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Chondroblastoma of the Tibial Tuberosity in an Adult: A Case Report

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ABSTRACT

Chondroblastoma is a rare benign bone tumor that typically arises in the epiphysis of long bones in adolescents, making its occurrence in adults and at atypical locations both uncommon and diagnostically challenging. We report the case of a 41-year-old man with an eight-year history of episodic localized pain over the tibial tuberosity, precipitated by direct pressure and exposure to cold weather. The lesion was initially misinterpreted as a neuroma or a benign cystic lesion based on clinical assessment and imaging studies. Surgical excision with intralesional curettage was performed, and histopathological analysis confirmed the diagnosis of chondroblastoma. This case highlights the importance of integrating clinical, radiological, and histopathological findings to establish an accurate diagnosis. Early recognition and timely surgical management are essential to prevent disease progression, reduce the risk of recurrence, and optimize patient outcomes.

Keywords: Chondroblastoma; Bone tumor; Tibia tuberosity

INTRODUCTION

Chondroblastoma is a rare, cartilage-producing bone tumor that primarily affects the epiphyses of long bones in skeletally immature individuals, accounting for less than 1% of primary bone tumors and demonstrating a male predominance.[1] Histologically, it is composed of immature chondrocytes (chondroblasts) along with mature cartilage, multinucleated giant cells, calcifications, and occasionally aneurysmal bone cyst–like components.[2] Because several benign and malignant tumors can closely mimic its features, accurate diagnosis is critical to guide appropriate management and optimize outcomes. The differential diagnosis includes giant cell tumor, chondromyxoid fibroma, aneurysmal bone cyst, clear cell chondrosarcoma, and the rare chondroblastoma-like osteosarcoma, all of which may share overlapping clinical or radiologic features.[3] Distinguishing factors include patient age, anatomic location, histologic patterns, and the presence of the highly specific H3F3A/H3F3B K36M mutation.[4] Accurate diagnosis requires a multidisciplinary approach integrating imaging findings, histopathology, and molecular testing.[5] Chondroblastoma typically presents as a solitary lesion and, in younger patients, most commonly involves the epiphyses of the proximal or distal femur, proximal tibia, and

proximal humerus. In older adults, it is more frequently found in non-tubular bones, including the craniofacial skeleton and the small bones of the hands and feet.[6]

This report presents a case of chondroblastoma of the tibial tuberosity in a 41-year-old man, underscoring the importance of maintaining a broad differential diagnosis, as well as the need for close collaboration among clinicians, radiologists, and pathologists to prevent diagnostic delay.

CASE PRESENTATION

A 41-year-old male with no significant medical history presented with an eight-year history of localized left knee pain. The pain was confined to the tibial tuberosity and was exacerbated by direct trauma, palpation, and exposure to cold weather, with marked tenderness on examination. The patient sought medical attention on multiple occasions and was advised to observe the lesion, as it was considered benign and not requiring intervention. On another occasion, plain radiographs were interpreted as consistent with Osgood–Schlatter disease. Due to work-related constraints, the patient did not undergo further evaluation or treatment.

On examination, the overlying skin appeared normal, with a prominent and highly tender tibial tuberosity, clinically mimicking a neuroma. There were no other notable musculoskeletal abnormalities. Plain radiographs revealed a well-circumscribed, oval lytic lesion of the proximal tibial tuberisity with a thin sclerotic rim demarcating it clearly from the adjacent normal bone, Figure 1. MRI initially suggested a simple cortical cyst at the anterior cortex of the proximal tibia, Figure 2.

