Flare Phenomenon in Osteosarcoma after Complete Remission

Kristian Herrlin, Helena Willén and Thomas Wiebe

Departments of Diagnostic Radiology, Pathology and Pediatrics, University Hospital, Lund, Sweden

A patient undergoing cytostatic therapy for osteosarcoma of the right humerus had bone scans at 2-mo intervals. A skeletal focus of increased radiotracer accumulation occurred and subsequently was confirmed by CT and MRI. A necrotic metastasis was found during biopsy. There were no remaining viable tumor cells. This finding confirms the presence of the flare phenomenon in skeletal metastases in primary malignant bone tumors and that radionuclide imaging may fail to detect intramedullary foci of viable metastases in these tumors.

Key Words: osteosarcoma; flare phenomenon; computed tomography; magnetic resonance imaging; remission


Flare responses on bone imaging have been well documented in patients with breast and prostatic carcinoma (1,2) and, to a lesser extent, in other tumors such as small-cell carcinoma of the lung (3). It is characterized by increased tracer accumulation on bone scans in metastatic foci of the skeleton after the start of systemic therapy, despite clinical improvement (4). The reports on the flare phenomenon are scarce for other tumor types. One report includes histologic correlation of primary malignant bone tumors with soft-tissue manifestation of flare (5,6).

CASE REPORT

A 17-yr-old boy presented with a 4-mo history of pain in the right upper arm. Diagnostic evaluation with CT and fine-needle aspiration biopsy revealed an osteosarcoma in the right proximal humerus. Preoperative cytostatic treatment was given for 8 wk. Amputation of the right arm through the scapular neck was subsequently performed.

At the initial bone scan, extensive tracer accumulation was found in the primary tumor proximally in the right humerus. There was also a small area of tracer accumulation in the right pubic bone that was initially overlooked (Fig. 1).

A follow-up scan 2 mo later, near the completion of the initial cytostatic treatment, revealed additional faint isotopic accumulation in the mid-diaphyseal area of the right femur (Fig. 2). Conventional x-ray examination of the femur was normal, whereas CT showed increased density of the medullary cavity of the right femur at the site of the lesion. MRI confirmed the presence of a fairly well circumscribed intramedullary lesion (Fig. 3). Open biopsy and subsequent curretage were performed.

Six months later, MRI was performed over the area of increased tracer accumulation medially in the right pubic bone, with
inflammatory infiltrate adjacent to a primary neoplastic process as flare (9). For most authors, however, the flare phenomenon is synonymous with transient increased radioisotope accumulation in bone tumors after the start of systemic therapy, despite other evidences of therapeutic success (1–3, 10–11). Therapeutic success has been evaluated by either clinical or laboratory parameters or by a combination of both (1–3, 10, 11). There is no agreement on the incidence of the phenomenon or on the limitations it will have on the usefulness of radionuclide bone imaging (1, 2, 11). The appearance of new lesions as part of the flare response is considered unusual (12–14).

The reported incidence of skeletal metastases in osteosarcoma is 15%–30% (15). Early detection of these significantly affect therapy and prognosis. Whole-body bone scanning, which provides an overview of the entire skeleton, at 2–6 mo intervals has evolved as a practical clinical tool in the follow-up of patients.

Bone-seeking tracers are known to accumulate in tumors with clinical symptoms in which peristomal or cortical bone involvement can be anticipated. Little is known, however, about radioisotope accumulation in small metastatic foci, solely located in the medullary cavity. In our patient, a small, completely necrotic metastasis was found in the medullary cavity of the right femur 2 mo after normal bone scanning of the area. The scans were obtained at the beginning and end of the initial cytostatic treatment.

CONCLUSION

Our results indicate that conventional radionuclide imaging may not be as sensitive in the detection of early skeletal metastasis in osteosarcoma as commonly believed and that the flare phenomenon could account for radiotracer accumulation previously considered to represent new tumor involvement.

REFERENCES


