

Elbow Tuberculosis: A Radiological Dilemma

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Abstract:

Background: Tuberculosis is considered to affect approximately one third of the world population. Being an air-borne infection the percentage of skeletal tuberculosis is found to be very low compared to pulmonary tuberculosis. The incidence of musculoskeletal tuberculosis affecting elbow joint is extremely rare.

Materials and Methods: We present a case of a 21 year old male residing in India presented with complaints of progressive left elbow pain for 6 months with restriction of movement later. On examination, the left elbow was in fixed flexion deformity with 40degree with diffuse swelling around the joint. There is fullness in the para olecranon fossa with doughy feeling of the joint which suggests synovial hypertrophic over posterior joint line and anconeus triangle. Range of movement on flexion was 40 to 90degree; supination 0 to 70 degree and pronation 0-30 degree. Inflammatory markers on examination were elevated and revealed C-reactive protein of 29.8mg/L and Erythrocyte Sedimentation rate (ESR) of 40mm/hr.

Plain radiograph of left elbow joint shows multifocal geographical areas of lytic destruction involving proximal end of ulna predominantly in olecranon process and cortical irregularity at the head of radius. Computed tomography showed multifocal lytic areas involving the olecranon process of ulna, head of radius and lateral condyle of humerus with synovial thickening around the elbow joint. Magnetic resonance imaging of elbow joint showed homogeneously enhancing diffuse synovial thickening in and around the elbow joint with resultant widening of the joint space. The hypertrophic synovium is extending within the olecranon process of ulna through multiple cortical defects. A differential diagnosis of monoarticular rheumatoid arthritis and possibility of granulomatous lesion was given.

Results: The patient was admitted and a synovial biopsy was taken. The histopathology report was suggestive of granulomatous lesion with possibility of tuberculosis. Patient was conservatively managed with anti-tubercular treatment. On further follow up the patient had better mobility of the joint.

Conclusion: TB of the joint should be considered in the differential diagnosis of monoarticular arthropathy or arthritis due to its indolent course. This case highlights the diagnostic challenges of TB in an appendicular joint, non-specific imaging findings, and resultant joint dysfunction. It also underscores systemic flaws in healthcare, particularly the lack of drug susceptibility testing and the limited availability of GeneXpert in endemic regions, exacerbating the practice of empirical treatment amidst the rising tide of MDR-TB.

Keyword: Joint swelling; Synovial thickening; lytic lesion in joint; monoarticular; granulomatous lesion.

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I. Introduction

Tuberculosis is considered to affect approximately one third of the world population. Being an air-borne infection the percentage of skeletal tuberculosis is found to be very low compared to pulmonary tuberculosis. The incidence of musculoskeletal tuberculosis is found to be approximately 2% of which only 1-3% affect the elbow joint¹. The incidence of Mycobacterium TB in males and females are equal until adolescence; beyond which, the incidence is higher in males². Patient usually present with joint pain in early stage which is non specific for joint tuberculosis. Progressive erosion and destruction of bone and joint can result in joint dysfunction. Early diagnosis and treatment is necessary to prevent joint erosion and destruction leading to elbow dysfunction. We present a case of a young male presenting with movement restriction who was later diagnosed with tuberculosis of elbow joint.

II. Material And Methods

This is a case report of a 21 year old male patient presented with complaints of progressive left elbow pain for 6 months, to Department of Orthopedics following which patient was sent for radiological investigations to Department of Radio-diagnosis at Sri Nijalingappa Medical College, Bagalkot, Karnataka.

Study Design: A retrospective case report.

Study Location: This was a tertiary care teaching hospital based study done in Department of Radiodiagnosis, at Sri Nijalingappa Medical College, Bagalkot, Karnataka.

Study Duration: 1month

Case Report: 21 year old male residing in India presented with complaints of progressive left elbow pain for 6 months, controlled by simple analgesia. Soon after the cessation of medication he started developing pain in the left elbow for which he visited an orthopaedician and he was advised for an X-ray. The X-ray was reported to be normal. He was advised to continue the same analgesics and local gel application after which he started having on and off pain.

He started developing restriction of movements in the left elbow for the past 4months which was insidious in onset and progressive in nature. No history of morning stiffness, night sweats, weight loss, loss of appetite or other joint involvement. No past history of trauma.

On examination, the left elbow was in fixed flexion deformity with 40degree with diffuse swelling around the joint. No evidence of local rise in temperature or any sinus noted. There is fullness in the para olecranon fossa with doughy feeling of the joint which suggests synovial hypertrophic over posterior joint line and anconeus triangle. Range of movement on flexion was 40 to 90degree; supination 0 to 70 degree and pronation 0-30 degree. Inflammatory markers on examination were elevated and revealed C-reactive protein of 29.8mg/L and Erythrocyte Sedimentation rate (ESR) of 40mm/hr.

Plain radiograph of left elbow joint shows multifocal geographical areas of lytic destruction involving proximal end of ulna predominantly in olecranon process and cortical irregularity at the head of radius (Figure 1).



Fig 1A: Plain Radiograph Of Elbow AP View Shows Cortical Irregularity Of Head Of Radius; 1B: Lateral View Shows Multifocal Geographical Areas Of Lytic Destruction Seen Involving The Olecranon Process Of Ulna

Computed tomography showed multifocal lytic areas involving the olecranon process of ulna, head of radius and lateral condyle of humerus with synovial thickening around the elbow joint (Figure 2).

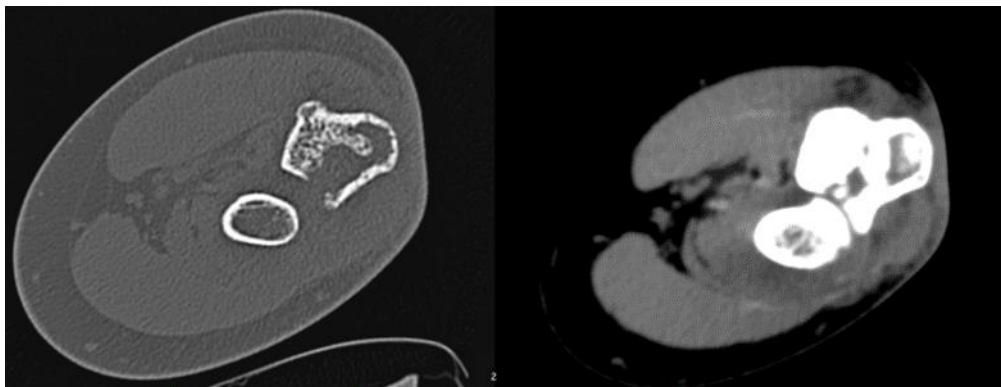
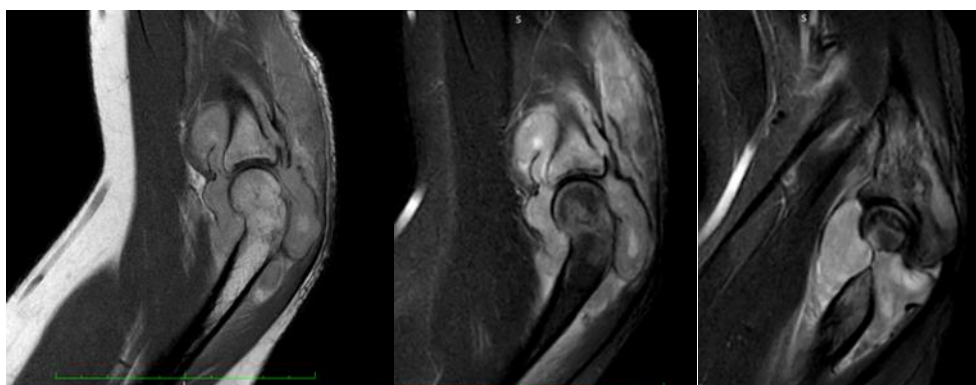