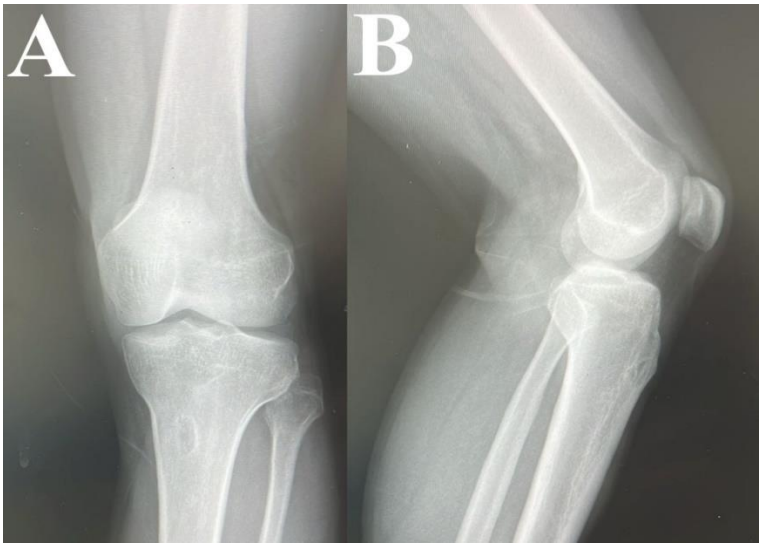

Figure 1: Radiographs of the left knee. (A) Anteroposterior and (B) lateral views demonstrate a well-circumscribed, oval radiolucent lesion of the tibial tuberisity with a thin sclerotic border sharply delineating the tumor from the surrounding normal bone.

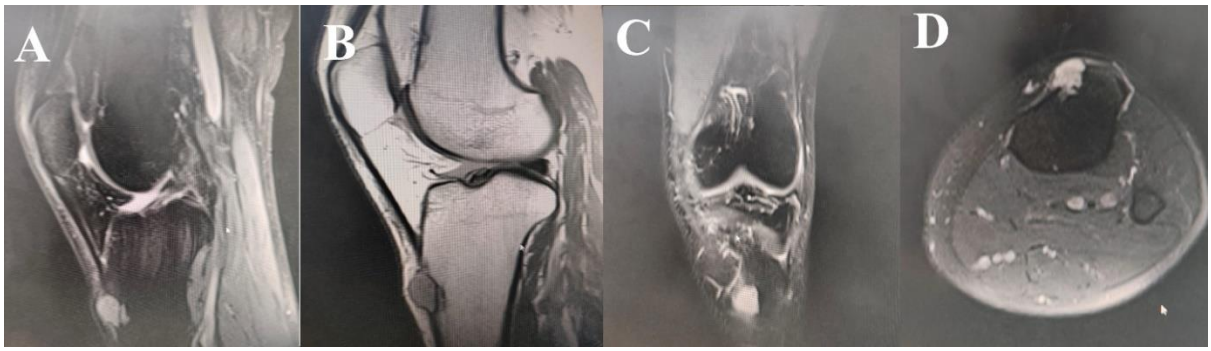

Figure 2: MRI of the knee. Sagittal T2-weighted fat-suppressed (A), sagittal proton density (B), coronal T2-weighted fat-suppressed (C), and axial T2-weighted fat-suppressed (D) images demonstrate a well-defined, expansile, cortically based lesion at the tibial tuberosity with a narrow zone of transition and no surrounding bone marrow edema. No periosteal reaction or soft-tissue extension is identified. These imaging features are consistent with a non-aggressive bone lesion.

Given the severity of localized tenderness and the presumed diagnosis of neuroma, excisional surgery was planned. Under spinal anesthesia and tourniquet control, a 5-cm vertical incision centered over the tibial tuberosity was performed. Intraoperatively, a well-defined friable gray lesion with cortical erosion at the tibial tuberosity was identified. Intralesional curettage of the mass and surrounding cortex was performed, and the specimen was submitted for histopathological examination.

Histology demonstrated a 1.5-cm lesion composed of round to polyhedral chondroblasts with abundant eosinophilic cytoplasm and distinct cell borders. Classic pericellular “chicken-wire” calcification was observed among degenerating chondroblasts within a chondroid matrix. No significant nuclear atypia was noted, although focal hemorrhage was present. These findings are diagnostic of chondroblastoma.

