



## Isolated Carpal and Metacarpal Bone Tuberculosis - A Case Report

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### ABSTRACT

Tuberculosis infection of the musculoskeletal system comprises 10% of all extra pulmonary cases of tuberculosis. Although musculoskeletal tuberculosis frequently affects the spine (51%), pelvis (12%), hip and femur (10%), knee and tibia (10%), and ribs (7%)<sup>2</sup>, tuberculosis involvement of the carpal and metacarpal bones is rare<sup>3, 6</sup>. When it occurs, the patient may experience a variety of symptoms including local pain and swelling, limitation of movements and soft-tissue mass. The diagnosis of tuberculous involvement of the carpal and metacarpal bones is often difficult, particularly in the absence of a history of tubercular infection and of the rarity of site. The confirmatory diagnosis is by demonstrating typical granulomas with acid fast bacilli. Hereby, we report a case of female patient presented with the aggressive nature of chronic progressive monoarticular symptoms that did not respond to conventional treatment.

### KEYWORDS

Tuberculosis, carpal, metacarpal

### Introduction:

Tuberculosis (TB) is the second most frequent infectious disease after malaria on a worldwide basis and remains a major cause of skeletal infection in many parts of the world<sup>8</sup>. The tubercle bacillus infects one-third of the world's population<sup>8</sup>. It is the most common single agent causing death in young adults and causes two million deaths each year around the world<sup>8</sup>. Here we are presenting an interesting case which will mislead the clinician in arriving at a proper diagnosis.

### Case report:

A 70 year old female patient came to the department of orthopaedics with complaint of pain and swelling of left wrist joint since 5 months. Detailed history revealed that swelling was initially less, which increased progressively. Pain was continuous, dull aching type. She also had low grade fever. She was given antibiotics and other supportive treatment earlier but there was no improvement. There was no history of cough or any chest symptoms. There was no past history of tuberculosis/antitubercular treatment as well as no history of contact to a known case of tuberculosis. There was no history of diabetes / hypertensive / any allergy.

General examination revealed an under nourished patient. Pallor was present. No cyanosis / icterus / lymphadenopathy were present. She was afebrile. Her resting pulse rate was 92/min and blood pressure was 112/68mmhg. Examination of left hand revealed gross swelling over the dorsum of left wrist and fingers. On palpation, skin was warm with severe tenderness over the entire left wrist and hand. A tender fluctuant mass measuring 3 x 2 cm was palpated over dorsum of hand. Wrist and finger movements were restricted and painful. There was no distal neurovascular deficit. Respiratory system examination was within normal limit. Examination of others system was unremarkable. Clinical examination was suggestive of septic arthritis of left hand.

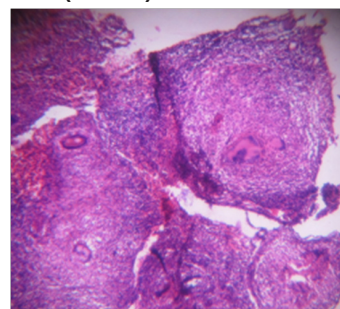
Thorough investigation had been done. On routine blood examination, patient was mild anaemic (9.5 gm/dl), total WBC count was 7700/cumm with predominant neutrophils (77%) and raised ESR (93mm/hr). Liver and renal function tests were within normal limit. Serum HIV and HbsAg were negative. C-reactive protein

was positive. Rheumatoid factor was negative. X-ray of left wrist showed diffuse osteopenia of the visualized bones. Erosions of distal carpal bones i.e.-trapezium, trapezoid, capitate and hamate. Erosions of base of 2nd, 3rd and 4th metacarpal bones were noted. Trapezium and hamate bone showed sclerosis. Carpometacarpal joint space is reduced. Radiocarpal joint space appeared normal. Soft tissue swelling was seen noted around the wrist. No evidence of periosteal reaction was seen (Figure 1). There was no evidence of tubercular lesion in the chest X-ray.

