Mayo Clinic Tumor Rounds

CHONDROBLASTOMA OF BONE

Anne-Marie Kurt, MD
Robert E. Turcotte, MD
Richard A. McLeod, MD
K. Krishnan Unni, MB, BS
Franklin H. Sim, MD

Chondroblastoma is uncommon, representing less than 1% of all bone tumors and approximately 3% of all benign bone tumors in the Mayo Clinic files.1 Classically, the tumor is located in the epiphysis of long bones and most frequently affects males in their second decade of life.2 The male-to-female ratio is 2:1, and if the lesion occurs in long bones, 92% of the patients are younger than 30 years.

CASE REPORT

A 17-year-old boy was seen at the Mayo Clinic with a history of pain in his right ankle. Six months before examination, he noticed the gradual onset of pain in his right ankle while weight bearing. The pain became more severe, and there was some swelling.

Examination revealed a healthy young man with a swollen right ankle that was tender to touch along the medial and lateral malleoli. The range of motion was 5° of dorsiflexion and 30° of plantar flexion on the right foot and 10° of dorsiflexion and 40° of plantar flexion on the left foot. There was also limitation of subtalar motion on the right as compared with the left. No mass was palpable, and the results of laboratory evaluation were normal.

The AP and lateral views of the right foot, including the ankle, showed a lytic lesion within the talus (Fig 1). Biopsy of the lesion revealed a tumor composed of round-to-oval regular cells with distinct cytoplasmic borders and indented nuclei without atypia. There were giant scattered benign cells throughout the lesion, as well as many areas of chondroid matrix with small foci of characteristic "lace-like" calcific deposits (Fig 2). In areas of the tumor, there were fibrous septa showing loose proliferation of spindle cells and seams of osteoid (Fig 3). The pathologic diagnosis was chondroblastoma with areas of aneurysmal bone cyst. The lesion was curetted, and the defect was filled with an autogenous iliac bone graft. The postoperative course was uneventful. Six years after the surgical procedure, the patient was asymptomatic and free of disease (Fig 4).

DISCUSSION

Chondroblastoma is a distinctive lesion of bone. The small bones of the hands and feet are a common location, with the talus and os calcis representing the great majority of the sites. Less frequently, the tumors arise in flat bones or the skull and facial bones. The patients with tumors in these sites tend to be older, and the histologic patterns are frequently more atypical.3 Of patients with chondroblastoma of the skull and facial bones, 83% are older than 30 years.

The association of chondroblastoma of bone with an aneurysmal bone cyst is found frequently, especially if the tumor is located in the small tubular bones of the hands and feet, as it was in our patient. Usually, the component of the aneurysmal bone cyst is present in small foci that are recognizable only on microscopic examination. However, in some patients, the cyst can be so prominent as to mask the underlying chondroblastoma, and only after a careful search of multiple sections of the tumor can the correct diagnosis be made. This distinction is important because chondroblastoma, even if benign, can recur.

A few patients with pulmonary metastasis have been reported.4-6 In the Mayo Clinic files, and among the cases received in consultation,
Fig 1: AP (A) and lateral (B) views of right foot and ankle showing lytic lesion with extension into soft tissues.

Fig 2: Specimen obtained at curettage showing areas of chondroid differentiation (lower middle field) with lace-like calcific deposits and scattered giant cells (hematoxylin and eosin ×250).

Fig 3: Area of aneurysmal bone cyst with fibrous septa and loci of well-recognizable chondroblastoma at periphery (hematoxylin and eosin ×100).

we found only seven of 494 cases of chondroblastoma with documented pulmonary metastasis. Some of these cases have been reported previously.

Kyriakos et al. reviewed the clinical data of the 21 patients with metastatic chondroblastomas described in the literature to 1985. Only three of 21 patients died of metastatic disease. The remaining 18 patients were alive for 4 to 26 years after the discovery of the pulmonary metastasis. All but one patient developed the metastasis after a surgical procedure. Some authors believe that the metastasis represents a seeding of the tumor cells secondary to vigorous curettage or surgical manipulation.