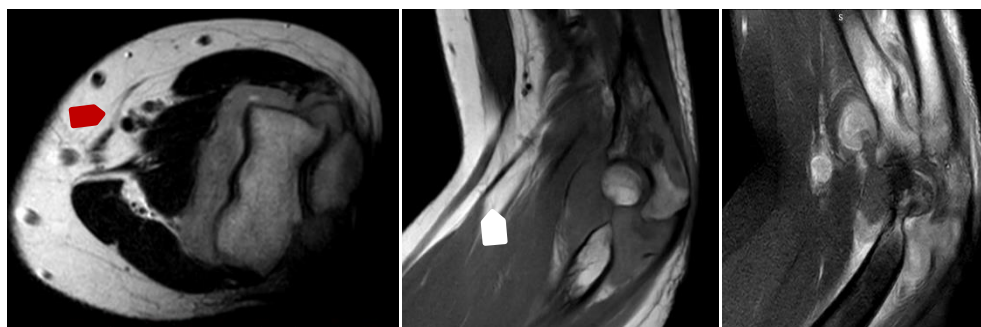
Fig 2A: Axial CT sections (Bone window) shows multifocal lytic areas involving ulna (red arrow); 2B: Axial CT (Soft tissue window): synovial thickening around the elbow joint (red arrow).

Magnetic resonance imaging of elbow joint (Fig 3) showed homogeneously enhancing diffuse synovial thickening in and around the elbow joint with resultant widening of the joint space. The hypertrophic synovium is extending within the olecranon process of ulna through multiple cortical defects. Multifocal lytic destruction is noted in the olecranon process of ulna, head of radius and lateral epicondyle of humerus. These area appear heterogeneously hyper intense on T2/STIR representing oedematous changes.

Adjacent soft tissue shows inflammatory stranding in the form of T2 hyperintensity. Enlarged homogeneously enhancing lymph node of size 10x7.9mm in the cubital region. Contrast study was done to differentiate between synovial thickening and joint effusion which shows peripheral enhancement compared to diffuse enhancement seen in synovial thickening. A differential diagnosis of monoarticular rheumatoid arthritis and possibility of granulomatous lesion was given.



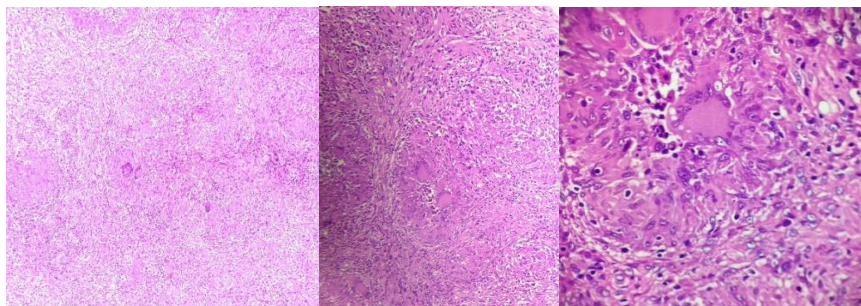
3D: T2 axial images shows; 3E: T1 sagittal reformed images show isointense synovial thickening around the elbow joint. 3F: T1+C shows diffuse enhancement of thickened synovium and homogeneously enhancing enlarged lymph node in the cubital fossa.



MRI report Fig 3A: PD TSE (Sagittal reformed view) shows hyperintense diffuse synovial thickening around the elbow joint; 3B & 3C: STIR images show heterogeneous hyperintensity within the bone marrow representing marrow edema;

III. Result

The patient was admitted and a synovial biopsy was taken. The histopathology report shows aggregates of granuloma comprising of langerhan type of giant cell, foamy histocytes, epithelioid cells and lymphocytes suggestive of granulomatous lesion with possibility of tuberculosis. Patient was conservatively managed with anti-tubercular treatment. On further follow up the patient had better mobility of the joint.



Histopathology Fig 4A & B shows 10X and 25X images show aggregates of granuloma comprising of epithelioid cells and langerhans' type of giant cell. Fig4C shows langerhans' type of giant cell, foamy histocytes, epithelioid cells and lymphocytes.

