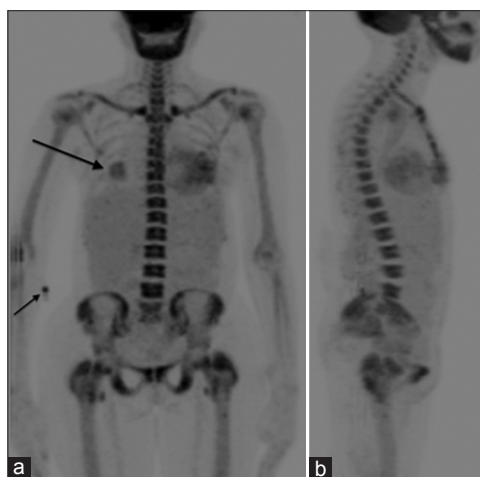


Figure 1: Whole body anterior (a) and lateral (b) maximum intensity projection (MIP) images from 18F fluorodeoxyglucose positron emission tomography/computed tomography (FDG PET/CT) scan demonstrated diffusely increased FDG uptake in the osseous structure without any abnormalities on corresponding CT scan and absence of radiotracer excretion in the kidneys and urinary bladder. Focal radiotracer uptake was observed in the primary neoplasm in the right breast (long arrow). A small focus of increased FDG uptake noted in the right antecubital fossa (short arrow) was at the site of radiopharmaceutical injection



Figure 2: Tc99m methylene diphosphonate bone scan demonstrated classic findings of super scan of diffuse, uniform radiotracer uptake in the axial and appendicular skeleton, faint visualization of soft tissue and absence of radiotracer excretion in the kidneys and urinary bladder. As both bone scan and 18F FDG PET/CT scan demonstrated diffuse uniform radiotracer uptake in osseous structure indicative of metabolic bone disease rather than patchy, heterogeneous radiotracer uptake observed with skeletal metastasis and corresponding CT scan images were unremarkable, skeletal metastasis was felt less likely

term describing the mixture of pathophysiological conditions that afflict the skeletal system of patients with chronic kidney

disease (CKD). It is most evident in patients on renal replacement therapy (RRT), but usually starts early in the course of CKD.^[10] It is characterized by bone mineralization deficiency that is a direct result of the electrolyte and endocrine derangements that accompany chronic kidney disease. Renal osteodystrophy can be further divided into metabolic states associated with either high or low bone turnover. Increased radiotracer uptake on bone scan in patients with renal osteodystrophy is due to increased chemisorption onto the calcium of hydroxyapatite crystal from increased bone turnover.^[4] We hypothesize that increased metabolism from accelerated bone turnover is likely reason for diffusely enhanced FDG uptake on PET/CT scan.

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