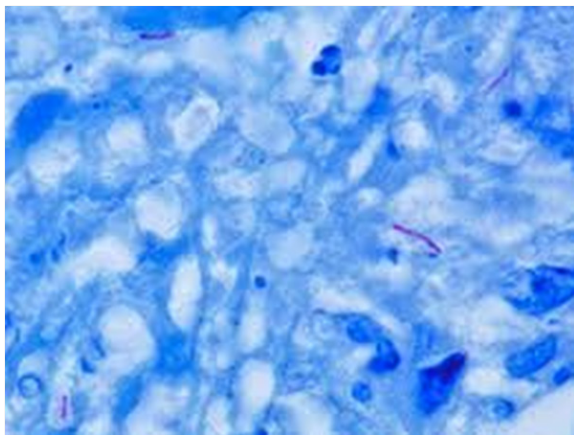
**Figure 1: X-Ray of left wrist joint (PA view) showing diffuse osteopenia and erosion of carpal and metacarpal bones and reduced carpometacarpal joint space**



**Figure 2: Section showing multiple granulomas with giant cells. (H&E.4X)**



**Figure 3: Section showing rod shaped pink color acid fast bacilli- Ziehl-Neelsen stain( 100x)**



After initial investigation, probable diagnosis of septic arthritis was suspected and the patient was taken up for urgent arthrotomy and drainage. Operative findings: Prior to incision a needle aspiration was attempted which yielded 10 -15 cc of frank pus. A longitudinal dorsal incision was made and formal arthrotomy of wrist was performed. There was plenty of unhealthy granulation tissue mixed with purulent discharge. The entire tissue from the dorsum of carpal bones was curetted out. Destroyed bone tissue and periosteum were visible in the specimen which was sent for histopathological as well as microbiological examination.

Pus drained from the site was sent for culture for aerobic and anaerobic bacteria but showed no growth. Acid fast bacilli were not detected in the pus. Pus had not sent for the culture of mycobacterium tuberculosis, as the diagnosis of tuberculosis was not suspected clinically. Histopathological study of the tissue showed necrotic bony trabeculae and cartilage with marrow. Wide areas of caseous necrosis surrounded by epithelioid cell granulomas and Langhan's type giant cells were seen (Figure 2). Ziehl- Neelsen stain was positive for acid fast bacilli (Figure 3). Hence final diagnosis of tubercular osteomyelitis of carpal and metacarpal bones was made. The patient was started on anti-tubercular treatment of four drug regimens (isoniazid, rifampicin, streptomycin, ethambutal, pyrazinamide). Follow up: patient was improving and operated site was recovering fastly. Swelling disappeared after institution of anti-tubercular treatment along with decrement of shadow in radiology

### Discussion

Tuberculosis infection of the carpal and metacarpal bones is a rare condition. Because of the increased number of immunocompromised individuals and drug-resistant bacterial strains, the incidence of extrapulmonary mycobacterium infection has gradually increased over the past decade.<sup>5</sup> Only about one third of patients who have osteoarticular tuberculosis have evidence of pulmonary disease and the majority of the cases have normal chest x-ray<sup>1</sup>. Osteoarticular involvement occurs in 10% of patients with extrapulmonary tuberculosis and spine represents majority of these lesions including 51% of cases, followed by pelvis(12%),hip and femur(10%), knee and tibia(10%),ribs (7%) and wrist bones are rare<sup>9</sup>. Tuberculosis arthritis most frequently causes a monoarthritis with a predilection for weight-bearing joints such as hip, knee, shoulders or elbow <sup>6,9</sup>. The wrist is an unusual site for osteoarticular tuberculosis. Isolated involvement of the wrist is rare and accounts for only 1 % of all cases of peripheral osteoarticular tuberculosis. <sup>7</sup>

