Subungual Extraosseous Chondroma in a Finger

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Chondromas are benign cartilage-producing tumors that are commonly found in tubular bones but seldom form in extraosseous soft tissues. These tumors must be distinguished from their malignant counterparts by histology and biological behavior. The 3 types of extraosseous chondromas are intra-articular/para-articular chondromas, juxtacortical chondromas, and chondromas of soft parts. Intra-articular/para-articular chondromas are histologically different in that they include benign-appearing nuclei.[1] Juxtacortical chondromas and chondromas of soft parts tend to have mild nuclear atypia, despite a benign clinical course, and differ only in their association with periosteum and synovium, respectively.[2-9] Juxtacortical chondromas are adjacent to bone and subperiosteum, whereas chondromas of soft parts are found in various tissue planes often associated with synovium.

Here we report the case of a rare subungual extraosseous chondroma that presented atypically and that was therefore treated aggressively with disarticulation, despite an ultimately benign pathologic evaluation. The subungual location caused the tumor to obliterate the overlying nail bed and nail plate, raising concern of a potentially malignant pathology during initial evaluation. In addition, the elderly male patient's tumor was near the distal interphalangeal (DIP) joint. Disarticulation was planned before surgery not only because of potential malignancy but also because of location. Resection followed by reconstruction of the nondominant, index finger distal phalanx would have required a more complex procedure, such as a skin graft or a cross-finger flap, without a significantly improved functional outcome. These options necessitate more surgery with the morbidity of a donor site and a return to the operating room for pedicle division in the finger-flap option. These options went against the patient's wish for minimal surgery.

In this patient, the paucity of subungual soft tissue caused the tumor to appear in a juxtacortical location, though it actually sat in a supraperiosteal tissue plane. As a result, the tumor was found in close opposition to the underlying bone but lacked the classic radiologic findings of juxtacortical chondromas, such as bony saucerization and sclerosis.[8,9] Having a better understanding of the nature of juxtacortical chondromas and chondromas of soft parts should aid surgeons in anticipating the diagnosis in the instance of atypical presentation and should help make them more comfortable managing treatment decisions surrounding these histologically worrisome, yet benign lesions.

"These tumors must be distinguished from their malignant counterparts by histology and biological behavior."

Case Report

A right-handed man in his mid-70s presented with a painless, slow-growing tumor within the distal phalanx of the left index finger. Tumor growth was first noted after trauma to the finger 9 years before presentation; the patient had not sought medical treatment during the intervening years.

Past medical history included a seizure disorder treated with lamotrigine, hypertension treated with metoprolol, and

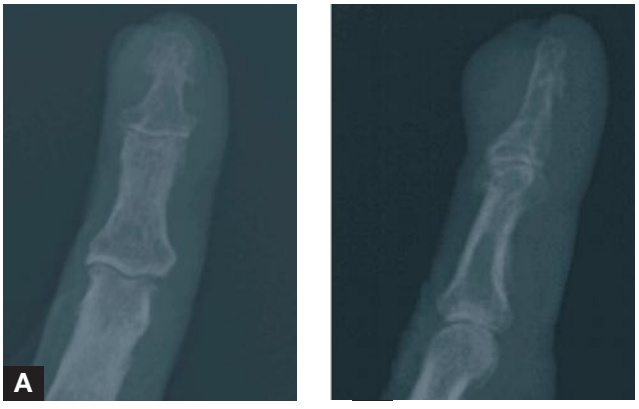

Figure 1. **(A)** Posteroanterior (PA) and **(B)** lateral radiographs of distal finger.

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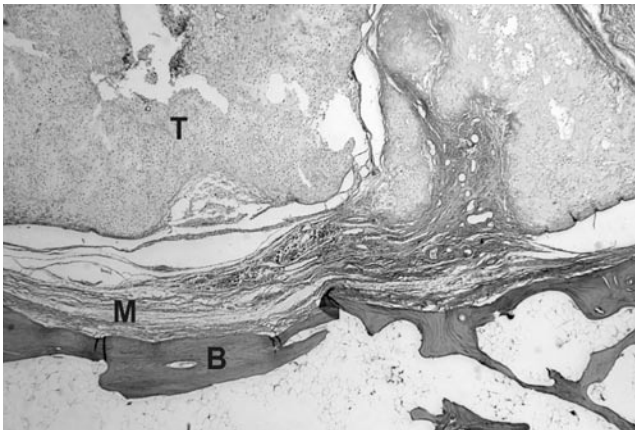

Figure 2. Membrane (M) between bone (B) and tumor (T) (original magnification ×100).

