

Chondrosarcoma of the Proximal Phalanx

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An 87-year-old male presented with a painless, large mass on the dorsum of the left foot. He reported that the mass had first appeared 10 years ago and now had become so large that he could no longer tie his shoe. The mass originated from the proximal aspect of the second digit, encompassing the second web space and distal one third of the second and third metatarsals. Surgical excision of the mass was performed and pathologic diagnosis of the specimen confirmed a grade 1 chondrosarcoma. As expected with a lower grade chondrosarcoma, the patient did not have metastasis and fully recovered. While the occurrence of chondrosarcoma is not uncommon, it rarely affects the foot. This appears to be the third case of chondrosarcoma appearing in the proximal phalanx second digit of the foot. (The Journal of Foot & Ankle Surgery 38(3):219-222, 1999)

Key words: bone tumors, chondrosarcoma

Chondrosarcoma, the second most common primary malignant bone tumor, accounts for approximately 10% of all cases (1, 2). The tumor originates from cartilage cells and maintains its cartilaginous nature throughout its evolution. In most cases there are no pre-existing conditions, however, chondrosarcomas may derive from a benign cartilaginous lesion. It has a slight propensity to affect males more frequently and usually occurs in the 4th to 6th decades of life (1). It is important to distinguish chondrosarcoma from enchondroma or another benign tumor as metastasis to the lung may prove fatal.

Case Report

An 87-year-old male presented with a painless, large mass on the dorsum of the left foot. The mass first appeared 10 years ago and progressed each year, making it impossible for the patient to wear a shoe without leaving it untied. The patient had no history of trauma or surgery to the affected foot.

The large irregular subcutaneous mass was firm and nonmoveable, measuring approximately 5 × 4.5 cm. It appeared to originate from the proximal aspect of the second digit encompassing the second web space and

the distal one-third of the second and third metatarsals (Fig. 1). The mass was smooth, non-nodular, and no increase in temperature was noted. Slight erythema, likely due to pressure, was noted over the mass. It was nontender and there was no pain on palpation of the lesion or through range of motion on the second and third digits. A decrease in the range of motion of the digits secondary to the space occupying lesion was noted.

Preoperative radiographs revealed a bony abnormality that involved the proximal phalanx of the second digit. The mass appeared to have invaded the cortex of the proximal phalanx and extended into the first web space



FIGURE 1 Irregular subcutaneous mass measuring 5 × 4.5 cm originating from the proximal aspect of the second digit.

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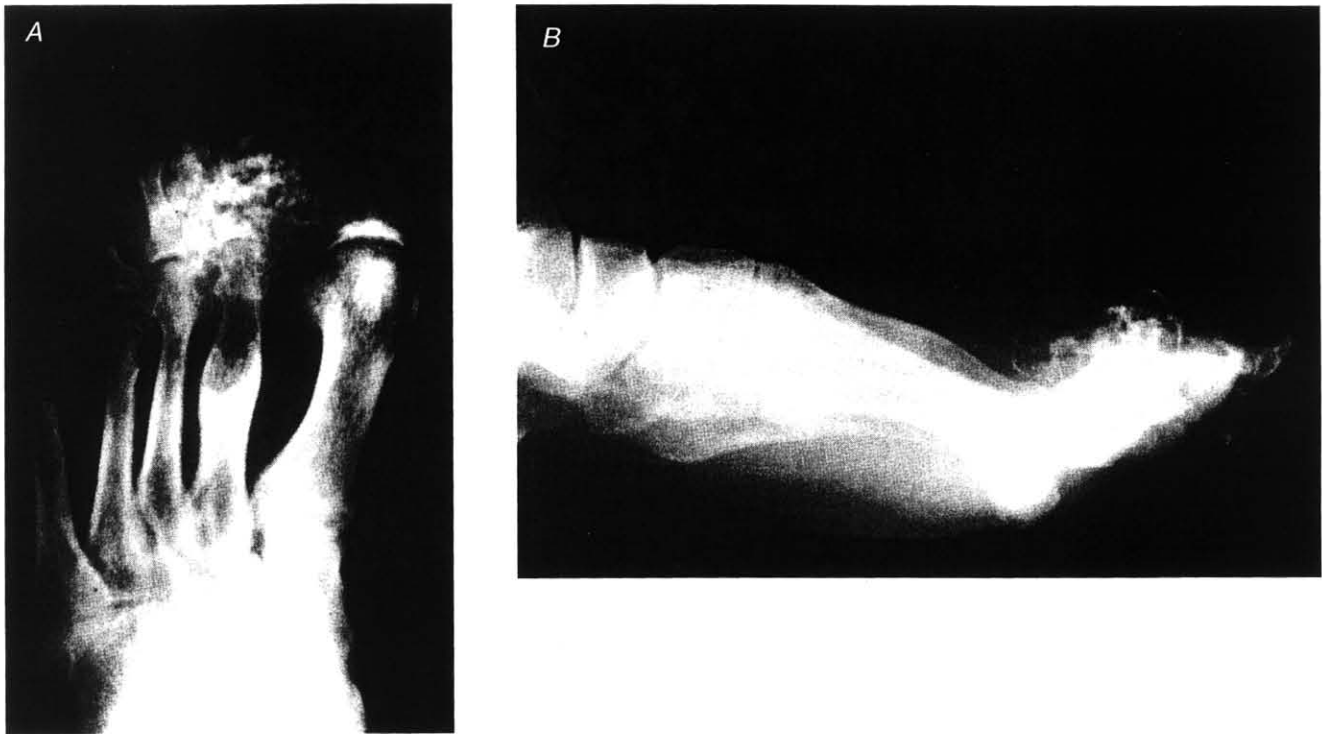