The mode of infection is mainly haematogenous spread through arteries and veins. Few predisposing factors commonly seen in cases of osteoarticular tuberculosis are malnutrition of the protein calorie type, environmental conditions and living standards such as poor sanitation, overcrowding and slum

dwelling. Trauma as a causative factor is debatable, but cases following trauma have been reported. Repeated pregnancies and lactation in women is also a factor. A diabetic status is an important predisposing factor. Acquired immune deficiency syndrome has certainly led to a resurgence of tuberculosis.<sup>7,8</sup>

The patients with osteoarticular tuberculosis presents with mild degree of fever, swelling and pain over the affected area. On examination, there will local rise in temperature, tenderness with restriction of full range of movements of the affected joint. The diagnosis of osteoarticular tuberculosis is established by one of two criteria:

(a) Positive culture for mycobacterium tuberculosis from synovial fluid, synovial tissue or paravertebral abscess; or

(b) Histological findings of caseating granulomas in biopsied tissues from the joints along with a clinical response to anti-tuberculosis therapy.<sup>5</sup>

Mere presence of local signs and symptoms over the affected area without pulmonary manifestation poses a big diagnostic challenge for the treating physician to diagnose the osteoarticular tuberculosis. Many differentials can come into the picture and hence delay the treatment. Among various differentials, few are discussed with their typical presentation. 1) Septic arthritis: the clinical presentation is acute with high rise of temperature. The ESR is well above 100 mm/hr and there is a possibility of septicaemia. 2) Rheumatoid arthritis: rheumatoid (seronegative) involvement and ankylosing spondylitis can be differentiated with haematological investigations; no abscess shadow is seen radiologically. 3) Traumatic compression fracture: history of trauma is significant 4) Malignancy: either benign or malignant may have to be differentiated from skeletal tuberculosis. Malignant lesions may either be primary or secondary. Primary malignancy usually will not produce high degree of fever and pain, whereas secondaries usually have some evidence of signs and symptoms of primary malignancy. 5) Lyme arthritis: presence of rashes and antibody detection by ELISA is usually diagnostic.

Due to various differentials and rare involvement of site, detail investigation of such cases is needed to arrive at the proper diagnosis. On routine investigation, patients will be anaemic with increased ESR and increase in total leukocyte count (> 10,000/cumm). There are no specific radiologic features for the confirmatory diagnosis of tuberculosis bone. Common radiological findings seen are fusiform soft-tissue swelling and periostitis. As underlying bone is destroyed, a cyst like cavity forms and the remaining bone appears to be ballooned out. This appearance is termed spina ventosa("wind-filled sail")<sup>3</sup>. CT-scan and MRI: These imaging modalities are helpful in demonstrating the extent of disease and complications<sup>6</sup>. The sensitivity of demonstration of acid fast bacilli in synovial fluid/aspirate is around 20-25%. The culture of aspirate for tuberculosis bacilli is 75- 100%. The presence of granuloma is around 90-100% in biopsy material<sup>5</sup>. So, for the confirmatory diagnosis, biopsy material should be sent for both histopathological examinations for the demonstration of granuloma and acid fast bacilli as well as for culture.<sup>5</sup>

The cornerstone of treatment is multi-drug anti-tubercular therapy and active or assisted non-weight bearing exercises of the involved joint throughout the period of healing. An initial period of rest is to be followed by supervised gradual mobilization. Adequate nutritional support is also essential, as in all forms of TB. The goals of treatment are to contain and eradicate the infection, relieve pain, and preserve and restore bone and joint function. The main reason for poor outcome is delay in the diagnosis, which is common.<sup>8</sup>

### Conclusion:

In conclusion, the preoperative diagnosis of tuberculosis involving carpal and metacarpal bones is often difficult, particularly in the absence of a history of tubercular infection and because of rarity of site. We report a patient who presented

with the aggressive nature of chronic progressive monoarticular symptoms that did not respond to conventional treatment. Appropriate diagnosis is essential to avoid delay in establishing Appropriate therapy.

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