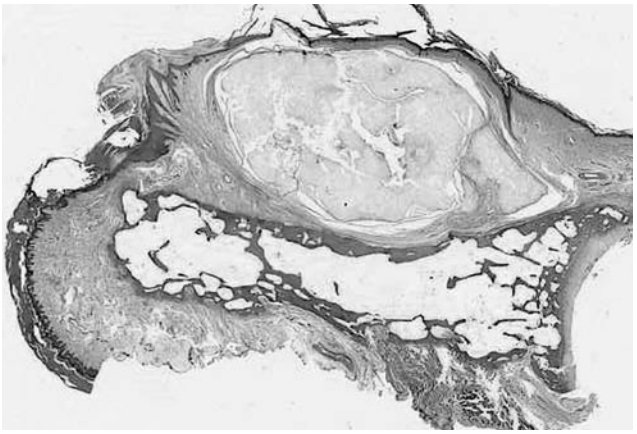

Figure 3. Sagittal cut of distal finger includes entire distal phalanx with tumor. Above the nail, membrane separates bone surface and tumor, and skin covers tumor (top). Tumor size relative to bone can be appreciated (original magnification ×10).

hypercholesterolemia treated with simvastatin. The patient denied smoking.

Physical examination revealed a 1×1-cm mass on the dorsum of the distal phalanx of the left index finger. No nail or residual nail bed was apparent. The tumor was round, white, hard, and smooth with no evidence of inflammation. The patient had full painless range of motion of the DIP joint. The hand examination was otherwise unremarkable.

"The clinical utility in distinguishing between juxtacortical chondromas and chondromas of soft parts is unclear."

Radiographs showed a small indentation in the dorsum of the distal phalanx with slight reactive sclerosis and no evidence of bony invasion. There was no scalloping of the bone. There was no stippling or other soft-tissue irregularity (Figure 1).

The patient consented to excision and disarticulation of the DIP joint, as the diagnosis was not definite, and, though the prolonged clinical course suggested the lesion was benign, complete obliteration of the nail bed could represent malignant progression. The classic radiographic signs of juxtacortical chondromas, cortical erosion and overhanging reactive sclerosis were absent, and there were no visible calcified masses to indicate one of the other possible benign subungual hard-tissue masses. Furthermore, the patient was interested in limited surgery without the need for complex reconstruction to preserve the tip of the finger. During surgery, disarticulation was performed, as the tumor could not be removed with safe margins. Frozen sections were not sent to pathology, and the distal phalanx/tumor was removed en bloc. The patient healed uneventfully.

On gross examination, the pathologic specimen consisted of the distal phalanx with the neoplasm measuring 1.5×1.5 cm and about 1.0 cm in thickness indenting the phalanx. Surgical margins of 3 mm were obtained. The cut surface was translucent and firm. On microscopy, there was no erosion or induction of sclerosis of contiguous cortex. The tumor was separated from the cortex by a periosteal fibrous membrane (Figure 2), and the other surface was covered with skin (Figure 3). The neoplasm was composed of mature adult hyaline cartilage arranged in a lobular manner (Figure 4). There were rare cartilage cells containing double nuclei (Figure 5). No calcifications were evident. The lesion was originally diagnosed as juxtacortical chondroma, but with subsequent review of the literature we decided that the location of the tumor in a tissue plane superficial to the periosteum was more indicative of a diagnosis of chondroma of soft parts.

We have obtained the patient's informed, written consent to publish his case report.