FIGURE 2 AP (A) and lateral (B) views of bony abnormality involving the proximal phalanx of the second digit.

medially, as well as laterally over the fourth phalanx (Fig. 2). No other cortex showed radiographic evidence of being invaded.

Surgical excision of the mass was performed. Under ankle block, an incision was made in the midline over the mass and extended deep through subcutaneous tissue. The periosteum was peeled off the mass with caution not to violate the integrity of the lesion. Once completely exposed, the lesion and entire proximal phalanx of the second digit were excised. The tumor had not invaded any other bones. Due to the removal of the bone and the amount of soft tissue that was removed, circulation to the digit would be hindered and amputation was necessary. Using a rongeur, the articular surface of the second metatarsal was removed. The area was then irrigated and Gelfoam was used to achieve hemostasis. A small Penrose drain was placed and the area was closed using 3.0 Vicryl deep and 5.0 Prolene on the skin. A sterile compression dressing was then applied (Fig. 3).

The patient was examined for distant metastasis. This was a low-grade tumor and, as expected, there was no metastatic involvement. The patient's recovery was uneventful and he continues to be followed. At 18-month follow-up, the wound was completely healed and the patient was ambulating pain free in normal shoe gear without any limitations.

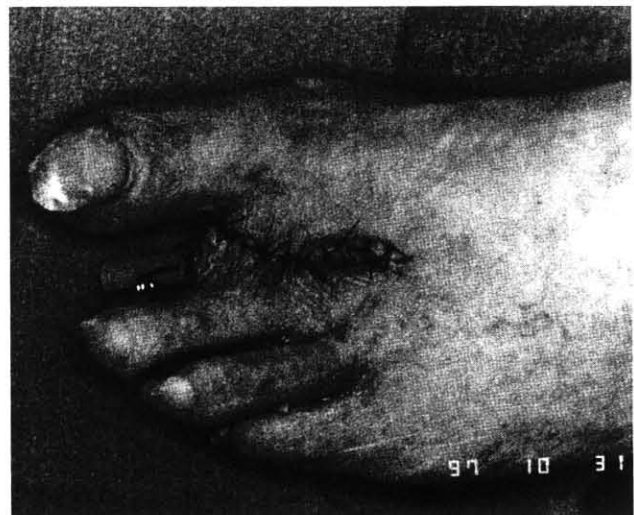


FIGURE 3 Postoperative status showing the Penrose drain and wound closure.

Pathologic Findings

Gross Pathology

The resected specimen consisted of an irregular mass of malignant cartilaginous tissue measuring $5.1 \times 4.5 \times 4.0$ cm. The external surface was rough and irregular.

A 5.5×1.8 cm area on the surface appeared to be chondroid and had a soft gelatinous cut surface (Fig. 4). The remaining specimen was white and hard. The cut section of the cartilaginous component did not show any area of necrosis and the surface was shiny. Following sectioning, the central portion of the specimen appeared to be residual bone with a thickness of up to 2.0 cm at the interface.

Histopathology

With low-power examination, the tumor was seen to be developing in relation to the periosteum and invading the underlying cortex. On increased magnification, there were areas of myxoid degeneration, nuclear atypia, and

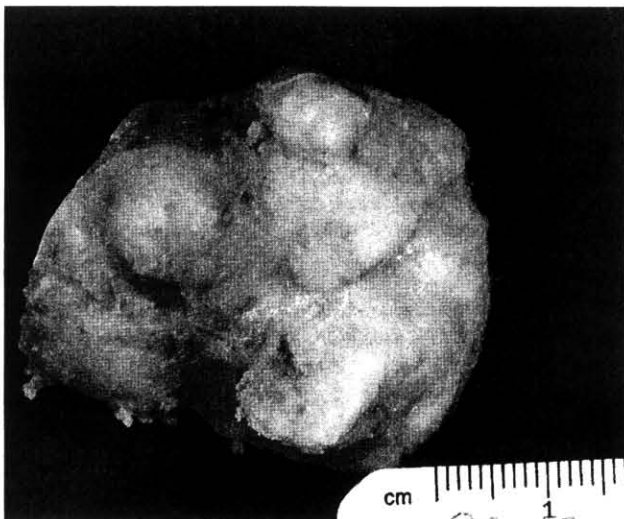


FIGURE 4 Section of resected specimen shows a 5.5×1.8 cm area which appears chondroid with a soft gelatinous cut surface.

