Is There Still a Place for Bone Scanning in Ewing's Sarcoma?

Concise Communication

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In this retrospective study, 28 cases of Ewing's sarcoma are reviewed for the onset of metastasis.

Bone scans demonstrated bone metastasis in three out of 28 patients at presentation. Of the 22 patients free of metastases at presentation, ten subsequently developed bone metastases. In six of these patients, the bone scan was the earliest demonstrator of metastatic disease. Bone scans are recommended at presentation and periodically during follow-up.

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Bone scintigraphy at presentation and during follow-up in patients with osteosarcoma and Ewing's sarcoma has been reviewed previously (*1*). Only nine patients with Ewing's sarcoma were evaluated in that report. None of the patients had bone metastases at presentation, but two of the nine subsequently developed bone metastases in the 2 yr following diagnosis. Recently we reviewed the value of bone scans in osteosarcoma, and noted that the introduction of adjuvant therapy has changed the pattern of development in metastatic disease (*2*). Since most patients with Ewing's sarcoma are routinely treated with adjuvant therapy, we have reviewed our now larger experience with this tumor to determine the value of bone scintigraphy at presentation and during the follow-up period.

MATERIALS AND METHODS

From 1972 to 1977, 28 patients with biopsy-proven Ewing's sarcoma† had 79 bone scans performed at varying intervals. Scintigraphic follow-up was obtained on all patients from 1 to 54 mo after their initial diagnosis (median time = 23 mo).

Twenty-six of the patients had radiation therapy as part of their primary therapy; two required an amputation, and one received only chemotherapy. Twenty-seven of the 28 patients received chemotherapy consisting of either methotrexate alone or in combination with doxorubici and/or vincristine, actinomycin D, and cyclophosphamide.

BONE SCANS

Bone scans were performed with fluorine-18 during the first year of the study. Subsequently, all scans were performed with a technetium-labeled bone agent (EHDP or MDP). All bone scans were reviewed by two observers to determine whether there was scintigraphic evidence of metastatic bone disease. These data were compared with chart reviews indicating the presence or absence of concomitant pulmonary metastases.

RESULTS

Of the 28 patients, 18 were males and ten females, age range 5–32 yr (average = 14). In these patients, the most common site of the primary tumor was the pelvis; other

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TABLE 1. PRIMARY SITES OF EWING'S SARCOMA

Pelvis	7
Ribs	4
Femur	4
Spine	3
Tibia	2
Fibula	2
Scapula	2
Calcaneus	1
Clavicle	1
Humerus	1
Ulna	1
	28

frequently noted sites were the ribs, spine, and femur (Table 1).

At presentation, three of the 28 patients (11%) had bone metastases and another three had pulmonary metastases (Table 2).

In the follow-up period involving the 22 patients free of either pulmonary or bony metastatic disease at presentation, ten (45%) developed bone metastases. Four developed bone metastases alone; two developed bone metastases before, and four after, the onset of pulmonary metastases. Bone metastases occurred most frequently in the ribs and spine (Table 3). Six other patients developed only pulmonary metastases in the follow-up period.

TABLE 2. DEVELOPMENT OF BONE AND PULMONARY METASTASES IN EWING'S SARCOMA

Age (yr)	Sex	Length of follow-up (mo)	Time of metastasis (mo)	
			Bone	Pulmonary
28	F	4	0	—
16	M	6	0	—
8	M	12	3	—
19	M	23	3	—
16	F	7	7	—
9	M	54	13	—
16	M	17	0	1
13	M	26	21	23
7	M	46	37	39
16	M	26	9	5
32	M	34	34	8
16	M	25	20	5
12	F	30	30	24
9	F	12	—	0
20	M	23	—	0
7	M	34	—	0
6	F	15	—	2
12	F	54	—	2
17	M	13	—	5
5	M	26	—	14
18	M	14	—	14
7	M	21	—	18
14	F	1	—	—
23	F	9	—	—
9	F	24	—	—
15	F	25	—	—
8	M	30	—	—
12	M	35	—	—

DISCUSSION

Ewing's sarcoma is a common primary bone tumor, generally occurring in the second decade of life. Currently, the 5-yr survival rate for treatment using combinations of chemotherapy, radiation therapy, and occasionally, surgery is about 75% (*3, 4*).

Our data indicate that unlike osteosarcoma, where ~2% of the patients have bone metastases at presentation, a larger percentage of patients with Ewing's sarcoma (11%), present with such disease. During the follow-up period, however, both tumors act similarly: about 40% of patients with osteosarcoma develop bone metastases during the first 2 yr after presentation, and the study indicates essentially the same proportion for Ewing's sarcoma (45%). As in our earlier report on nine patients (*1*), we have not observed any relationship between the development of bone metastases and the development of pulmonary metastases in Ewing's sarcoma.

Because of the large impact that the presence of metastatic disease has on the choice of primary or follow-up therapy in this disease, our data suggest an important role for bone scans in patients with Ewing's sarcoma. Their role at presentation is clear—11% of patients have unsuspected bone metastases, making bone scans mandatory at this time. During the follow-up of patients in this study, 16 developed bone or pulmonary metastases and six of them (38%) had their first or only metastatic site in bone. Thus, periodic follow-up bone scans also appear mandatory.

TABLE 3. SITES OF BONE METASTASES OF EWING'S SARCOMA

Ribs	5
Spine	4
Skull	2
Pelvis	2
Scapula	2
Femur	1
Clavicle	1
Sternum	1
Humerus	1
Tibia	1
	20*

* Seven patients had multiple sites of bone metastases.

FOOTNOTE

† One patient was diagnosed as having an undifferentiated round-cell tumor of bone, but was treated as a patient with Ewing's sarcoma.

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