Following histologic confirmation, the MRI was re-evaluated, revealing imaging features consistent with a non-aggressive bone lesion. This case underscores the importance of close collaboration among orthopedic surgeons, radiologists, and pathologists to minimize diagnostic errors and ensure timely, appropriate management.

DISCUSSION

Chondroblastomas are rare benign primary bone tumors that typically originate in the epiphysis or apophysis of long bones and most often affect children and adolescents.[7] Although their clinical and radiological features are well established in the literature, limited familiarity among orthopedic surgeons and radiologists—particularly when these tumors occur in adults—may result in diagnostic difficulties. In our case, localized tenderness over the lesion initially prompted consideration of alternative diagnoses, such as a neuroma or a mass causing nerve compression. Despite obtaining radiographs and MRI, the findings were misinterpreted as a simple bone cyst or another benign cystic lesion. Therefore, clinicians should remain vigilant for this diagnosis, as unfamiliarity with the differential diagnosis may lead to misdiagnosis and potentially inappropriate management.

The most common presenting symptom is persistent bone pain, which may be accompanied by localized swelling, joint stiffness, effusion, or gait disturbance when the epiphysis of a long bone is involved. Lesions occurring in the skull may present with neurological manifestations, such as seizures or progressive hearing loss. Physical examination may reveal focal tenderness, restricted joint motion, joint effusion, muscle atrophy, and, less frequently, a palpable mass.[3]

Surgical management of chondroblastoma typically consists of intralesional curettage, with or without bone grafting or other void fillers such as bone substitutes or cement, aiming to remove the tumor while preserving function. Reported recurrence rates after intralesional curettage vary widely in the literature, generally ranging from approximately 10% to more than 30%, depending on factors such as the use of adjuvant therapies and the completeness of excision.[8] Although recurrences are more common in younger patients and in cases of incomplete curettage, long-term outcomes are generally favorable when adequate surgical excision is achieved and recurrences are appropriately managed.[9] In our patient, intralesional excision with thorough curettage of the lesion base was performed, and the diagnosis was confirmed histologically on the surgical specimen.

Although prompt surgical treatment was provided, greater awareness of this diagnosis may prompt consideration of adjunctive local therapies aimed at reducing recurrence. Common adjuvant modalities include phenol, hydrogen peroxide, and cryotherapy.[8] Another treatment option is radiofrequency ablation, which can be considered a first-line modality in selected cases, as its success and recurrence rates are comparable to those of intralesional curettage.[9]

Chondroblastoma may be associated with secondary aneurysmal bone cyst (ABC) formation, which can occur in up to one-third of cases.[10] A much rarer association is pulmonary metastasis, which has been reported in fewer than 1% of patients.[11] Although these lesions are often described as “benign,” their biological behavior can resemble the metastatic pattern occasionally observed in giant cell tumors. Management varies according to disease burden, ranging from observation to surgical excision. When metastatic disease is suspected, chest computed tomography should be performed if chest radiographs reveal concerning findings. For pulmonary metastases, surgical resection is recommended for solitary or oligometastatic lesions, whereas patients with more extensive disease may benefit from denosumab, which has demonstrated favorable long-term outcomes.[12]

This case highlights the need to consider chondroblastoma in the differential diagnosis of chronic, localized pain in the tibial tuberosity region, even in adult patients. Effective collaboration among orthopedic surgeons, radiologists, and pathologists is crucial to minimize diagnostic errors and ensure timely, appropriate management.

CONCLUSION

Chondroblastoma, although classically a tumor of adolescents, can occur in adults and may present at atypical locations such as the tibial tuberosity. This case underscores the importance of maintaining a broad differential diagnosis when evaluating bone tumors. Accurate diagnosis requires careful correlation of clinical, radiological, and histopathological findings. Early recognition and appropriate surgical management are essential to alleviate

symptoms, prevent disease progression, and reduce the risk of recurrence. Increased awareness of this rare presentation may help avoid diagnostic delays and improve patient outcomes.

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