

Tuberculous Osteomyelitis of the Long Bones and Joints

M. Hakimi¹, F. Hashemi², A. Zare Mirzaie³, A. Hassan Pour³ and H. Kosari¹

¹National Research Institute of Tuberculosis and Lung Diseases, Massih Daneshvari Hospital, Darabad, Tehran, Iran, ²Shafayahyaeian Orthopedic Center, Baharestan Sq. Iran University of Medical Sciences and Health Services, Tehran, ³Hazrate Rasool Akram Hospital, Niyayesh St. Sattarkhan Ave. Iran University of Medical Sciences and Health Services, Tehran

ABSTRACT

Skeletal tuberculosis (TB) is usually a rare osteoarticular disease in which bones or joints are involved. We studied 4 such cases admitted to Iranian National Research Institute of Tuberculosis and Lung Diseases from 2000 to 2003. In the initial stages of the disease, diagnosis is very difficult and conventional radiographies often reveal nonspecific findings. Our experience in these cases showed that a high index of suspicion is the most important step in early diagnosis of skeletal tuberculosis. [*Indian J Pediatr* 2008; 75 (5) : 505-508] E-mail : Zaremir@gmail.com

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Although tuberculosis (TB) is rare in developed countries, it is very common and endemic in developing states.¹ As compared to pulmonary TB, skeletal TB is a very rare disease comprising 1-3% of the total population of TB patients. In the extrapulmonary TB group, the rate of skeletal TB is about 10-20%.¹⁻⁴ Only 1/3 of patients with tuberculosis of the bone are diagnosed with concomitant active pulmonary disease.⁵

The diagnosis is often delayed because osseous tuberculosis is a paucibacillary lesion, and smears are often negative. Localized pain, fever, and weight loss are described in several case reports of musculoskeletal tuberculosis.^{6,7} Nonspecific nature of radiographic findings can often delay the diagnosis.⁸⁻¹⁰ Cystic skeletal TB is a rare disease mostly seen in children. In this age group, cystic lesions usually involve the metaphysis of the peripheral long bones.¹¹ In spite of all recent advances in diagnosis and treatment, tuberculosis remains a major unsolved issue at the international level.

CLINICAL DATA

We studied 4 cases with tuberculous osteomyelitis in Iranian National Research Institute of Tuberculosis and Lung Diseases from 2000 to 2003.

Correspondence and Reprint requests : Dr. Ali Zare Mirzaie, Pathology Department of Hazrate Rasool Akram Hospital, Niyayesh St. Sattarkhan Ave., Tehran, Iran

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RESULTS

Three Iranian and an Afghan infants, ranging from 10 to 16 month old (mean: 13.5 months) with an equal gender ratio, were diagnosed with osteoarticular TB. The duration of symptoms ranged from 2 weeks to 4 months. Sites of the involvement were ankle, wrist (in 2 patients) and knee joints. Clinical and laboratory data about the patients is summarized in table 1.

DISCUSSION

Any part of the skeleton may be involved but the sites most commonly affected are spine, femur, tibia, and fibula. The spine represents 50% of these lesions. As compared with pyogenic osteomyelitis, tuberculosis of the bones in infants and children tends to occur in the vascularized metaphyses where it produces an endarteritis.¹²⁻¹⁴ The factors that influence localization of skeletal tuberculosis to a specific bone are undefined. Tuberculosis of the joints is characteristically monoarticular, the knee and hip are most frequently affected.¹⁵ As in other forms of extrapulmonary tuberculosis, the respiratory tract is the primary portal of entry of mycobacteria. Tuberculous osteomyelitis is thought to occur secondary to lymphohematogenous dissemination to the bone at the time of initial pulmonary infection, with local reactivation at a later date.¹³⁻¹⁶ The clinical and radiographic presentation of skeletal tuberculosis varies widely and depends primarily on the stage of the disease at evaluation. Systemic symptoms such as fever, night sweat

