Mayo Clinic Tumor Rounds
Chondroblastoma-Like Osteosarcoma

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CASE REPORT

In April 1986, a 20-year-old man was referred to the Rizzoli Institute with a 4-year history of increased swelling at the back of his right foot. The lesion was not painful, but the patient was not able to get his foot into his shoe.

One year prior, the patient underwent a biopsy on the first metatarsus after undergoing a radiographic study (Fig 1). After an initial diagnosis of chondroblastoma, the diagnosis was changed to grade 3 chondroblastic osteosarcoma. At that time, two metastatic lesions were detected on a computed tomography (CT) scan of the thorax.

A marginal resection of the first metatarsus was done followed by autologous fibular graft. Grossly, the lesion was expanding the bone with soft-tissue extension. The histologic diagnosis was grade 3 chondroblastic osteosarcoma (Fig 2).

Two months later, a lung biopsy of the observed lesions showed only fibrosis. Two suspect nodules (7 cm and 3.5 cm in diameter) were not ablated because the surgeon did not believe it would be possible. The patient underwent chemotherapy, and 9 months later, a lobectomy was performed. Histology revealed metastatic grade 3 chondroblastic osteosarcoma (Fig 3). No further treatment was performed.

After 4 years and 4 months, curettage (plus phenol) was performed on a right cuboid lytic lesion that had been present for several years and had started to increase in size over the past year (Fig 4). Histologic diagnosis was similar to the previous one. No further treatment was necessary until 3 years and 5 months later when a round radiopaque lesion in the soft tissues close to the metatarsus in which the bone graft had been done was ablated. The lesion had been present for several years and had slowly increased in size (Fig 5). The histologic diagnosis was the same.

Since then, the patient has undergone regular follow-up, and no other lesions or metastases have been detected except for a tiny radiopaque nodule (3 mm in diameter) in the soft tissues adjacent to the right distal first phalanx. This lesion (Fig 6) recently was excised and had the same histologic features as the previous lesions.

Histologic Features. The lesions showed a tumor composed of round, polygonal cells, with eosinophilic cytoplasm and scattered giant cells. The overall appearance of the tumor resembled a chondroblastoma, but the anaplasia of the tumoral cells was not in keeping with this diagnosis.

On low-power microphotographs, tumor infiltration between the host bone trabeculae was present (Fig 2A). On high-power photomicrographs, the tumor had a monotonous appearance (Fig 2B) and was composed of oval-round cells, with scattered giant cells. Anaplasia of the tumoral cells was noted along with chondro-osteoid matrix between the cells. These histologic features were detected in the previous surgical specimens, and the lung metastases were indistinguishable histologically from the lesions in the foot (Fig 3).

DISCUSSION

Osteosarcoma of the bone is no longer a monotypic entity. Several variants have been reported in the literature,1-3 one of which is chondroblastoma-like osteosarcoma.4-5 Chondroblastoma-like osteosarcoma is a rare tumor, occurring in <1% of all osteosarcomas in the Mayo Clinic series.

Chondroblastoma-like osteosarco-
ma involves an older group of patients than the usual osteosarcoma. The foot was the location in 5 out of 11 cases in the Mayo Clinic series of chondroblastoma-like osteosarcomas. The consistent recurrence when adequate surgical margins were not achieved and the high metastatic potential underline the highly malignant nature of chondroblastoma-like osteosarcoma and call for aggressive treatment as with more common osteosarcomas.

The histologic similarity to chondroblastoma raises the question of whether the case presented here should be diagnosed as an aggressive chondroblastoma or a chondroblastoma with benign-appearing lung metastases instead of chondroblastoma-like osteosarcoma. However, the diagnosis of "aggressive" chondroblastoma is reserved for cases that are associated with aggressive bone invasion and have produced huge local recurrences, while the term "chondroblastoma with benign-appearing lung metastases" has been used for chondroblastomas that at some time in their history have included lung metastases. The histology in aggressive chondroblastoma and chondroblastoma with benign-appearing lung metastases is indistinguishable from conventional chondroblastoma, and the lung metastases have the histologic appearance of chondroblastoma.

In our case, metastases were present at the time of the patient's initial presentation. Only one other case has been reported in the literature in which metastatic chondroblastoma was present at the time of the initial diagnosis. As the metastases followed surgery, they may represent the transport of implant phenomenon observed in giant cell tumors.

Radiographically, the case described here was characterized by an expansile lesion with extensive spotty and fluffy calcifications, and the patient's age was more in keeping with chondroblastoma. In fact, the average reported age is 22 years for chondroblastoma and 40 years for chondroblastoma-like osteosarcoma.

Location does not differentiate chondroblastoma from chondroblastoma-like osteosarcoma; 23 of the chondroblastoma cases reported by Kurt et al were located in the bones of the hand and foot, and almost 50% of chondroblastoma-like osteosarcomas were located in the bones of the feet. Histologically, the features of chondroblastoma and chondroblastoma-like osteosarcoma are indistinguishable on low-power photomicrographs. High-power photomicrographs normally reveal anaplasia of the cells, a permeation pattern, and bone formation that favor the diagnosis of chondroblastoma-like osteosarcoma.

Kurt et al reported that atypical nuclei in the form of enlarged, irregular, sometimes hyperchromatic nuclei were present in 28% of chondroblastoma cases. Nuclear atypia was more frequent in tumors located in the skull and facial bones (48%) than in tumors in short tubular bones (21%). In our case, the cytologic atypia was diffuse in the entire lesion and characterized by hyperchromatic nuclei, many of which were large and embedded in a small amount of deep-stained pink cytoplasm.

Kurt et al reported cortical and soft-tissue permeation in 5% of chondroblastomas. In our case, the permeation was between the host bony trabeculae. This phenomenon can be present in
both tumors, although less prominent in chondroblastomas. The area of chicken-wire calcification can be found in both lesions, but woven bony trabeculae produced by the cells is not a feature of chondroblastoma. Furthermore, the last feature was present not only in the primary lesions but also in the lung metastases.

In our patient, the similar histology of the initial lesion, the recurrences, and the lung metastases rules out the possibility of malignant transformation in chondroblastoma. The histologic evaluation of the surgical specimens did not reveal any clear cell component and excluded a clear cell chondrosarcoma. Finally, we were not able to detect in our patient any of the unusual histologic features reported by Kurt et al. as atypical chondroblastoma.

CONCLUSION

Chondroblastoma-like osteosarcoma is rare, and the differential diagnosis can be difficult. Bone production and anaplasia of the cells are important diagnostic features. Radiographic features, particularly when depicting a lesion in an uncommon location for chondroblastoma, are helpful in making the diagnosis.

REFERENCES