Dilemmas in Distinguishing Between Tumor and the Posttraumatic Lesion with Surgical or Pathologic Correlation

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KEYWORDS

• Bone tumor • Soft tissue tumor • Sports injury • Hemorrhagic soft tissue sarcoma • Myositis ossificans • Hematoma

KEY POINTS

- Prolonged and atypical swelling of soft tissue, even in combination with a previous traumatic lesion, may be an indication of underlying malignancy, and proper imaging studies should be obtained before surgery or arthroscopy.
- A history of spontaneous fracture or fracture with minor trauma should raise suspicion for underlying disorder as the cause. MR imaging is often useful to show marrow abnormality and the accompanying soft tissue mass often associated with a pathologic fracture.
- Traumatic hematomas commonly develop under an area of subcutaneous ecchymosis, and the absence of this finding should raise the suspicion of tumor-associated hemorrhage. The absence of edema surrounding a large, round hematoma on imaging also suggests tumor.
- Healing avulsion injuries may show lytic and destructive imaging characteristics mimicking osteomyelitis or aggressive tumor.
- The earlier stages of myositis ossificans are likely to mimic a soft tissue neoplasm. Follow up radiograph or CT will demonstrate the typical peripheral calcification pattern.

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INTRODUCTION

A bone or soft tissue tumor occasionally presents clinically or by imaging with characteristics suggesting a traumatic injury. The opposite is also true, because posttraumatic lesions may be confused with soft tissue or bone tumor at presentation. Both joint-related tumors and sports injuries often afflict young active patients and the symptoms may display significant overlap. To add to the diagnostic dilemma, the lower extremity is the most frequent location for sports injuries as well as for the development of osseous or soft tissue neoplasms.[1] Without adequate imaging studies, there may be a significant delay in diagnosis or an inappropriate arthroscopic procedure may ensue. For the sports physician, it is crucial to realize that prolonged and atypical swelling of soft tissue, even in combination with a previous traumatic lesion, may be an indication of underlying malignancy.

PART I. TUMORS THAT PRESENT AS SPORTS INJURY OR OTHER TRAUMA

Bone Tumors that Mimic Traumatic Lesions

An osseous lesion may occasionally be misdiagnosed as a sports-related injury on clinical grounds. When a patient presents with a trauma-related complaint that does not respond to treatment, the possibility of underlying malignancy should be considered and appropriate imaging studies obtained. Delay in diagnosis is the most frequent complication in this scenario, but an arthroscopy may be erroneously performed if the proper imaging studies have not been obtained to allow accurate diagnosis. In the literature, arthroscopy has been reported to cause seeding of a tumor into a joint or the adjacent soft tissues.[2–4] For persistent knee pain, a radiographic series should be sufficient in identifying most osseous lesions, but is not as effective for identifying soft tissue masses. The most frequent bone tumors to be confused with trauma on clinical presentation in the literature include giant cell tumor (GCT), osteosarcoma, chondroblastoma, osteoid osteoma, and Ewing sarcoma.[2,4,5] If a lesion arising from the bone is encountered during an arthroscopic procedure, it must not be biopsied by transsynovial approach, but through a separate extracapsular procedure, with the biopsy path discussed with the orthopedic oncologist or treating surgeon before the procedure. Tumors of bone do not often invade joints, because the articular capsule and synovial tissues present a barrier to tumor invasion. Violation of the synovial lining to obtain a biopsy specimen may result in seeding of the joint by tumor and preclude the possibility of limb sparing procedure.[4] Diagnostic errors that may contribute to performance of an inappropriate arthroscopy of a bone tumor include failure to obtain presurgical radiographs, obtaining the radiographs too close to the scheduling of an arthroscopy, or failure to recognize the lesion on radiographs.[6]

GCT of Bone

GCT of bone is a benign lytic, periarticular lesion centered at the metaepiphasis usually with subchondral involvement.[7,8] The knee is the site of almost 50% of GCTs, with the distal femur affected more often than the proximal tibia.[8] A GCT is usually accompanied by pain, local swelling, mechanical symptoms, and occasionally pathologic fracture, and approximately 80% occur in patients between 20 and 50 years of age.[8] The prevalence of this lesion at the knee of young adults can lead to GCT being confused with several sports-related injuries, resulting in a delay in diagnosis.

Osteosarcoma (Conventional Intramedullary Subtype)

Osteosarcoma is the most common primary malignant tumor of bone to afflict children and adolescents. The conventional intramedullary subtype is most frequently