

CASE REPORT

An Unusual Case of Extraosseous Accumulation of Bone Scan Tracer in a Renal Calculus - Demonstration by SPECT-CT

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ABSTRACT

Extraosseous localization of radioisotope, used in bone scan, in a variety of physiological and pathological conditions is a well-known phenomenon. The causes of extraosseous accumulation of bone-seeking radiotracers should be kept in mind when bone-imaging studies are reviewed to avoid incorrect interpretations. We report an extremely rare occurrence of extraosseous accumulation of bone scintigraphy tracer in a renal calculus, in a patient with adenocarcinoma of prostate, that was demonstrated by Single Photon Emission Computed Tomography and Computed Tomography (SPECT-CT) fusion imaging.

Key words: Bone scan, extraosseous uptake, renal calculus, SPECT-CT, 99mTc-MDP

INTRODUCTION

The purpose of bone scintigraphy is to portray areas of new bone formation within the skeleton. This is useful in imaging reaction of bone to tumor, fracture, and infection. Since approximately half of the administered radioisotope is excreted through renal filtration, abnormalities of the

urinary system are also frequently noted during bone scintigraphy. In such cases, to reach an accurate diagnosis, the interpreting physician must first recognize which structures are involved in the uptake and the significance of the uptake.^[1] We describe a rare case in which extraosseous bone scan tracer accumulation was noted in a renal calculus.

CASE REPORT

A 60-year-old man, who had difficulty in passing urine for the past 6 months and a complaint of lower back pain presented to our department. On ultrasound imaging, he was found to have an enlarged prostate. Transrectal ultrasound-guided biopsy revealed adenocarcinoma of prostate,

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Gleason's score 3+3=6. His PSA was normal (1.3 ng/ml) and serum Alkaline phosphatase was elevated 58 U/L (Normal range 30-50 U/L). A 99m Technitium methylene diphosphonate (99mTc-MDP) bone scan was performed. The scan [Figures 1 and 2] showed mildly increased tracer uptake in lumbar vertebrae and focal accumulation of tracer in lower pole of the left kidney. Fusion imaging [Figure 3], using Single Photon Emission Computed Tomography along with X-ray Computed Tomography (SPECT-CT) of the lumbar spine was performed to characterize the vertebral tracer uptake. Lasix 40 mg was given 45 minutes prior to SPECT-CT to monitor the renal tracer accumulation. The scan demonstrated degenerative changes in lumbar vertebrae. The kidneys were included in the SPECT-CT imaging. High tracer uptake in a lower pole of the left kidney was found localized in a calculus in the lower calyx of kidney. The calculus measured 8 x 8 mm in size. The CT attenuation factor was 1060 Hounsfield unit, compatible with that of a renal calculus.

We concluded this as extra-skeletal bone scintigraphy tracer uptake in a renal calculus.

DISCUSSION

Bone scintigraphy is a valuable diagnostic tool in the evaluation of patients with a variety of osseous abnormalities. However, accumulation of bone scan tracer

outside the skeleton can pose a difficulty in reporting for a nuclear medicine physician, especially if only planar imaging is performed and the tracer uptake is overlapping or is in close vicinity of the skeleton.

Localization of bone scan tracer in a renal calculus has been reported in the past and its use in preoperative *in vivo* localization of the renal calculus has been explored.^[2] Retention of bone scan tracer on ureteric calculi and bladder calculus has been reported in the past.^[3-5] In

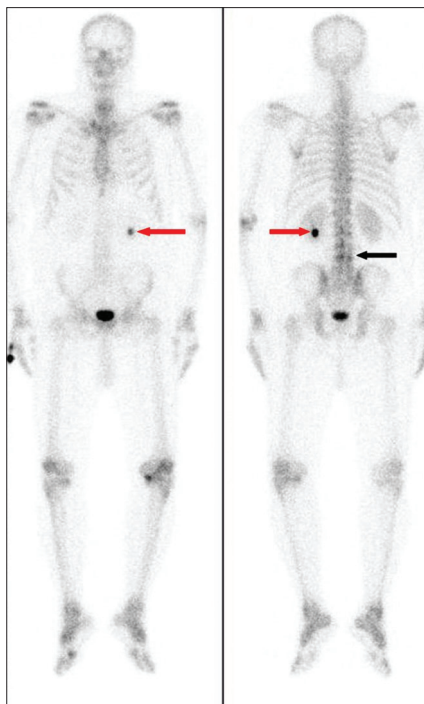


Figure 1: Whole body bone scan with 99Tc MDP of the patient. (a) Anterior and (b) posterior views, showing mildly increased tracer uptake in the lumbar vertebrae (black arrow) and intense, focal localization of the tracer in the lower pole of left kidney (red arrows).

