

A rare case of no-calcific liver metastases detected by ^{99m}Tc -methylene-diphosphonate skeletal scintigraphy

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Case report

We report the case of a fifty-eight years old woman with history of left breast cancer diagnosed in November 2010 and treated with radical mastectomy, chemotherapy and radiation therapy, followed by hormone therapy. From August 2011 to November 2017 the patient was in imaging follow up, free from recurrences or metastases.

In December 2017, due to the onset of intense dorsal-lumbar spine pain, the patient underwent ^{99m}Tc -methylene-diphosphonate (MDP) scintigraphy to evaluate possible skeletal involvement. The whole-body scan showed multiple bone metastases, more evident in skull and axial skeleton, and inhomogeneous ^{99m}Tc -MDP uptake in the right upper quadrant of the abdomen, suspect for hepatic localization (Figure 1). Bone scan was completed with single photon emission computed tomography/computed tomography (SPECT/CT) confirming the focal ^{99m}Tc -MDP uptake areas in liver, more evident in the sixth and eighth segments. At the CT images these areas showed slight inhomogeneity without macroscopic calcifications. Moreover SPECT/CT accurately highlighted metastases of the VIII and IX right ribs and confirmed the other sites of bone metastases (Figure 2).

Various conditions can influence MDP accumulation in tissues, such as serum calcium increase, PO_4 ion, tissue pH and factors which alter cell integrity like infection, radiotherapy and expansion of the extracellular fluid [1].

Hepatic uptake of ^{99m}Tc -MDP is an specific finding and its pattern can be focal or diffuse, with different meaning. Literature reports some cases of focal faint uptake in various malignancies, in particular in liver metastases from breast, colon or lung cancer. Also, primary breast cancer could uptake ^{99m}Tc -MDP [2-4].

Liver ^{99m}Tc -MDP uptake pathogenesis is firstly related to calcific regions in necrotic or proliferating fibrous tissue. The necrotic metastatic mass produces passive congestion and liver enlargement and then hypoxia with hemosiderin and calcium deposits with ^{99m}Tc -MDP affinity growing. Furthermore, ischemia damages cell integrity, calcium precipitates within mitochondria and on denatured proteins. So ^{99m}Tc -MDP is evidenced in irreversibly damaged cells in presence of residual blood flow [1].

Otherwise diffuse liver ^{99m}Tc -MDP uptake can be related to amyloidosis, hepatitis or recent intravenous injection of gadolinium contrast for Magnetic Resonance. These causes of diffuse hepatic uptake have to be considered after technical problems exclusion, due to ^{99m}Tc -MDP dose degradation by excess allumina chemical impurity, with colloid formation [2,5].

Incidental findings of extraosseous uptake can have an important impact on cancer patient management; for this reason the role of

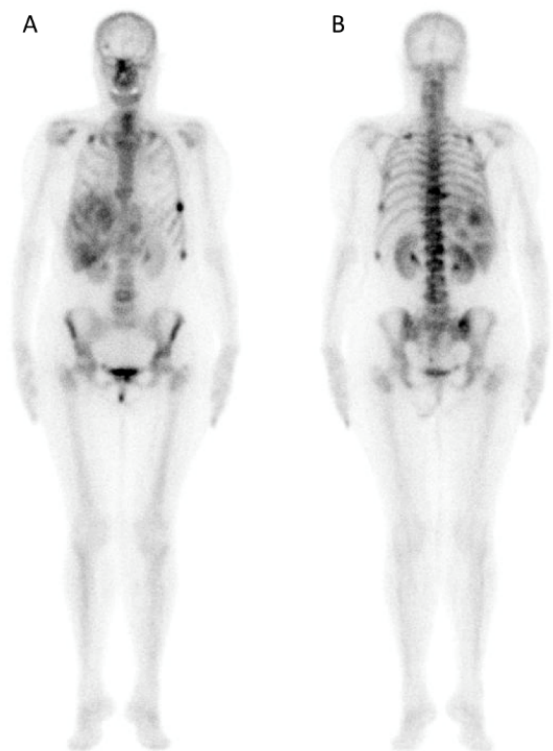


Figure 1. (A) anterior and (B) posterior whole body ^{99m}Tc -MDP scintigraphy shows multiple bone metastases of skull and axial skeleton and inhomogeneous uptake in the right upper quadrant of the abdomen.

hybrid SPECT/CT imaging appears particularly relevant because fused technology provides the great opportunity to combine nuclear medicine examinations sensitivity with CT anatomical information. The role of SPECT/CT in management of breast cancer patients have been already investigated in other procedures such as lymphoscintigraphy for sentinel lymph node radioguided surgery [6-8].

Currently bone scan is the gold standard in breast cancer follow up for skeletal metastases. Occasionally incidental extraosseous findings

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Figure 2. (A) MIP and (B) SPECT, (C) CT, (D) SPECT/CT coronal images of ^{99m}Tc-MDP scintigraphy show focal uptake areas in the 6th and 8th liver segments (green arrows) and VIII and IX right ribs metastases (red arrow) in addition to the multiple skeletal metastases detected at the whole-body scan.

are possible and the knowledge of their meaning is important for a correct diagnostic and therapeutic classification and a better patient's management.

The most modern multimodal SPECT/CT technology have a decisive role in improving the accuracy of ^{99m}Tc-MDP bone scintigraphy.

Disclosure

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