IV. Discussion

This case study elucidates three critical learning points. Firstly, diagnosing *Mycobacterium tuberculosis* (MTB) of the elbow joint can be easily overlooked even in regions where TB is endemic, potentially leading to significant joint dysfunction. Secondly, non-specific imaging findings of osteoarticular tuberculosis resembles other osteoarthropathies like rheumatoid arthritis, gout, septic arthritis, synovial osteochondromatosis, tenosynovial giant cell arthritis etc³. that further adds to the difficulty in diagnosing based on imaging features and finally, the management of tuberculosis (TB) poses long-term challenges, particularly with the rising incidence of multi-drug resistant (MDR) and extensively drug-resistant (XDR) TB.

Tuberculosis remains a prevalent infection in low- and middle-income countries, primarily affecting the lungs but frequently presenting with extrapulmonary manifestations. Extra-spinal infections are more common in men^{4,5} with the elbow joint being the second most frequently affected site after the knee⁶. Although the pathogenesis of osteoarticular TB is not well understood, it is hypothesized to result from hematogenous spread from a primary active focus, seeding in the growth plates of long bones⁵. Clinical presentation can range from asymptomatic to joint movement restriction accompanied by constitutional symptoms, complicating the diagnosis of septic arthritis^{4,7}. Early stages may present with muscle spasms, progressing to joint movement restriction and fixed deformity. A secondary consequence is osteoarthritis of the elbow, that leads to significant morbidity and poor quality of life⁴.

In this case, the patient presented with joint restriction but no constitutional symptoms, with radiograph findings showing multiple lytic lesions in the olecranon, consistent with Stage II of the Kerri and Martini staging classification^{4,8}. MRI remains the imaging modality of choice for joint assessment⁹. Despite Phemister's triad being associated with TB arthritis, there are no standardized clinical or radiological criteria for diagnosing osteoarticular TB¹⁰. Radiological imaging can mimic other osteoarthropathy like monoarticular rheumatoid arthritis, septic arthritis, gout and tenosynovial giant cell tumor. Histopathological examination and culture⁴, though having a sensitivity of only 44%⁵, are standard diagnostic methods, supplemented by TB-PCR for confirmation. Management typically involves a anti tubercular therapy course of 4-6 weeks, extendable in cases of MDR or XDR-TB, with surgical intervention as needed⁹. Early surgical intervention may be beneficial to prevent fixed deformity or joint restriction, particularly in advanced stages of disease⁸.

A significant concern in developing countries, including India, is the limited availability of facilities for drug susceptibility testing. The global pooled prevalence of MDR-TB is estimated at 11.9%¹¹, with a tertiary center in India reporting an MDR-TB prevalence of 12.7% in spinal TB cases¹². Culture remains the gold standard for TB diagnosis but is time-consuming and has a low yield from osteoarticular samples, complicating the initiation of empirical treatment¹⁰. Failure to achieve systemic response or worsening joint infection often necessitates further drug susceptibility testing, adding to morbidity and reduced quality of life^{10,13}. The GeneXpert or Xpert MTB/RIF assay offers rapid confirmation of *M. tuberculosis* and rifampicin resistance, even in culture-negative samples, aiding in tailored treatment to limit disease progression and complications^{10,14}. The prevalent practice of empirical treatment contributes to antimicrobial resistance, underscoring the need for widespread availability of GeneXpert in endemic regions and enhanced awareness among clinicians regarding the importance of drug susceptibility testing.

V. Conclusion

TB of the joint should be considered in the differential diagnosis of monoarticular arthropathy or arthritis due to its indolent course. This case highlights the diagnostic challenges of TB in an appendicular joint, non-specific imaging findings, and resultant joint dysfunction. It also underscores systemic flaws in healthcare, particularly the lack of drug susceptibility testing and the limited availability of GeneXpert in endemic regions, exacerbating the practice of empirical treatment amidst the rising tide of MDR-TB.

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