Tuberculosis of the elbow: radiologic findings and differential diagnosis
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Section: Musculoskeletal system
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Case Type: Clinical Cases
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Patient: 59 years, female

Clinical History:

The patient was admitted to hospital for severe pain and swelling in the left elbow. She also complained of restricted motion in this joint.

Imaging Findings:

The patient was admitted to hospital for severe pain and swelling in the left elbow and restricted movement of this joint. The pain and swelling had been present for several months. Abdominal ultrasonography and thoracic computed tomography (CT) revealed nothing remarkable.

Conventional radiography of the affected elbow showed osseous erosions, osteopenia, narrowing of the posterior joint space, and soft-tissue swelling (Figure 1).

Computed tomography of the elbow demonstrated cystic lesions in the olecranon bursa and adjacent to the posterolateral aspect of the distal humerus (Figure 2a,b). In addition, sites of cortical erosion were noted in the bony structures of the joint (Figure 2c), and there were millimeter-sized soft-tissue calcifications medial to the proximal radius noted.

T1-weighted axial and sagittal magnetic resonance (MR) images of the left elbow revealed cystic lesions, focal areas of low signal intensity in the bone marrow, and cortical erosions (Figure 3a,b). The soft-tissue components adjacent to the elbow joint and the rims of the cystic lesions were enhanced after injection of intravenous (IV) contrast material (Figure 3c). T2-weighted MR images revealed heterogeneous areas of decreased signal intensity in the medullary bone and fluid collections exhibiting homogeneous high signal intensity near the joint (Figure 3d). A synovial biopsy showed caseous granulomas. The patient was diagnosed with tuberculosis and was treated with multi-drug therapy.

Discussion:

Only 1% of patients with tuberculosis develop tuberculous arthritis, and most such cases are monoarticular. In skeletal tuberculosis, joints are affected more often than bone. Approximately 50% of patients with skeletal involvement have spinal disease, and 50% have inflammation of the hip, knee or other joints. When tuberculosis affects long bones, the initial infection is usually in the epiphysis and/ or metaphysis. When joints are involved, histopathological examination reveals synovial proliferation similar to that seen in rheumatoid arthritis and hemophilia. However, caseous granulomas are also present in tuberculous arthritis.

Periarticular osteopenia, cortical erosion, narrowing of the joint space, minimal periosteal reaction, and calcification of adjacent soft-tissue structures are the common radiologic findings in tuberculosis arthritis. Cortical erosions and soft-tissue calcifications are best evaluated with CT, however MR imaging is best for delineating soft-tissue changes.
near arthritic joints. With MR technique, bone erosions are demonstrated most clearly on T1-weighted images. Bone marrow abnormalities on these images appear as focal areas of low signal intensity relative to fatty bone marrow. Synovial inflammation manifests as areas of medium-high signal intensity on T2-weighted MR images. After injection of IV gadolinium, these inflamed sites show heterogeneous enhancement. In some cases, the affected joint has an extraarticular component which is well-demarcated with smooth contours. In some other cases, the joint has an extraarticular component which has irregular contours with an infiltrative pattern. This areas have high signal intensity compared to muscle and fibrous tissue on T2-weighted images. The rims of cystic lesions show smooth enhancement after IV contrast injection.
The differential diagnosis for elbow joint tuberculosis includes pyogenic arthritis, rheumatoid arthritis, degenerative arthritis and synovial sarcoma.
Considering tuberculous versus pyogenic arthritis, on MR imaging bone erosions are more prominent in the former and enhancement of abscess walls is thin and regular in tuberculous arthritis, whereas it is thick and irregular in the pyogenic form.
The characteristic signs of rheumatoid arthritis are juxtaarticular osteoporosis, marginal bone erosions, symmetrical involvement of multiple small joints, and diffuse narrowing of affected joint spaces.
The main features of degenerative arthritis are osteophytes, asymmetrical narrowing of affected joint spaces which is not diffuse and subchondral sclerosis.
Our patient exhibited monoarticular disease, associated soft-tissue calcifications, and secondary bone destruction, all of which are also seen in synovial sarcoma. Tuberculosis and synovial sarcoma were the primary concerns in our case. One third of synovial sarcomas show calcification. Secondary bone destruction is infrequent, with an incidence of only 10%. The soft-tissue component of synovial sarcoma is generally nodular in nature.
In monoarticular disease, infectious etiologies should always be considered until they are ruled out. In tuberculous arthritis the definitive diagnosis is based on examination of aspirated synovial fluid or synovial membrane biopsy. Tuberculosis should be included in the differential diagnosis for tumor-like cystic lesions of the elbow joint, especially if the patient has chronic complaints.

**Differential Diagnosis List:** Tuberculosis of the elbow

**Final Diagnosis:** Tuberculosis of the elbow

**References:**

Description: Lateral plain radiograph of the left elbow shows periarticular osteopenia and soft tissue swelling with osseous erosions at level of olecranon, epicondyle, the cortex of posterolateral distal humerus and proximal ulna. Calcification in the adjacent posterior soft tissue structures was also present. Origin:
Figure 2

a

**Description:** Post-contrast axial computed tomography of the distal level of humerus shows a loculated cystic lesion with an opaque wall and septae. **Origin:**

b

**Description:** Post-contrast axial computed tomography shows cystic lesions at the level of olecranon bursa. The most medial cystic lesion has calcifications. Note the cortical erosion of the medial epicondyle. **Origin:**

c

**Description:** Axial computed tomography with bone window shows cortical erosions and ill-defined lytic areas in the medulla of the distal humerus at the level of the olecranon bursa. **Origin:**
Description: An axial spin-echo T1-weighted image demonstrates loculated fluid collections around the elbow joint and cortical erosions on the inner surface of the distal humerus. Also note the focal areas of low signal intensity in the bone marrow. Origin:

Description: A T1-weighted coronal spin-echo image reveals fluid collection at the medial aspect of the elbow. Origin:
Description: A contrast-enhanced axial T1-weighted image shows marked enhancement of the cyst walls and the soft-tissue of the olecranon bursa. The medulla of the distal humerus is mildly enhanced.

Origin:

Description: T2-weighted images of the affected elbow reveal heterogeneous areas of decreased signal intensity in the medullary bone and fluid collections exhibiting homogeneous high signal intensity near the joint. Origin: