

Abnormal extraosseous activity in both lungs and stomach in pre-transplant ^{99m}Tc -MDP bone scan disappearing after renal transplant

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ABSTRACT

A chronic kidney disease male patient presenting with bone pains, fever, weakness, and clinically ascites was subjected to four technetium-99m-methylene diphosphonate (^{99m}Tc -MDP) bone scans, two before renal transplant and two after renal transplants. Pretransplant bone scan revealed metabolic bone disease with focal insufficiency fractures. Marked extraosseous activity in both lungs and stomach was also visualized. On regular hemodialysis (HD) after 4 months, repeat pretransplant bone scan showed persistent uptake in lungs and stomach, representing altered calcium metabolism with microcalcifications. He underwent human leukocyte antigen (HLA) matched live donor renal transplantation, started on immune-suppression and steroids. Posttransplant bone scan at 20 days revealed no definite interval change, but bone scan performed approximately 17 months posttransplant showed resolving metabolic bone disease and the tracer uptake in the lungs and stomach was no more visualized. Patient clinically followed-up until the date (February 2013) is asymptomatic with serum creatinine of 1.5 mg/dl, no bone scan done.

Keywords: ^{99m}Tc -MDP, bone scan, chronic kidney disease, gastric uptake, hemodialysis, lung uptake

INTRODUCTION

Extra skeletal uptake of technetium-99m (^{99m}Tc) phosphate and phosphonate radiopharmaceuticals is reported in a wide variety of conditions.^[1] In both malignant and nonmalignant conditions, impaired renal function with consequent decreased phosphate excretion is a prerequisite for this phenomenon.^[2] Extraosseous pulmonary calcification (PC) is found most commonly in end-stage renal disease (ESRD) patients on chronic hemodialysis (HD) therapy.^[3] In our patient, pre-transplant whole body bone scan revealed lung and stomach uptake, which completely resolved in 17 months post-transplant bone scan. This case report highlights the importance of normalization of renal function and disappearance of insufficiency fractures along with the extraosseous ^{99m}Tc -methylene diphosphonate (MDP) uptake.

CASE REPORT

A 25-year young male, chronic kidney disease (CKD) patient, on HD for 3-4 months, developed bone pains. Patient had high creatinine (5.2 mg/dl) and serum phosphorus, low albumin (normal 0.8-1.2), and normal calcium. Pretransplant bone scan [Figure 1a and b] revealed insufficiency fractures involving the medial and lateral cortices of distal shaft of both femora and medial cortex of mid shaft of bilateral tibiae with periarticular increased radiotracer. Both the kidneys appeared small in size, with no definite tracer activity visualization in the bladder; but extraosseous activity noted in both lungs and stomach. ^{99m}Tc -MDP labeling was greater than 98%. Patient was regularly dialyzed and serum parathyroid hormone level was always low. Second bone scan [Figure 2] done 4 months later revealed no definite change. Patient underwent human leukocyte antigen (HLA) matched live donor (mother) renal transplantation. Posttransplant, patient was on tacrolimus, mycophenolate mofetil, and steroids. Serum creatinine reduced to 1.2 mg/dl with normal calcium and phosphorus. Bone scan [Figure 3] performed 20 days posttransplant showed no definite interval change. On follow-up, patient developed acute graft dysfunction, serum creatinine became 3.6 mg/dl. Patient complained of bone pains more in legs and thighs. A repeat bone scan (17 months

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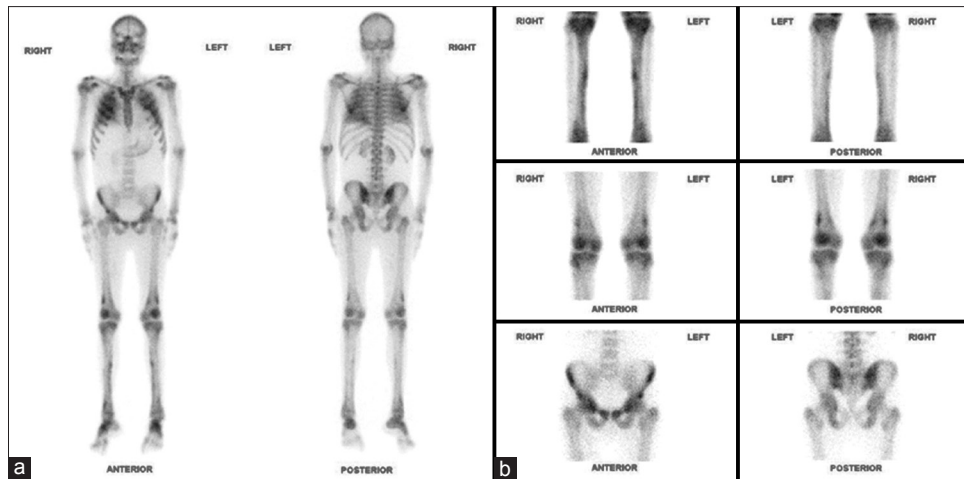


Figure 1: Pre-transplant (a) whole body bone scan (b) static images in multiple projections shows abnormally increased periarticular radiotracer concentration. Both the kidneys appear small in size and are visualized with no definite excretion of tracer in the bladder. Abnormal diffusely increased radiotracer accumulation seen in both lungs and stomach. Focal increased radiotracer concentration involving the Medial and lateral cortices of distal shaft of both femora and medial cortex of mid shaft of bilateral tibiae representing insufficiency fractures