TABLE 1. Clinical and Paraclinical Findings of the Patients

Case NO.	Clinical findings	Laboratory findings	Radiologic findings	Pathologic findings	Treatment and Outcome
1	A 10 month old Afghan girl with pain and swelling of the left ankle joint, no family history of TB and cough, body temperature : 37.2°c, swelling and tenderness of the left ankle joint	WBC:8000/mm ³ (PMN:61%, Lymphocyte:23%, Monocyte:10%, Eosinophil:6%) PPD:15mm, ESR:22mm/hr Gastric washing for acid fast bacilli: Negative Bone culture:Positive for M.Tuberculosis , sensitive to INH and Rifampin	CXR and thoracic CT scan:Mild hilar lymphadenopathy Whole body bone scan: Increased uptake in the left ankle region Left ankle X-ray: Large lytic lesion in the posteromedial aspect of the left distal metaphysis of tibia bone along with periosteal reaction and soft tissue swelling	Multiple caseous granulomas compatible with TB osteomyelitis.	Isoniazid, Rifampin, Ethambutol and Pyrazinamide (4-drug regimen) for two months continued with 2 drugs given twice weekly for 7 months. Rapid recovery and improvement in health was observed within one month and lytic lesion was sclerosed.
2	A 15 month old boy with claudication of 2 weeks duration, unresponsive to intravenous cloxacillin. History of cough, fever and TB was not detected in other family members. Temp:37.8° C ,tenderness and swelling of right knee with white pus oozing from the medical aspect of the right knee joint (Fig. 1)	WBC:8200/mm ³ (PMN:66%, Lymphocyte:15%, Monocyte:17%, Eosinophil:2%) Both gastric washing and Culture for acid fast bacilli:Negative Bone culture:Positive for M.Tuberculosis, sensitive to INH and Rifampin	CXR :Unremarkable Right knee X-ray: Large lytic lesion in the metaphysis and diaphysis of distal end of right femur along with periosteal reaction and soft tissue swelling	Multiple caseous granulomas	Isoniazid, Rifampin, Ethambutol and Pyrazinamide (4-drug regimen) for two months continued with 2 drugs given twice weekly for 7 months. After 5 months there was complete recovery and the patient did not have difficulty in walking
3	A 13 month old Iranian girl with swelling of the left wrist joint for 2 weeks. There was history of recent occasional fever and poor weight gain. TB was diagnosed in the patient's mother about 8 months prior to her admission. Physical examination revealed swelling and tenderness of the left wrist joint.	WBC:10300/mm ³ (PMN:61%, Lymphocyte:2%, Monocyte:19%, Eosinophil:18%) PPD:15mm, ESR:42mm/hr Both smear and culture of gastric washing for acid fast bacilli:Negative Bone culture: Positive for acid fast bacilli	CXR and thoracic CT-scan: Unremarkable Left wrist X-ray: Single lytic lesion in the distal metaphysic of radius	Multiple caseous granulomas. Acid fast bacilli were detected by Ziehl-Neelsen staining	4 drugs for 2 months (DOTS) and 2 drugs twice weekly for 7 months. Monthly serial radiographies were taken. After 5 months, the lytic lesion completely disappeared.
4	A 16 month old Iranian boy with swelling and pain in the left wrist joint of 4 months, duration. There was no history of TB in other family members. Physical examination detected swelling without any redness in the left wrist joint and occasional fever. Also, mild degree of axillary lymphadenopathy was detected.	WBC:Unremarkable PPD:16mm, ESR:30mm/hr Bone culture: Positive for M.tuberculosis, sensitive to INH and Rifampin	CXR and thoracic CT-scan: Mild hilar lymphadenopathy Left wrist X-ray: Single lytic lesion in the distal metaphysis of radius (Fig. 2)	Multiple caseous granulomas	4 drugs for 2 months (DOTS) continuing with 2 drugs given twice weekly for 7 months. After one month of therapy the lytic lesion showed signs of sclerosis. At the end of 6 months the lytic lesion had completely disappeared and the patient had full, symmetrical movement in the left wrist joint

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and weight loss were present in 50% of cases. Skeletal tuberculosis may go underrecognized for months to years because of the indolent nature of the infection and the lack of specific signs or symptoms.^{13,17} The adjacent joint may become involved as the bone is destroyed by pressure necrosis and cold abscess formation. Damage to the adjacent epiphyseal growth centers has been reported to occur in upto 41% of cases of bone disease in metaphyses are typically affected.¹⁵ Usually there is minimal periosteal reaction or new bone formation surrounding the affected area.¹² These X-ray features are nonspecific and may also be presented in conditions such as inflammatory arthritis, pyogenic osteomyelitis, Brodie's abscess, Kaposi's sarcoma, and other malignancies. Other findings on plain radiographs include soft tissue swelling and narrowing of the joint space, cysts in bone adjacent to joints, and subchondral erosions.^{18,19} Multiple cystic tuberculous lesions of the



Fig. 1. White pus-oozing lesion of right knee joint



Fig. 2. Single lytic lesion in the distal metaphysis of radius

skeleton, or Jungling disease, is a rare variety of tuberculosis reported extensively 30 to 40 years ago.¹⁹

The diagnosis of osteoarticular tuberculosis is confirmed by isolation of *Mycobacterium tuberculosis* from a skeletal site, usually from a bone or synovial biopsy.²⁰ In differential diagnosis, some other organisms should be considered and excluded by clinical and paraclinical evaluations. *Staphylococcus aureus*, is the most common organism involved in osteomyelitis. Other types of organisms include the salmonella bacteria in patients with sickle cell anemia, and *Pseudomonas aeruginosa* in drug addicts. Extremely rarely, the viruses which cause chickenpox and smallpox have been found to cause viral osteomyelitis.^{2,13,20}

The gold standard for the diagnosis of osseous tuberculosis is culture of *Mycobacterium tuberculosis* from bone tissues. Positive Ziehl-Neelsen staining for acid-fast bacilli requires at least 10^4 acid-fast bacilli per milliliter of specimen and does not differentiate between tuberculous and non-tuberculous mycobacteria.²¹ Ziehl-Neelsen staining and culture of tissue obtained via surgical biopsy offer the most direct approach to diagnosis. The advent of DNA detection via PCR (polymerase chain reaction) may increase sensitivity and allow for the exclusion of non-tuberculous mycobacteria (such as *Mycobacterium marinum*) that also cause soft tissue infections.¹²

Current recommendations for the treatment of osseous tuberculosis include a 2 month initial phase of isoniazid, rifampin, pyrazinamide, and ethambutol followed by a 6 to 12 month regimen of isoniazid and rifampin.²¹

These cases illustrate the importance of a high index of suspicion when evaluating a patient with an unusual destructive bone lesion, particularly in a susceptible epidemiologic and clinical setting. Familiarity with various radiologic features of the disease is also very important. Early biopsy and appropriate microbiologic testing can avoid diagnostic delay. Bone biopsy followed by microbiologic studies including culture and PCR as well as pathologic examination are recommended confirmatory tools.

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