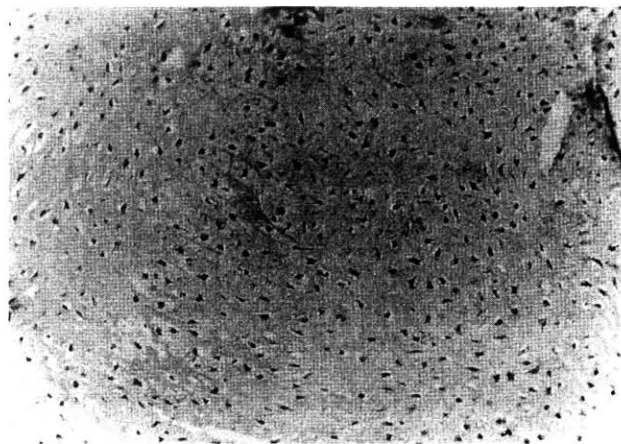


FIGURE 5 High-power magnification showing areas of myxoid degeneration, nuclear atypia, and hypercellularity in the hyaline cartilage.

focal areas of hypercellularity in the hyalin cartilage (Fig. 5). There was no plumpness of the cells' nuclei or abnormal mitosis that would suggest malignancy. The histopathology of this lesion was consistent with a low grade chondrosarcoma.

Discussion

Occurrence of chondrosarcoma is not uncommon, appearing 75% of the time in the axial skeleton, femur, and humerus (3). However, it is rarely found in the foot, with only 1% of all reported cases seen in the pedal bones (4). The calcaneus is the most common bone involved, followed by the talus, first metatarsal, and distal phalanx of the hallux (5). To the authors' knowledge, there have only been two other reported cases of chondrosarcomas appearing in the proximal phalanx, second digit of the foot (6).

Chondrosarcoma is one of the few tumors in which microscopic grading has a significant prognostic value (1). The grading scale is 1–4, with grade 1 being slow growing and offering the best prognosis. Grade 4 lesions grow much more rapidly and are likely to metastasize. The 5-year survival rate for low-grade chondrosarcomas is about 80%, moderate-grade tumors about 50%, and high grade tumors only 20% (1). Chondrosarcomas slowly expand by stimulating osteoclastic resorption of bone and often breaking through the cortex. Hematogenous metastasis to the lungs are common in poorly differentiated variants (1).

Histologic diagnosis of chondrosarcomas is made by the presence of double-nucleated cells, hypercellularity, myxoid changes in the matrix, permeation within the bone, cytologic atypia, and extension into soft tissue (5). Most enchondromas tend to show the same histology. Radiographically, zones of calcification are often seen as splotches or bulky masses of the cartilaginous matrix. Using radiographic and histologic examination alone, it is difficult to differentiate low-grade chondrosarcoma from benign lesions, such as enchondromas. Therefore, diagnosis must be made in conjunction with clinical history and physical examination. Definitive diagnosis can only be made with a biopsy.

Chondrosarcoma occurs in three variants, classified according to location. Central chondrosarcoma arise in the medullary cavity of bones and are characterized by poorly defined borders, thickened shaft, and cortical perforations. Areas of necrosis, cystic change, and hemorrhage are present. They present with deep pain which intensifies over time. Peripheral chondrosarcoma appears outside the bone and usually presents as a slowly growing mass, often in patients with a history of multiple osteochondromatosis. Expansion causes pain and local symptoms. In our case, the patient presented with the least common variant, juxtacortical chondrosarcoma which tends to be situated in

the metaphysis of long bones lying on the outer surface of the cortex. It may be either translucent or calcified. Swelling occurs with little or no pain (1).

Chondrosarcomas are radioresistant and show little response to adjunctive chemotherapy. Treatment depends solely on surgical removal (3). It is important to take wide margins, cutting through only healthy surrounding tissue and being careful not to invade the tumor or its pseudocapsule. This will help prevent spilling of the tumor cells into the surgical site. Cryosurgery can be effective in destroying additional cells that are in contact with the bone or within the bone itself (7).

Conclusion

While chondrosarcoma is a common primary malignant bone tumor, it rarely affects the pedal bones of the foot. The patient's prognosis is dependent on the microscopic grading of the tumor. Diagnosis can only be made by biopsy and wide surgical excision of the mass is the treatment of choice.

This case report documents a rare case in which the mass was left untreated for a decade and finally demanded attention. Due to the size of the tumor and its need for removal, biopsy was not performed prior to surgery. Because the mass was of low-grade intensity, there was no metastasis and the patient had a total recovery.

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