

Spectrum of technetium-99m methylene diphosphonate (^{99m}Tc MDP) uptake in Osteosarcoma

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Abstract

Osteosarcoma is a frequently occurring primary skeletal malignancy in the adolescent population. It arises from primitive mesenchymal bone forming cells and frequently involves long bones near the metaphyseal growth plate. Multiple imaging modalities are used for complete staging workup at the time of presentation; including magnetic resonance imaging (MRI) for local disease extent, computed tomography (CT) scan to rule out pulmonary metastasis, and bone scan to look for distant osseous metastases. We present the case of a young boy with osteosarcoma of left tibia, showing additional findings on MDP bone scan acquired for initial staging work up.

Key words: Osteosarcoma, bone scan, calcified nodal metastases, SPECT/CT

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Description

Radionuclide bone scan is one of the most common skeletal imaging done in an oncological setting. It involves scanning of the patient after intravenous injection of technetium-99m (^{99m}Tc) methylene diphosphonate (MDP).¹ ^{99m}Tc MDP is

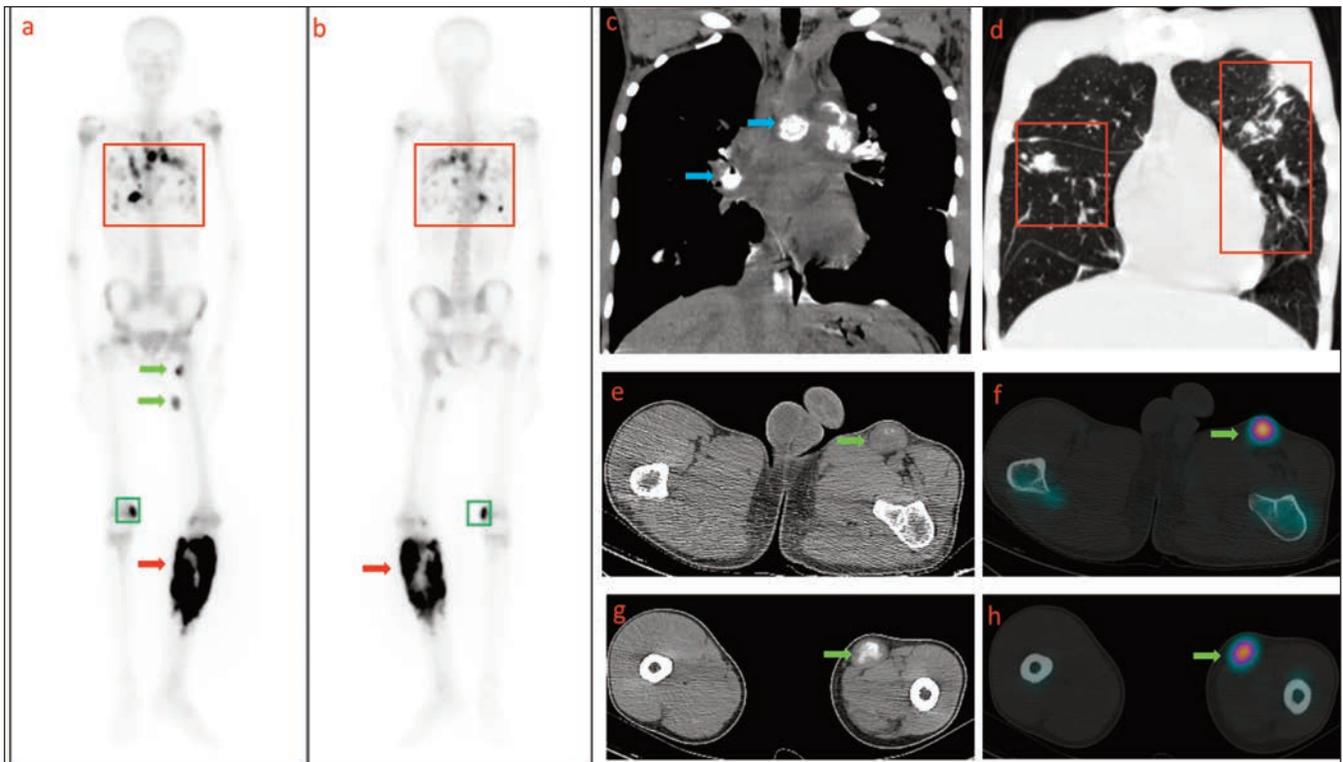


Figure: Whole body planar images showing heterogeneous expansile uptake with internal photopenic areas in proximal half of left tibial shaft; primary tumour (a,b red arrows). Focal soft tissue uptakes in the left proximal lower limb (a,b green arrows) correlate with partially calcified left inguinal and femoral lymph nodes on limited SPECT/CT (fused axial images c-f, green arrows). Multifocal uptake in the thorax (a,b red boxes) on planar images correspond to calcified mediastinal and hilar nodes (g, blue arrows) and bilateral pulmonary metastases (h, red boxes) on correlative coronal CT. Uptake in the right medial femoral condyle (a,b green boxes) is suspicious for distant osseous metastases.

primarily a bone seeking agent, however increased radiotracer uptake can be seen in soft tissues due to various factors that evoke calcification i.e. dystrophy, metastatic involvement, or heterotopic calcification. Additional spectrum of non-osseous uptake includes hormonal changes, ischaemia, traumatic causes and inflammatory process.^{2,3}

Osteosarcoma tends to metastasize to lungs most commonly, followed by bone, lymph nodes and other organs.⁴ Metastases of osteosarcoma are often calcified and hence show avidity on conventional bone scan.⁵ This was seen in our 18 years old patient who had his staging bone scan along with single photon emission computed tomography – computed tomography (SPECT-CT). In addition to the primary tumour in left tibia, MDP uptake is seen in partially calcified left inguinal and femoral nodes (Figure 1: a-f green arrows). Additional scattered uptakes in the thorax (a, b red boxes) correlate with partially calcified pathological mediastinal nodes and pulmonary nodules (g, h).

Abnormal soft tissue uptake on conventional bone scans with further characterization on SPECT-CT leads to change in staging and hence management of the patient. Therefore, nuclear physicians should utilize SPECT/CT whenever there is unusual tracer uptake on conventional nuclear imaging.

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