

Asymmetrical Uptakes in ^{99m}Tc MDP Bone Scan in Upper Extremity in Patient with Prostate Cancer: an Interesting Case

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ABSTRACT

Asymmetrical uptake of ^{99m}Tc MDP (methylene diphosphonate) in skeletal scintigraphy in extremity may lead to confusion in the diagnosis of metastasis or complex regional pain syndrome. After the exclusion of possible contamination in this report a case was presented with asymmetrical uptake of MDP in the upper extremity from accidental intra-arterial injection.

Key words: ^{99m}Tc MDP, Complex regional pain syndrome, Intra-arterial injection.

INTRODUCTION

Bone scan ^{99m}Tc MDP is a bone seeking radiopharmaceutical which after intravenous injection attached to surface of the bone by chemisorptions of the diphosphonate compound. But faulty and accidental intra-arterial injection can cause uptake distal to the injection site, which may mimic as metastatic lesions at unusual site (1). Here, a case of accidental intra-arterial injection of ^{99m}Tc MDP agent in a case of prostate cancer patient was reported, where increased unilateral accumulation of tracer in left upper limb was mimicking metastatic lesion.

CASE REPORT

A 90 years old man with newly and incidentally diagnosed adenocarcinoma of prostate with history of acute retention of urine was referred to National Institute of Nuclear Medicine and Allied Sciences (NINMAS) for the evaluation of baseline bone scan. He had high serum PSA level (771.40 ng/ml) and with Gleason score of 7 (4+3). Three hours after injection of ^{99m}Tc MDP, whole body imaging and static views

showed focal increased activity at the lateral half of the left wrist joint. There was diffuse uptake in the 4th and 5th digits of same hand including metacarpo-phalangeal, interphalangeal joints (Figure 1). The patient had no history of recent or old trauma, pain or any clinical history of arthritis. On plain x-ray of hand there was no apparent abnormality. The unusual pattern and distribution of the bony lesions in MDP scan has produced diagnostic confusion and differential diagnosis could not be made. For clarification reevaluation was done with three phase bone scintigraphy with pedal vein injection which showed no abnormality in all three phases on the left wrist and the other joints (Figure 2).

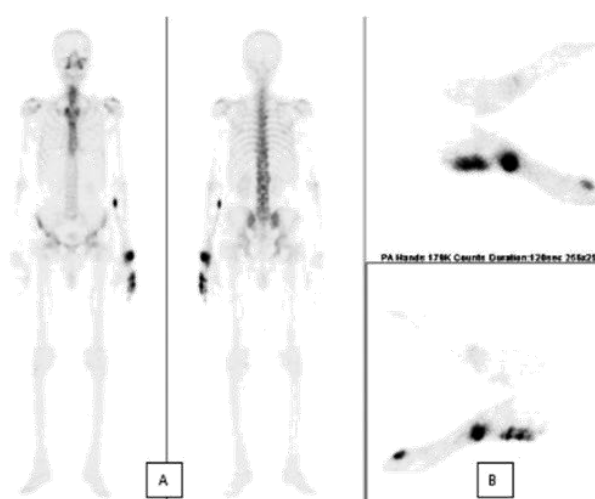


Figure 1: Delayed images of bone scan: (A) whole body and (B) upper limbs: increased activity at the left forearm, over the lateral half of left wrist and left 4th and 5th digits including metacarpo-phalangeal and inter-phalangeal joints.

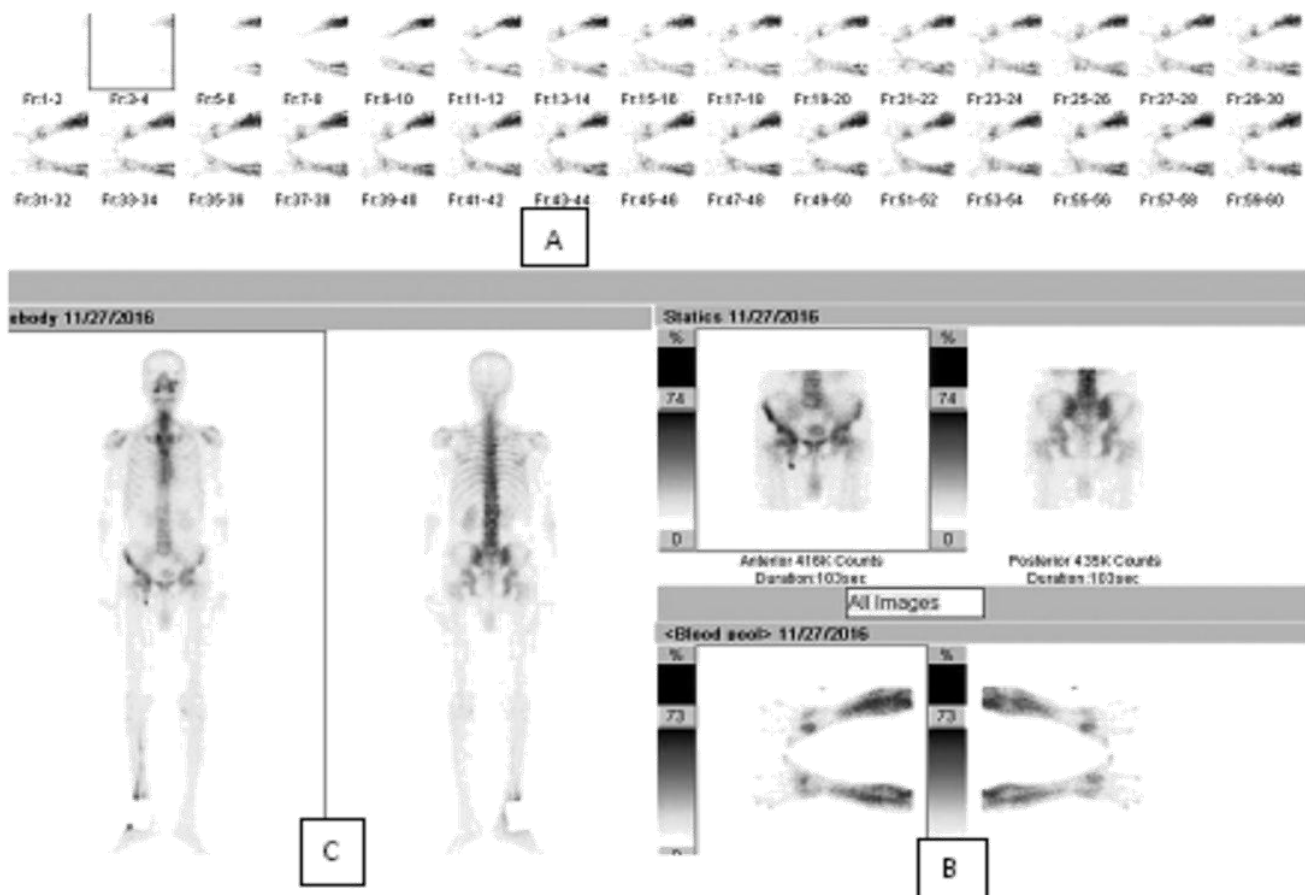


Figure 2: Repeat three phase bone scan with pedal injection of radiotracer show no abnormal flow (A); No focal or asymmetrical increased activity in arterial phase, (B): no increased blood pool activity (C): Delayed bone scan Images: no abnormal tracer accumulation in left upper limb.

DISCUSSION

Uptake of ^{99m}Tc MDP is primarily controlled by the amount of osteogenic activity, which is higher in areas of active bone formation or repair comparing to mature bone. Binding of the tracer occurs by chemisorption in the hydroxyapatite mineral component of the osseous matrix. Bone scan is very sensitive tool for the detection of osteoblastic metastasis in prostate cancer (2). The lesions are often located in vertebrae and ribs because of dissemination through internal venous plexus. The spread in the skeleton also follows the distribution of adult red bone marrow that is, skull, thorax, pelvis, spine, proximal long bones, which subsequently progress to involve adjacent cortical bone and distal parts of upper extremity are rare sites

of skeletal metastases from prostate cancer (3,4). In this reported case, increased accumulation of radiotracer was noted in the distal parts of left upper limb in initial scan; subsequent three phase bone scan showed no tracer accumulation, thus metastatic lesion was excluded, which was in agreement with most of the study findings. Other differential diagnosis of the case could be complex regional pain syndrome (CRPS); it is a chronic pain condition most often affecting one of the limbs (arms, legs, hands, or feet), usually after an injury or trauma to that limb. Complex regional pain syndrome is believed to be caused by damage to, or malfunction of the peripheral and central nervous systems. This condition is associated with abnormal bone scan and the classic pattern of three phase bone scan shows unilaterally

increased flow and blood pool activity with increased peri-articular uptake on delayed images. The increased uptake in the flow phase might be due to increased arterial flow in soft tissue around the joints, which leads to increased capillary flow and expanded diffusion. Increased uptake in delayed images is secondary to increased osteogenesis (2,6). Intra arterial injection of radiotracer may results in diffuse uptake distal to the injection site. Shin et al. described the "glove" phenomenon from an arterial injection of bone-imaging agent into the right distal radial artery near the wrist, which resulted in a "hot" palm and thumb. The mechanism of hot palm and thumb is due to hyperfixation of bone imaging agent, could be secondary to increase arterial blood flow at the first step of the radiotracers binding mechanism (5). Hence, accidental intra-arterial MDP injection may causes similar pattern of images like CRPS. These unusual images findings originating from the technical faults or benign conditions lead to confusion and results in suspicion of metastasis or CRPS. Careful evaluation is mandatory to overcome the confusion for appropriate diagnosis.

In this patient, there was no history of pain or fracture or immobilization of left hand. Tourniquet effect was excluded from the clinical history. The asymmetrical image pattern and location of bony lesions were not typical for the metastasis. To overcome the confusion reevaluation with three phase bone scan was considered mandatory to exclude CRPS. The three phase bone scan with pedal vein injection was done and revealed no abnormality in all three phases those

were evident or visualized in the earlier bone scan. Thereby the probability of the CRPS was excluded. The abnormal findings observed in the previous bone scan were attributed to the intra-arterial injection. Asymmetrical MDP uptake in upper extremity were reported by Ceylan et al. in three cases of intra arterial MDP injection and which were confirmed by three phase bone scan similar to this reported case (1).

In conclusion, nuclear medicine physicians must be aware of intra-arterial injection before the diagnostic evaluation of asymmetrically increased tracer activity in limbs, especially with no relevant clinical history. It is better to be careful during the radiotracer administration and to prevent the probable reevaluation for intra-arterial injection.

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