Discussion

Both juxtacortical chondromas and chondromas of soft parts present with local swelling, a distinct mass, or pain. Symptoms may be present for only a few weeks or for as long as 15 to 20 years, as was the case with our patient, suggesting the benign nature of the lesions.[2,4,6,9,10] Our patient was a man in his mid-70s. Juxtacortical chondromas are most prevalent in young adults; mean age at diagnosis has ranged from 18.3 to 26 years in different series, and the overall range is 6 to 70 years.[2,10,11] Similarly, chondromas of soft parts are found in all age groups; mean age in 1 case series was 34.5 years.[4,5] The 3 largest case series of juxtacortical chondromas (12-23 patients) had a small increased prevalence of juxtacortical chondromas in male patients, but it is unknown if this is significant given the small numbers.[2,3,10] The 2 case series of chondromas of soft parts are larger (70 and 104 patients), but there is a male predominance in one and equality of sex prevalence in the other.[4,5]

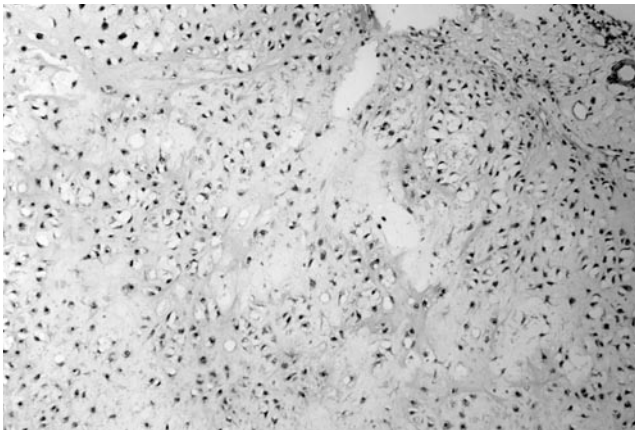

Figure 4. Hyaline cartilage is mature and arranged in a lobular manner (original magnification ×100).

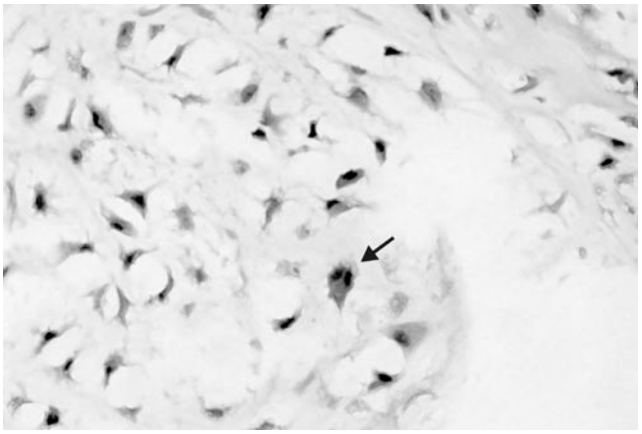

Figure 5. Cartilage cell containing double nuclei (arrow) (original magnification ×400).

Juxtacortical chondromas present adjacent to tubular bones, most commonly in the metaphyseal region. The tumor has a strong predilection for the hands and feet, as demonstrated by a review of all published cases that showed 51 of 183 tumors in the hand.[11] Chondromas of soft parts have a similar affinity for the distal extremities. In one series, 89 of 104 cases were found in the hands or feet and 51 in the fingers.[4] Another series showed 43 of 59 tumors in the hands and 16 in the feet.[5]

Pathologically, juxtacortical chondromas are grossly described as firm, rubbery, white or bluish masses. They are lobulated and well circumscribed and can contain various amounts of calcification imparting a yellowish color or gritty texture to the lesion.[2,3,6,8] Most of the tumors are small—mean diameter is 2.6 cm—but lesions as large as 8 cm have been described as being attached to larger bones, such as the femur.[2,3,8,10]

Similarly, descriptions of chondromas of soft parts state that most are well-demarcated rubbery or firm masses comparable in size to their juxtacortical counterparts.[4,5] Other descriptions are of cystic, soft, friable, or calcified masses. This disparity may be easily explained by a tendency to group multiple pathologies into this category with ill-defined pathologic criteria. This was best illustrated by Lichtenstein and Goldman,[7] who categorized chondromas of soft parts into 2 categories, a hyaline cartilage tumor, which behaves just as other chondromas of soft parts do, and chondroid tumors, which were histologically immature and locally aggressive and may be more appropriately considered an intermediary between a chondroma and chondrosarcoma.

On histologic examination, the defining characteristic of both juxtacortical chondromas and chondromas of soft parts is presence of mature hyaline cartilage with a pronounced cellular element in regions of the tumor marked by mild cellular atypia. Cells may have plump, bilobed nuclei, increased eosinophilia, and occasional mitotic figures. Although these features would be indicative of a low-grade malignancy if found in an intraosseous lesion, empiric experience with the 2 extraosseous counterparts shows these are benign tumors despite the pathologic characteristics.[2-9] The tumor described in this report histologically fits into either category; the only distinguishing feature seems to be whether it lies above or below the periosteum.

