Tuberculous infection of the upper extremities is rare and difficult to diagnose accurately at an early stage [1]. Tuberculous arthritis and tenosynovitis of the elbow joint are relatively rare as compared with other joints [2]. Extrapulmonary tuberculosis (TB) accounts for 18.5% of all TB cases, and musculoskeletal TB accounts for 10% of extrapulmonary TB cases [3]. The most common sites involved in musculoskeletal TB include the spine (50%), pelvis (12%), hip and femur (10%), knee and tibia (10%), ribs (7%), ankle or shoulder (2%), elbow or wrist (2%), and multiple sites (3%) [4]. Joint TB accounts for 1% to 5% of all presentations of TB, and it is therefore not surprising that the diagnosis is often missed, even in countries where TB is common [5]. Making an early diagnosis is often difficult, and treatment is therefore frequently delayed in clinical practice [6]. This report describes a patient with an unusual mode of presentation of tuberculous synovitis in the elbow joint.

At the age of 35, he had been treated for a left renal calculus accompanied by renal colic episodes. Ten years later, he was admitted to a regional hospital because of left pleurisy without a definite diagnosis. He recalled no medication taken after being discharged from the hospital. Approximately 7 years prior to the present visit, he had a left elbow dislocation, and he visited an orthopedic surgeon and reduction was performed. Mild restriction of left elbow range of motion was noted since then.

Physical examination showed a prominent mass (8 x 8 cm) over the volar aspect of the left proximal forearm without erythema or local tenderness (Fig. 1). No neurologic deficits were found. Mild restriction of left elbow flexion and extension was observed (range 15 to 95°). Plain roentgenograms of the left elbow revealed a soft-tissue density lesion over the left proximal forearm, narrowing of the ulnohumeral joint space, and periarticular osteoporosis at the radial head, trochlea, and coronoid process of the left ulna (Fig. 2). Magnetic resonance (MR) imaging was used to distinguish between an intraarticular process and a juxtaarticular soft-tissue mass, and revealed a large synovial effusion with inhomogeneous signal lesions between the biceps and brachioradialis muscles on both T1- and T2-weighted images (Fig. 3).

The preoperative white cell count was 6.9 x 10^9/L, but a differential count was not performed. Erythrocyte sedimentation rate (ESR) and the C-reactive protein (CRP) concentration were not determined because infection was not suspected upon admission. Serum biochemistry and liver aminotransferase concentrations were normal.

Tuberculous Synovitis of the Elbow Joint

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Abstract: Tuberculous synovitis in the elbow joint is extremely rare in developed countries. We describe a 68-year-old man who had had a gradually enlarging mass over the volar side of the left proximal forearm near the elbow joint for 4 months. Plain roentgenograms of the diseased elbow showed early osteoarthritic change. Magnetic resonance imaging revealed diffuse synovitis with a large 8 x 8 cm extra-articular synovial cyst. Synovectomy was performed and histopathologic examination of the surgical specimen revealed granulomatous inflammation with caseation, prominent Langhan's giant cells, and sparse acid-fast bacilli. The patient had been receiving antituberculous chemotherapy for at least 8 months at the time of examination and had no recurrence of swelling or discharging sinuses during follow-up. Differential diagnoses in patients with elbow swelling should include pigmented villonodular synovitis, hemophilic arthropathy, rheumatoid arthritis, degenerative joint disease, and tuberculosis. Simple aspiration may enable earlier diagnosis, before destructive arthropathy becomes advanced.

Case Report

A 68-year-old male farmer visited our outpatient clinic with the chief complaint of a mass on the flexor side of the left forearm near the elbow joint. He had noticed a mass growing from the lateral epicondyle of the left humerus toward the proximal anterior forearm 4 months before.
Aspiration of the fluid from the cyst just prior to surgery revealed turbid yellowish content. Synovectomy was performed. The cyst was perforated and the abscess was drained. The cyst was mainly located over the volar surface of the supinator and pronator teres muscles and biceps muscle tendon, and enclosed the brachial artery and vein. Exuberant lipoma-like synovium was noted over the radiocapitellar joint. The annular ligament was not found. The wound was closed over a suction drainage tube, and a long arm splint was applied. Samples of synovial tissue were sent for further pathologic examination and bacterial culture. Pathologic examination of the submitted synovial tissue revealed granulomatous inflammation with tuberculoid granulomas containing central foci of caseation necrosis. Langhan’s giant cells were prominent among the epithelioid histiocytes of these granulomas. Acid-fast bacilli, sparse in number but consistent morphologically with *Mycobacterium tuberculosis*, were present in the granulation tissue. The bacterial culture was negative.

