

Case Report

Ovarian cancer unmasked by technetium-99m bone scintigraphy and single-photon emission computed tomography-computed tomography

ABSTRACT

We report a case of a 30-year-old female patient with a painless palpable nodule in the chest wall, evaluated for osseous involvement by technetium-99m (Tc-99m) bone scintigraphy. A whole-body scan revealed numerous sites of increased tracer accumulation throughout the thorax, abdomen, and pelvis. Subsequent single-photon emission computed tomography-computed tomography (SPECT-CT) of the abdomen and pelvis showed no abnormal uptake in the bone; however, significant nonosseous tracer accumulation in calcified soft tissue metastases was noted. Pathology confirmed a high-grade ovarian papillary serous adenocarcinoma. Extrasosseous uptake of bone-seeking agents in the body is often incidental findings and can be explained by various benign and malignant conditions with soft tissue calcification. In our case report, this unusual finding on bone scintigraphy was highly suggestive for malignancy, initially not considered during the clinical evaluation of the patient. It also illustrates the usefulness of additional hybrid SPECT-CT to precisely localize extrasosseous uptake of Tc-99m methylene diphosphonate.

Keywords: Bone scintigraphy, ovarian cancer, single-photon emission computed tomography-computed tomography, soft tissue metastases, technetium-99m methylene diphosphonate

INTRODUCTION

Ovarian cancer is the seventh most common cancer worldwide among women and is the most lethal malignancy of the female reproductive system. This high mortality rate can be explained by the majority of patients being diagnosed with advanced and metastatic disease, due to nonspecific presentation of symptoms of the disease, therefore often called “silent killer.”^[1,2]

Here, we discuss a case of Stage IV psammoma-rich high-grade serous ovarian carcinoma that was initially suspected on bone scintigraphy by the presence of unusual soft tissue calcification within the metastatic sites.

CASE REPORT


A 30-year-old female patient with unremarkable medical history presented with a painless palpable parasternal mass.

Physical examination confirmed a rounded parasternal nodule on the left side, nontender, and partially fixed to the underlying chest wall and an ipsilateral enlarged supraclavicular lymph node. These findings were confirmed by initial radiological workup with ultrasound. Subsequent magnetic resonance image of the thorax demonstrated multiple other similar nodular masses with same appearance and characteristics spread in the anterior thoracic chest wall, left-sided supraclavicular lymphadenopathy, and massive right-sided pleural effusion. These findings were highly suspicious of malignancy.

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The patient was referred to the Nuclear Medicine Department for technetium-99m (Tc-99m) methylene diphosphonate (MDP) bone scintigraphy to evaluate for osseous metastatic disease. Planar whole-body images [Figure 1a] were acquired 2.5 h after intravenous injection of the bone-seeking agent Tc-99m MDP. Although no abnormal bone uptake was seen, extensive extraosseous activity was noted throughout the pelvis and abdomen as well as some foci of increased uptake in the thorax. Additional single-photon emission computed tomography (SPECT) with low-dose CT images [Figure 1b-d] of the abdomen and pelvis precisely visualized radionuclide accumulation in calcified soft tissue metastases, without any pathological uptake in the bone. These findings were confirmed with diagnostic contrast-enhanced CT evaluation [Figure 1e-g] and consistent with widespread omental and peritoneal metastatic deposits. Given these findings, an excisional biopsy on the left supraclavicular lymph node was performed. Histopathological examination was compatible with high-grade papillary serous adenocarcinoma of the ovary, with multiple psammoma bodies in the tissue sample.

These psammoma bodies contain a high content of calcium, responsible for the extraosseous uptake of Tc-99m-MDP.

DISCUSSION

Abnormal extraskeletal accumulation of the bone-seeking radiopharmaceuticals has been documented previously for many benign as well as malignant conditions and can be explained by the affinity of the Tc-99m-labeled diphosphonate for hydroxyapatite crystals and calcium precipitates.^[3,4] These soft tissue calcifications may be microscopic and beyond the resolution of conventional radiographs.^[5]

Soft tissue metastases from ovarian papillary serous adenocarcinoma are known to show high affinity for Tc-99m MDP, explained by the high calcium content of concentrically laminated psammoma bodies.^[6]

This case report illustrates the importance of careful interpretation of a whole-body bone scintigraphy on the presence of unusual nonosseous tracer accumulation as well as the additional value of hybrid SPECT-CT for further clarification.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients

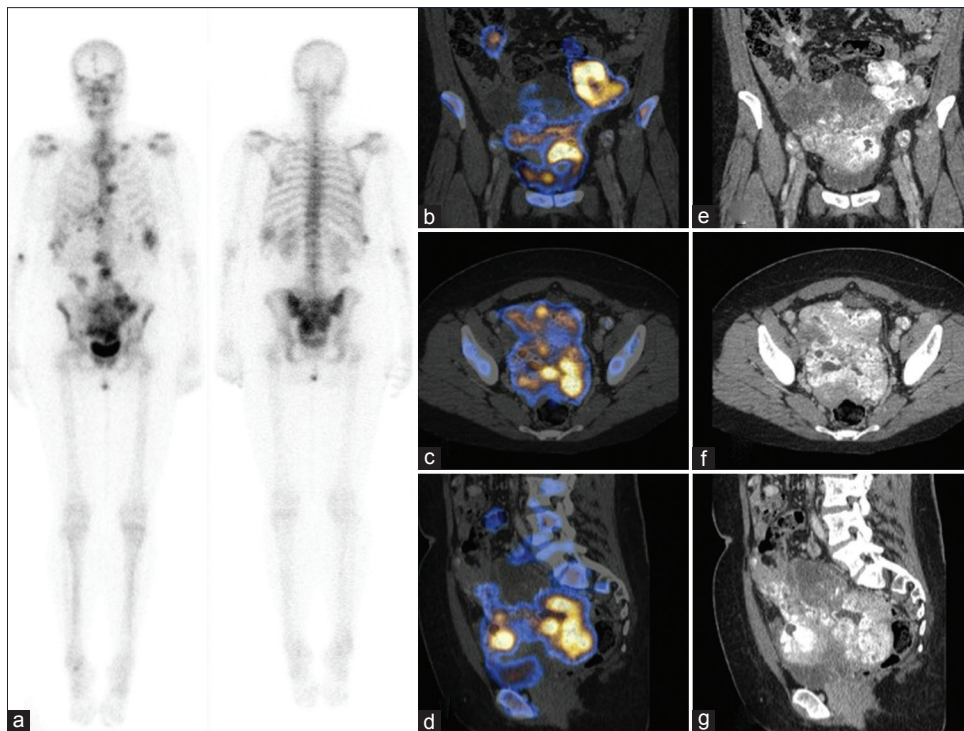


Figure 1: Technetium-99m methylene diphosphonate whole-body bone scintigraphy (a) revealed extensive extraosseous activity throughout the pelvis and abdomen as well as some foci of increased uptake in the thorax. Additional coronal, transverse, and sagittal fused single-photon emission computed tomography-computed tomography images (b-d) precisely visualized radionuclide accumulation in calcified soft tissue masses, without any pathological tracer uptake in the bone. These findings were confirmed by contrast-enhanced computed tomography images (e-g) and consistent with widespread omental and peritoneal calcified tumor implants

understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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