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CASE REPORT

Metastasis of femoral osteosarcoma to the abdominal wall detected on 99m Tc-MDP skeletal scintigraphy

Elahe Pirayesh · Azadeh Rakhshan · Mahasti Amoui · Afshin Rakhsha · Ali Shafie Poor · Majid Assadi

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Abstract Osteosarcoma is the most frequent primary malignancy of bone, and usually metastasizes to the lung and bones, while other sites are rare. In most reported cases, soft tissue metastasis of osteosarcoma is unusual, and only develops in the advanced stages of the disease, especially following multiple recurrences. We present a patient with recently diagnosed osteosarcoma of the right femur, showing abdominal wall metastasis diagnosed by technetium-99m-methylene diphosphonate (99m Tc-MDP) whole body bone scintigraphy and confirmed histologically. The present case highlights the importance of whole body imaging of patients with osteosarcoma for detecting unusual sites of metastasis, especially in soft tissue organs.

E. Pirayesh · M. Amoui
Department of Nuclear Medicine, Shohada e Tajrish Medical Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

A. Rakhshan
Department of Pathology, Shohada e Tajrish Medical Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

A. Rakhsha
Department of Radiation Oncology, Shohada e Tajrish Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran

A. S. Poor
Department of Nuclear Medicine, Shafa Yahyaian Medical Center, Tehran University of Medical Sciences, Tehran, Iran

M. Assadi (✉)
The Persian Gulf Nuclear Medicine Research Center, The Persian Gulf Biomedical Sciences Institute, Bushehr University of Medical Sciences, Boostan 19 Alley, Sangi Street, Bushehr, Iran
e-mail: assadipoya@yahoo.com; asadi@bpums.ac.ir

Keywords Osteosarcoma · Abdominal wall metastasis · 99m Tc-MDP whole body bone scan

Introduction

Osteosarcoma is the most frequent primary malignancy of bone, and usually metastasizes to the lung and bones, while other sites are rare. In most reported cases, soft tissue metastasis of osteosarcoma is unusual, and only develops in the advanced stages of the disease, especially following multiple recurrences.

We present a patient with recently diagnosed osteosarcoma of the right femur, showing abdominal wall metastasis diagnosed by technetium-99m-methylene diphosphonate (99mTc-MDP) whole body bone scintigraphy and confirmed histologically.

Case report

A 23-year-old woman with a 2-month history of right hip pain and a recent diagnosis of osteosarcoma in the proximal right femur was referred to our department for evaluation of distant bone metastasis. Her medical and family history was unremarkable. Hematological and biochemical tests were normal, with the exception of elevated alkaline phosphatase and lactate dehydrogenase. She had also undergone a computed tomography scan of the chest for staging purposes, which revealed no abnormality. A whole body bone scan was done 3 h after intravenous administration of 740 MBq (20 mCi) 99m technetium methylene diphosphonate. Bone scintigraphy demonstrated increased radiotracer uptake in the proximal right femur, as well as in the right sacroiliac joint and skull (Fig. 1). It also showed

intense, abnormal extraosseous tracer uptake in the right side of the abdomen, which persisted after the patient's clothes had been changed and skin washed (Fig. 2). In a physical examination, an oval-shaped abdominal wall mass was observed in the right periumbilical region, showing no tenderness or erythematous change. She denied trauma or injection at this site. An abdominal X-ray showed a focal area with calcification in that region (Fig. 3). The patient underwent surgical resection of the mass, and gross examination revealed an ovoid, tan yellow, elastic-to-hard, non-encapsulated mass measuring $4 \times 3 \times 2.5$ cm. Decalcified sections of the mass showed adipose tissue and skeletal muscle fibers infiltrated by a malignant neoplasm composed of atypical, plump, ovoid-to-spindle cells with a high nuclear to cytoplasmic ratio (N/C ratio), hyperchromatic nuclei, and prominent nucleoli resting in a chondroid matrix with foci of partially mineralized, lace-like, osteoid matrix (Fig. 4). The findings were diagnostic for high-grade osteosarcoma, and were morphologically similar to the patient's primary bone osteosarcoma and consistent with metastatic focus of osteosarcoma.

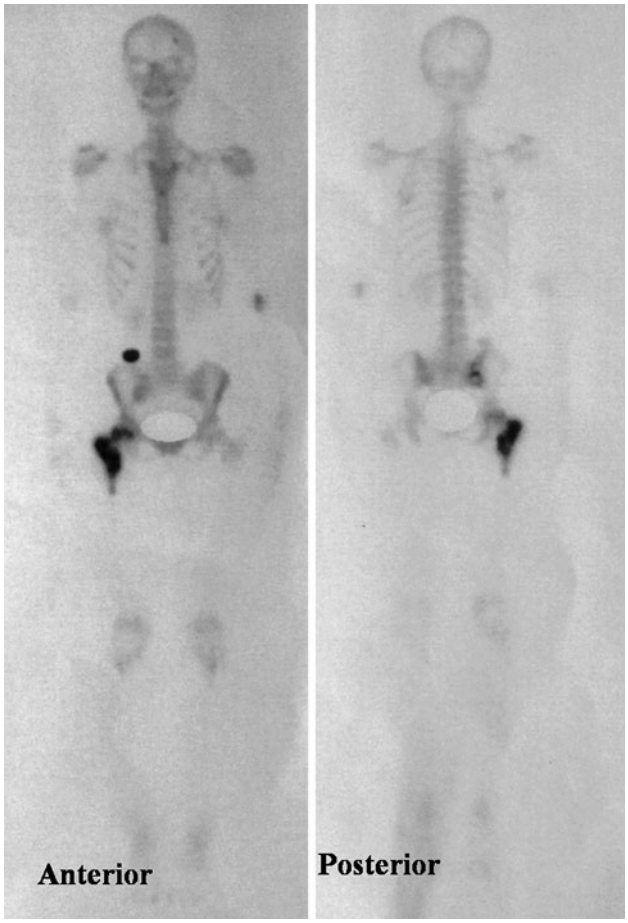

Fig. 1 Whole body bone scintigraphy using 99m technetium methylene diphosphonate demonstrated increased radiotracer uptake in the proximal right femur, as well as in the right sacroiliac joint and skull