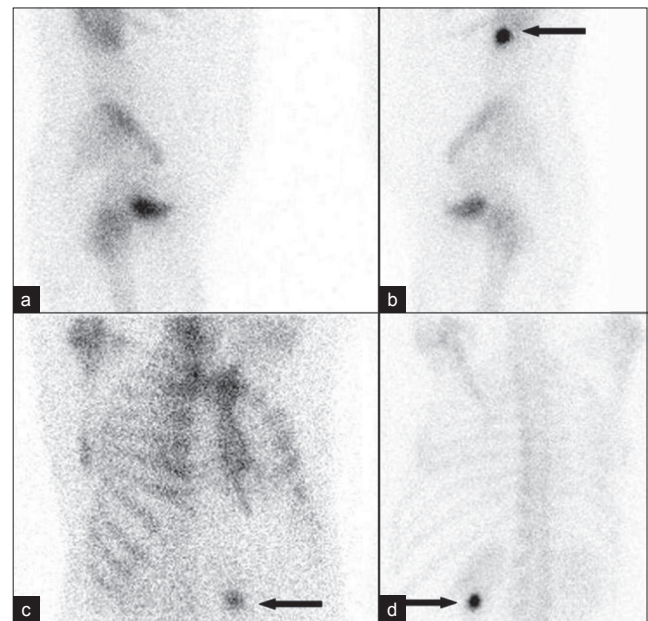


Figure 2: (a-b) Lateral and (c-d) oblique views clearly demonstrate the focal tracer uptake outside the skeletal structures in left kidney (arrows).

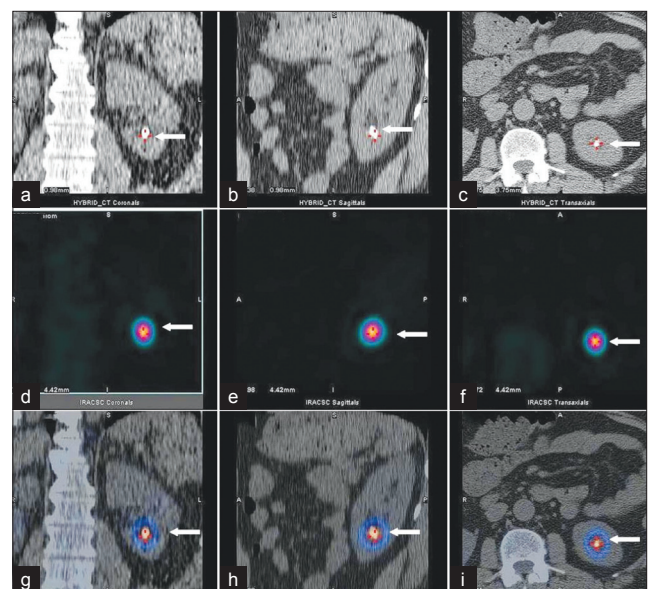


Figure 3: (a) Coronal, (b) sagittal and (c) transaxial CT images; (d) coronal (e) sagittal and (f) transaxial SPECT images; (g) Coronal, (h) sagittal and (i) transaxial SPECT-CT images. These revealed focal tracer accumulation in the left renal calculus (white arrows). The calculus measured 8 x 8 mm in size. The CT attenuation factor was 1060 Hounsfield unit, compatible with that of a renal calculus.

one of the studies, autoradiography of ureteric calculus demonstrated peripheral tracer distribution within the calculus. Accumulation of the radionuclide due to sluggish flow and its absorption onto the crystal surface, within the calculus, were suggested as possible mechanisms of tracer uptake.^[4] The other common causes of urinary system localization of the bone scan tracer are dilation of urinary-collecting system, bladder diverticulum, and presence of an ureterostomy bag.^[6-9]

CONCLUSIONS

Conditions causing extraskeletal accumulation of bone scan tracer must be kept in mind while reporting a bone scan. Our case demonstrates a rare occurrence of extraosseous bone tracer accumulation in a renal calculus. It also highlights important role played by SPECT-CT in localizing the extraskeletal tracer uptake. SPECT-CT can be used effectively when an extraskeletal uptake is encountered on planar bone imaging.

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