The standard treatment of chondroblastoma is curettage and bone grafting. The recurrence rate of between 10% and 15% is not influenced by the location of the tumor, and is histologically unpredictable. Some authors believe that the association with an aneurysmal bone cyst worsens the prognosis and increases the rate of recurrence. This theory is controversial, and many authors have been unable to demonstrate any difference in terms of recurrence in cases where the chondroblastoma was associated with an aneurysmal bone cyst.

Radiation therapy is almost never indicated because the tumor is always well-controlled with local resection. The risk of postradiation
sarcoma is not negligible. The radiographic differential diagnosis includes giant-cell tumor, aneurysmal bone cyst, degenerative cyst, and malignant tumors such as osteosarcoma and fibrosarcoma.

Giant-cell tumors usually occur in older patients, and usually have a more aggressive radiographic appearance, with expansion and often destruction of the cortex associated with a lack of sclerotic rim around the lesion. Aneurysmal bone cysts are located in the diaphysis and are usually eccentric. However, in small bones, this distinction can be difficult to make because the lesion tends to be in a central location.

A degenerative cyst is almost always associated with arthritic changes in the nearby joint and is most frequently seen in older patients.

Malignant lesions, such as osteosarcoma or fibrosarcoma, are usually metaphyseal and have more aggressive radiographic features with involvement of the cortex and association with a soft-tissue mass.

Histologically, the differential diagnosis includes clear-cell chondrosarcoma, giant-cell tumor, and chondromyxoid fibroma. Before 1976, when the clear-cell chondrosarcoma was first described, these tumors were included in the chondroblastoma group, and probably represented many of the lesions that were "atypical" because of histologic pattern, or early and multiple recurrences. The presence of cells with abundant clear cytoplasm, associated with trabeculae of benign osteoid or bone, and a lobulated growth pattern, distinguishes them from a chondroblastoma.

Giant-cell tumors lack the chondroid differentiation and usually have many giant cells. They also occur generally in older patients.

Chondromyxoid fibroma is often mistaken for a chondroblastoma. Usually, the latter tumor lacks the characteristic lobulation seen in chondromyxoid fibroma, and the chondroid differentiation is more pronounced. Nevertheless, these two benign tumors are closely related, both arising from the cartilage of the epiphyseal plate or from secondary centers of ossification in the bones. In some cases, a clear distinction between these two entities is very difficult.

Because chondroblastomas of bone are located near major joints and occur in younger patients, the standard treatment is curettage. More than 90% of the patients will be cured with this treatment. Curettage must be thoroughly performed using a surgical approach that will allow good visualization. Because of location, an intraarticular approach may be needed. Autogenous or allogenic bone grafting is often used to fill the defect, although Springfield et al have reported good healing without its use. The advantages of cauteryization of the cortices with phenol are still to be determined.

When the growth plate is involved and the patient is still young, an attempt to prevent a bony bridge formation may be necessary. Fat or silastic has been used for this purpose. In this situation, the physis is more likely to be damaged by the aggressive behavior of the tumor.
than by the surgical treatment. Ideally, the soft-tissue extension of the tumor should be marginally excised along with curettage of the lesion.

En bloc resection remains controversial, and may be indicated for tumor in an expendable bone, such as a rib or fibula. Generally, however, it is not advisable as the primary treatment. Rarely, when severe articular damage is present, or when a huge local recurrence with soft-tissue involvement is seen, a wide resection with reconstruction of the bony defect by the use of an allograft, prosthesis, or an arthrodesis will be necessary.

Local recurrence should be treated the same as a primary tumor, that is, by curettage. Radiation therapy has been successful in the treatment of chondroblastoma, but because the risks of radiation-induced sarcoma are not negligible, this modality probably should not be employed.

REFERENCES