Discussion

Approximately, 20 % of patients with osteosarcoma have distant metastasis at diagnosis, which is an extremely poor prognostic finding. The lung is the most common site, followed by the bone [1]. The occurrence of extrapulmonary soft tissue metastasis appears to be extremely rare, and is typically seen in the advanced stages [2]. Aggressive treatment with surgery and intensified chemotherapy have altered the pattern of metastatic recurrences in patients treated for osteosarcoma, and a higher rate of atypical extrapulmonary locations for metastasis is being reported [3], including lymph nodes, brain, small bowel, pancreas, kidney, peritoneum, pleura, breast, skin, and subcutaneous fat [2, 4–6]. There are also some limited reports of skeletal muscle [7, 8] and abdominal wall metastasis of osteosarcoma [9, 10]. Although skeletal muscle comprises about 40 % of total body mass and is a highly vascularized tissue, the frequency of intramuscular metastasis is just 0.8 %. The rarity of metastasis in skeletal muscle can be explained by various cellular and molecular mechanisms in the host environment, which inhibit growth and metastasis of tumors and make skeletal muscle a hostile milieu for the proliferation of malignant cells [11]. Likewise, some

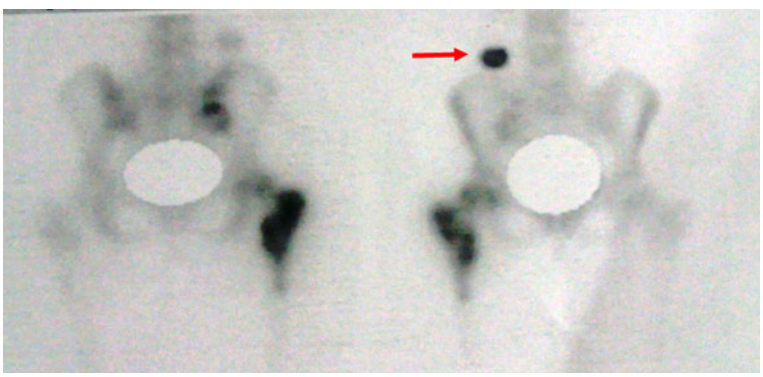

Fig. 2 Whole body bone scintigraphy using 99m technetium methylene diphosphonate showed intense abnormal extraosseous tracer uptake in the right side of the abdomen, which persisted after the patient's clothes had been changed and skin washed

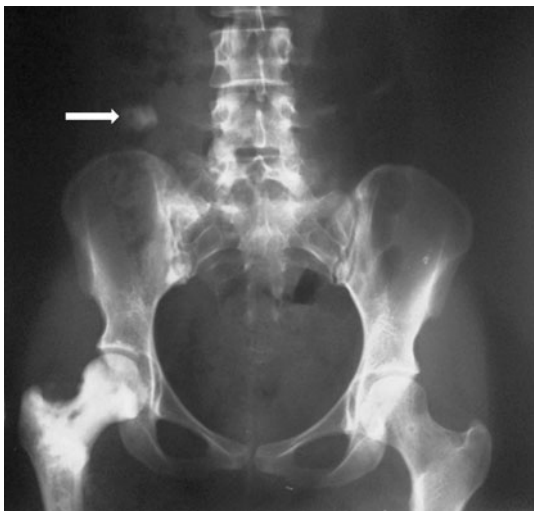

Fig. 3 Abdominal X-ray showed a focal area with calcification in the right side of the abdomen

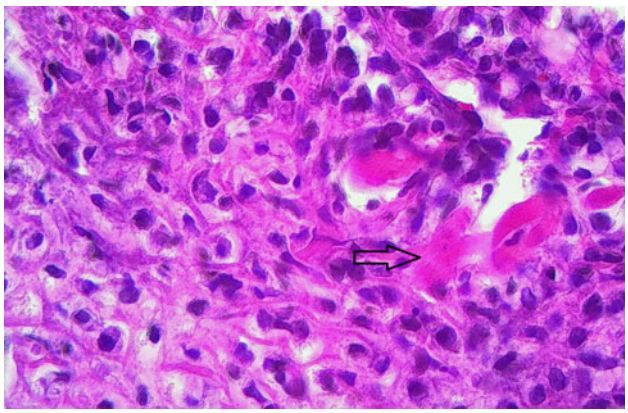

Fig. 4 Microscopic view (H&E, 400×) of the malignant osteoblasts infiltrating the skeletal muscle fibers of the abdominal wall (*arrow*)

evidences demonstrated a mechanism whereby muscular system puts forth three certain inhibitory effects upon metastatic cell which are (1) cellular recruitment into the myogenic lineage, (2) a paracrine-mediated cytostatic and (3) paracrine-mediated cytotoxic response [12].

In almost all reported cases, unusual metastatic sites have appeared as tumor recurrence at least several months after initial treatment. However, in this patient, who was newly diagnosed and previously untreated, metastasis was identified in the abdominal wall. Furthermore, this case describes an unusual metastatic pattern, whereby osteosarcoma preferred the soft tissue to the lung, which is the most common metastatic site. Our case highlights the importance of whole body imaging of patients with osteosarcoma for detecting unusual sites of metastasis, especially in soft tissue organs. Physicians should also be aware of changing patterns of metastasis in patients with osteosarcoma.

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