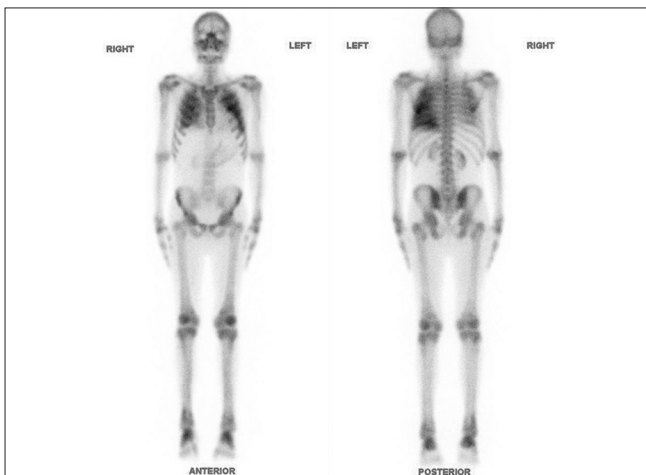


Figure 2: Second pre-transplant whole body bone scan dated (4 months later) on comparison with first bone scan revealed no definite new site of insufficiency fracture, insufficiency fractures involving the lateral cortices of distal shaft of both femora and medial cortex of mid shaft of bilateral tibiae were resolved, insufficiency fractures involving the medial cortex of distal shaft of both femora were significantly reduced in intensity representing healing insufficiency fracture. Abnormal tracer accumulation was persistent involving both lungs and stomach

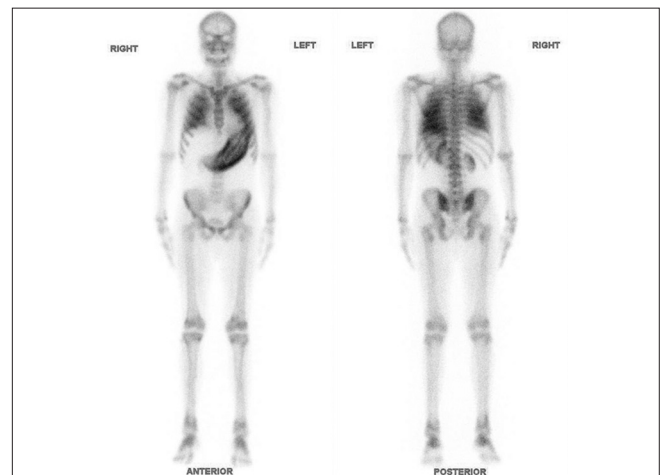


Figure 3: Immediate (within 20 days) post-transplant whole body bone scan, no definite interval change noted compared to the second pre-transplant bone scan

posttransplant) was performed which revealed [Figure 4] no lung or stomach uptake, resolving metabolic bone disease and resolved insufficiency fractures. Patient clinically followed-up until February 2013, asymptomatic and serum creatinine of 1.5 mg/dl, no bone scans performed.

DISCUSSION

Gastric uptake has been described in patients with hypercalcemia either from tumors such as myeloma and breast carcinoma,^[4] or from metabolic diseases such as renal insufficiency and milk-alkali syndrome.^[5] In both malignant and nonmalignant conditions, impaired renal function with consequent decreased phosphate excretion is a prerequisite for this phenomenon,^[2]

our patient is a case of CKD with hyperphosphatemia. PC in hemodialyzed patients may be detected by ^{99m}Tc-MDP scanning.^[6] Extrasosseous PC is found most commonly in ESRD patients on chronic HD therapy.^[3] In the lungs, calcium deposits have been found in the interstitium of the alveolar septum, bronchiole walls, in the large airways, and even in the walls of the pulmonary vessels.^[7] Elevated stomach uptake of ^{99m}Tc-MDP can be due to free pertechnetate, to dystrophic, and to metastatic calcification.^[8] In our case, the labeling of radiopharmaceutical was 98% and was injected immediately after preparation. The kidneys, the lungs, and the stomach are the three main organs in the body where acids are secreted.^[4] There is a local tissue alkalinity in the region of these acid producing cells, which has been suggested to predispose these tissues to metastatic calcification.^[4] With the normalization of both calcium and phosphate metabolism and improved kidney function, new formation of ^{99m}Tc-MDP avid amorphous calcium phosphate, had ceased,^[9] we noted complete disappearance of lungs

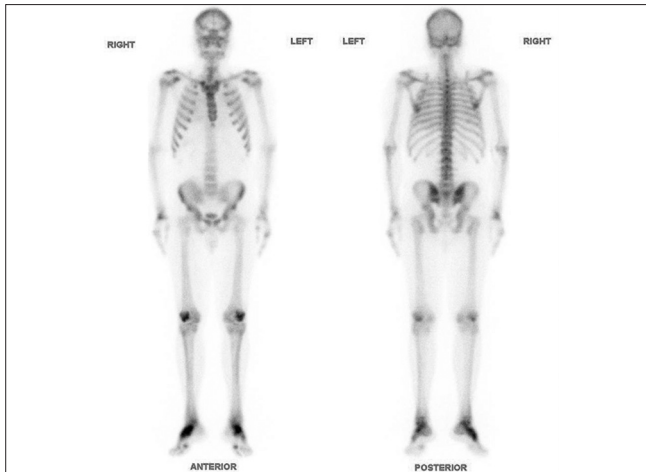


Figure 4: Whole body bone scan performed approximately 17 months post-transplant, the tracer uptake involving the lungs and stomach had completely resolved

and stomach uptake in ^{99m}Tc -MDP bone scan 17 months post-transplant. In any case of elevated ^{99m}Tc -MDP uptake in the stomach and/or lungs, vitamin D intoxication should be considered,^[9] but our patient had normal vitamin D levels. Insufficiency fracture is an important diagnosis to make because survival may be improved if specific management is used.^[10] This case report highlights the importance of normalization of renal function and disappearance of insufficiency fractures along with the extraosseous ^{99m}Tc -MDP uptake.

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