The long arm splint was applied for 2 weeks, and physiotherapy of the left elbow was initiated after removal of the splint. A 12-month anti-TB regimen was initiated, and the patient had completed 8 months of the regimen at last follow-up. The anti-TB regimen was a combination of pyrazinamide 1,500 mg/day (discontinued after 2 months), rifampin 600 mg/day, ethambutol 900 mg/day, isoniazid 300 mg/d, and pyridoxine 150 mg/day. He resumed work and no pain or discharging sinuses had developed in the elbow at 8 months’ follow-up. Range of motion of the left elbow was maintained without further deterioration. The results of postoperative CRP and ESR tests were not available because he refused further phlebotomy.

**Discussion**

Yu et al reported that, from 1985 to 1995, extrapulmonary TB accounted for 10.3% of all TB cases (9,453 patients) in Taiwan, and bone and joint TB accounted for 6.4% of all extrapulmonary TB cases [7]. Because of the lower proportion of cases, physicians became less aware of musculoskel-
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Neutrophils) [13]. Histopathologic examination of the surgical specimen showed that the initial impression was correct in only two patients, because of the lack of typical clinical manifestations of mycobacterial infection. Our initial impression for this patient was pigmented villonodular synovitis (PVNS), but histopathologic examination of the surgical specimen showed a TB infection.

The diagnosis of TB depends on the recognition of M. tuberculosis on either histologic study or culture, or, ideally, both [4]. M. tuberculosis is not always detectable in arthritis specimens. Smears of the synovial fluid were positive in 14 of 24 cases in a study by Berney et al [8] and in 14 of 74 cases in the review of Wallace and Cohen [9]. These findings indicate the limitation of acid-fast smear of biopsy specimens. On the other hand, the synovial fluid was positive in 82% of cases in the study of Berney et al [8] and in 94% of cases in the review of Wallace and Cohen [9]. The bacterial culture of our patient was negative.

Roentgenographic examinations play a supplementary role in the diagnosis of tuberculous arthritis. Juxta-articular osteoporosis and swelling of soft tissue are the earliest roentgenographic changes observed when involvement of a joint occurs [10]. Advanced synovial disease can occur with only minimal osseous findings. Destruction of the articular cartilage typically progresses slowly because of the lack of proteolytic enzymes [11]. Erosions of the articular bone begin at the peripheral margins. However, plain roentgenographic findings are not specific enough to distinguish tuberculous arthritis from other arthritides such as pyogenic arthritis, crystal induced arthritis, and PVNS [10, 11].

MR imaging does not help in making a specific diagnosis in the majority of arthritides, either. The MR imaging in our patient indicated a synovial process presenting mainly as an effusion. Schultz et al found that foci of low or absent signals were most likely due to bleeding with deposition of hemosiderin and loose cartilaginous fragments [10]. In contrast, Suh et al suggested that caseous necroses correspond to intermediate signal intensity lesions on T2-weighted images, rather than hemosiderin deposits [11]. We made the same observations in our patient when the surgical findings were compared with MR imaging.

Based on MRI findings, differential diagnosis should include diseases such as PVNS, hemophilic arthropathy, rheumatoid arthritis, and degenerative joint disease [10, 11]. The synovial process that most closely resembles the features observed in our patient is PVNS with synovial cyst formation. It is easy to differentiate PVNS with synovial cyst formation from abscess caused by septic or tuberculous arthritis by aspiration and fluid analysis. Hemarthrosis is common in PVNS, with bloody aspirates being found in 69% to 75% of cases [12]. In contrast, aspiration of synovial cysts in tuberculous arthritis often reveals an exudative effusion fluid with high protein and low glucose concentrations, and a leukocyte count of 10,000 to 20,000 cells/mm³ (predominantly neutrophils) [13].

The optimum duration of treatment for musculoskeletal TB has been controversial. The Centers for Disease Control and Prevention in the USA suggest that regimens that are adequate for treating pulmonary TB in adults and children are also effective for treating extrapulmonary disease (either 6-month or 9-month regimens); however, infants and children who have miliary TB, bone and joint TB, or TB meningitis should receive a minimum of 12 months of therapy [14]. Watts and Lifeso recommended that treatment be continued for a minimum of 12 months for osteoarticular involvement, extending to perhaps 18 months for certain problems [4]. Our patient began a 12-month regimen that included testing of ESR and CRP concentration again at the end of treatment.

Conclusions

A high level of clinical vigilance is needed to make an early diagnosis of tuberculous synovitis, the features of which are quite similar to PVNS with synovial cyst formation on MR imaging. Tuberculous synovitis should be included in the differential diagnosis in cases with intermediate signal intensity lesions on T2-weighted images. Aspiration of the suspected lesion and a prompt analysis and culture of the fluid content are crucial diagnostic tests.

References