The clinical utility in distinguishing between juxtacortical chondromas and chondromas of soft parts is unclear. These types of chondromas differ only in their anatomical location, and the distinction can confuse the diagnosis, as in our patient's case, in which the diagnosis was missed because the mass appeared in a juxtacortical location but was in the wrong tissue plane to produce the common radiologic findings. The distinction between extraosseous chondromas and chondroid tumors has much more clinical utility because the distinction indicates a very real different predilection for local recurrence and spread.

"Marginal excision is the treatment of choice for extraosseous chondromas, but care must be taken to ensure that all tumor material is removed to avoid local recurrence."

The typical radiographic findings of juxtacortical chondromas are well described. On plain radiographs, 92% of juxtacortical chondromas cause visible erosion of the underlying cortex, 67% cause sclerosis of the cortex, 67% show overhanging osseous margins, particularly at the proximal side, and only 50% show soft-tissue masses and calcifications. These values increase with magnetic resonance imaging.[10] Presence of a firm, slow-growing mass with these radiographic findings is highly suggestive of a juxtacortical lesion, but these findings are not seen in supraperiosteal chondromas of soft parts. These lesions produce radiograph-

ically visible soft-tissue masses or calcifications in only 60% of cases, and 8% have slight erosion of the bone.[5,12]

Only 4 cases of subungual extraosseous chondromas have been described in the English-language literature.[7,13,14] None of these was diagnosed as a subungual juxtacortical chondroma. Three of the 4 reports did not indicate whether the tumor was subperiosteal or supraperiosteal, and only the fourth indicated that the tumor was in a supraperiosteal plane, as was observed in our patient's case.[14]

There is always the potential confusion between extraosseous chondromas and malignant lesions. The distinction can often be based on degree of cellular atypia and number of mitoses. When this is not possible, clinical characteristics (eg, invasion of medullary cavity of bone, periosteal reaction, lack of cortical sclerosis, larger size, pain, rapid enlargement, ill-defined borders) are important clues to malignancy.[2,3] It should also be remembered that chondrosarcoma is much more prevalent in the deep musculature of the proximal extremities and is exceedingly rare in the hand.[15]

The differential diagnosis of subungual lesions includes malignancies (eg, squamous cell carcinoma, basal cell carcinoma, malignant melanoma), but the hard-tissue masses found in this region (eg, enchondromas, subungual exostoses, subungual osteochondromas) are all benign, with the exception of malignant enchondromas, which are extremely rare.[14,16-18] Therefore, when one is presented with a subungual hard-tissue lesion lacking the clinical signs of malignancy, as in our patient's case, the lesion can usually be treated as a benign mass with local excision. Care must be taken to adequately assess the lesion pathologically to ensure that malignant foci are not harbored in the removed tumor.

In the case presented, the decision to proceed with disarticulation was partially motivated by concern over the destructive and potentially malignant behavior of nail-bed obliteration. In retrospect, loss of the nail bed was likely due to increased pressure as the tumor distended the tightly adherent subungual soft tissue. This led to nail bed deformation and separation and possibly to vascular compromise to the germinal and sterile matrices. Frozen sectioning may have helped to alleviate these fears before disarticulation, but it must be remembered that, on initial evaluation, chondromas found outside osseous structures exhibit concerning atypical histology.[2-9] The reviewing pathologist must be aware of the clinical scenario and must be knowledgeable about the benign behavior of extraosseous chondromas. If the same degree of cellular atypia were seen in intraosseous lesions, it would carry a much graver prognosis and necessitate more aggressive surgical management.

Marginal excision is the treatment of choice for extraosseous chondromas, but care must be taken to ensure that all tumor material is removed to avoid local recurrence. Studies have shown that curettage of the underlying sclerotic bone is necessary in the juxtacortical subgroup of tumors to limit the rate of local recurrence.[11] In the case of a subungual location, this may require complex reconstruction with regimented follow-up.

Authors' Disclosure Statement

The authors report no actual or potential conflict of interest in relation to this article.

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