

Detection of Occult Breast Carcinoma during Evaluation of a Skeletal Tumor by Tc-99m MIBI Scintigraphy

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For the last several years the role of Nuclear Medicine in Oncology has been growing exponentially. One of the advantages of these techniques is that they survey the entire body and detect metastases at multiple sites simultaneously. New nuclear medicine techniques may also provide a functional evaluation of a tumor. This article demonstrates clinical applications using Tc-99m MIBI in a woman with bone metastases from unknown breast cancer.

Patient Description

A 56 year old woman presented with a 2 month history of right shoulder pain. X-ray examination revealed a bone lesion in the

proximal right humerus that was evaluated by magnetic resonance imaging and found undetermined for a malignant tumor. For further evaluation of the nature of the lesion the patient was referred for Tc-99m sestamibi (MIBI) scan. Whole body Tc-99m MIBI scan revealed markedly increased tracer uptake at the tumor site in the right shoulder [Figure A, curved arrow] compatible with the aggressiveness of a malignant tumor. A spot view to that region clearly demonstrated the lesion in the head of the right humerus but also revealed unexpected markedly increased focal tracer uptake localized in the right breast [Figure B, arrowhead]. Cytologic examination from both lesions confirmed the diagnosis of a

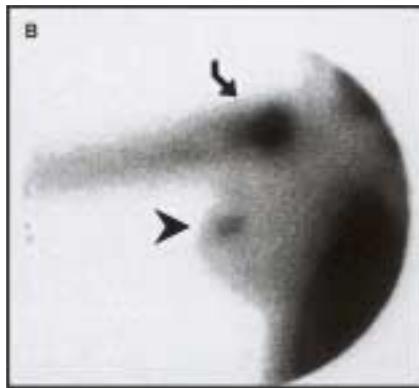
malignant breast carcinoma with skeletal metastasis. Sequential bone scans revealed progression of the disease with enlargement of the humeral metastasis and appearance of widespread metastatic skeletal disease.

Comment

Over the last decade, there has been a significant improvement in the ability of nuclear medicine physicians to preoperatively characterize the nature of lesions that are found undetermined for malignancy by conventional imaging modalities such as X-ray, computed tomography or MRI, by using more specific tumor-detecting agents. Tc-99m MIBI is a clinically



Tc99m MIBI Scan



[A] Anterior whole body Tc-99m MIBI scintigraphy showing a large focal area of increased uptake in the proximal right humerus. [B] A spot view demonstrating the focus in the humerus, as well as an area of increased uptake in the right breast.

effective tumor-seeking agent indicated for detection of musculoskeletal tumors [1–4] and for the detection of primary malignant breast carcinoma in patients with dense breast, or where significant architectural distortion has occurred from prior biopsies or surgery, making mammography inaccurate [5]. The tracer is concentrated within the mitochondria of metabolically active cells with a strikingly higher uptake in malignant pathologies. It is also a useful adjunct tool to distinguish between residual or recurrent active tumor from necrotic non-malignant tissue and post-therapeutic changes. MIBI localization in tumors reflects not only blood flow and tumor viability but also the presence or absence of p-glycoprotein activity, which is responsible for pumping chemotherapeutic drugs out of the tumor cells, thereby thought to be responsible for multidrug

The prime utility in this patient was to aid in differentiating a benign from a malignant skeletal lesion, as many primary malignant skeletal tumors and bone metastases have been shown in recent literature to avidly concentrate Tc-99m MIBI [1–4]. On the contrary, if Tc-99m MIBI imaging

shows little or no uptake, a benign tumor is more likely, with a reported negative predictive value of 88%, though this cannot replace histologic confirmation as a definitive diagnosis [2]. Recent studies have shown that the new nuclear medicine imaging modality of PET (positron emission tomography) using F¹⁸-FDG (fluorodeoxyglucose) is even more sensitive and specific for detection of various malignant tumors, however it is more expensive and not currently available for all oncologic patients [4]. In the present case, we demonstrate the potential of Tc-99m MIBI scan, both for imaging of skeletal metastases and detecting their origin from breast carcinoma. This is achieved by selectively adding spot views to include the breast, following whole-body scanning during evaluation of skeletal lesions in women. In this way it is possible to detect occult breast carcinoma, the most common primary malignancy metastasizing to bone in women.

References

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Travel is glamorous only in retrospect

Paul Theroux (1941-), American novelist and travel writer