

# Infantile Humeral Osteomyelitis Caused By *Mycobacterium tuberculosis* — A Case Report

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## ABSTRACT

Humeral osteomyelitis caused by *Mycobacterium tuberculosis* is rare. Since the advent of modern diagnostic techniques and antituberculous therapy, only a limited number of cases have been reported in the literature. Most patients are relatively young, free of underlying disease and live in rural areas. They always present with humeral pain and swelling. Diagnosis is based on histological examination or mycobacterial culture of infected tissue. Most patients recover after surgical debridement combined with chemotherapy. The possibility of humeral tuberculous osteomyelitis should be considered in a patient presenting with humeral pain and swelling. We report on a 6-month-old infant with tuberculosis osteomyelitis of the left proximal humerus and discuss this rare entity. (*Tzu Chi Med J* 2005; **17**:283-286)

*Key words:* humerus, osteomyelitis, *Mycobacterium tuberculosis*

## INTRODUCTION

According to the statistics of the World Health Organization from 1998, there were about 200 million people infected with *Mycobacterium tuberculosis* in the world [1]. Most patients are relatively young, free of underlying disease and live in rural areas [2]. Every year, about 8 million newly infected cases are recorded and around 2,900,000 infected people have died of this disease. In children, there are 1,300,000 newly infected cases every year, and about 450 thousand infected children die of tuberculosis-related disorders [3]. The common sites of extrapulmonary tuberculosis, in decreasing order, are lymph nodes, pleura, the genito-urinary tract and bony tissue. In the skeletal system, the common locations of tuberculous infection, in decreasing order, are the spine, joints, and long bones [4]. However, rare cases of humeral tuberculosis have been reported

in the literature. Herein, we present a 6-month-old female infant with proximal humeral tuberculous osteomyelitis.

## CASE REPORT

In January 2002, a 6-month-old female infant was brought to our pediatric out-patient department by her grandmother. According to her grandmother's description, the female infant had been crying for 3 days whenever her left upper arm was moved. Tracing her history, she was injected with Bacille Calmette Guerin (BCG) vaccine in the left upper arm two days after birth. When examined, we saw no obvious lesion on her arm. An X-ray of her left arm was taken and an intraosseous lesion was found (Fig. 1). Further examinations were performed using computed tomography scanning and

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magnetic resonance imaging, and a simple bone cyst was at first suspected. An orthopedist was consulted and the patient then underwent surgical intervention. During the operation, an osteolytic lesion with impending fracture was found in the left proximal humerus. After curettage, 20 bony chips were grafted within the lesion. Some soft and bony tissue were sent for frozen section and, in the meanwhile, 2 drops of lesional yellow fluid were sent for microorganism cultures, including routine bacterial cultures and a mycobacterial culture [5]. The immediate frozen report disclosed an inflammatory process within the soft tissue and small bony fragments. In the latter, with acid-fast staining, an acid-fast bacillus was found in the residual frozen-section tissue (Fig. 2). A mycobacterial infection was diagnosed pathologically and this was further confirmed by a mycobacterial culture on the 21st day after surgery (Fig. 3). After the operation, the patient's recovery was uneventful and she

was discharged 3 days later. After mycobacterial infection was diagnosed histologically, her preoperative chest X-ray film was reviewed and her 7 family members were screened by chest X-ray. There was no classical presentation of pulmonary tuberculosis found. The white count and differential count disclosed WBC: 14600/ $\mu$ L, segment: 19%, lymphocyte: 66%, monocyte: 12%, and eosinophil: 3%. A series of seral immune antibody studies were also performed and demonstrated IgA: 24 mg/dL (normal range: 4.4-84 mg/dL), IgM: 117 mg/dL (33-126 mg/dL), IgG: 674 mg/dL (172-1069 mg/dL), C3: 159 mg/dL (100-180 mg/dL), C4: 32 mg/dL (7-40 mg/dL). A human immunodeficiency virus test was negative. An antituberculous medication, including isoniazid, rifampin, pyrazinamide, and vitamin B6, was then given. Three months later, some solid union material forma-

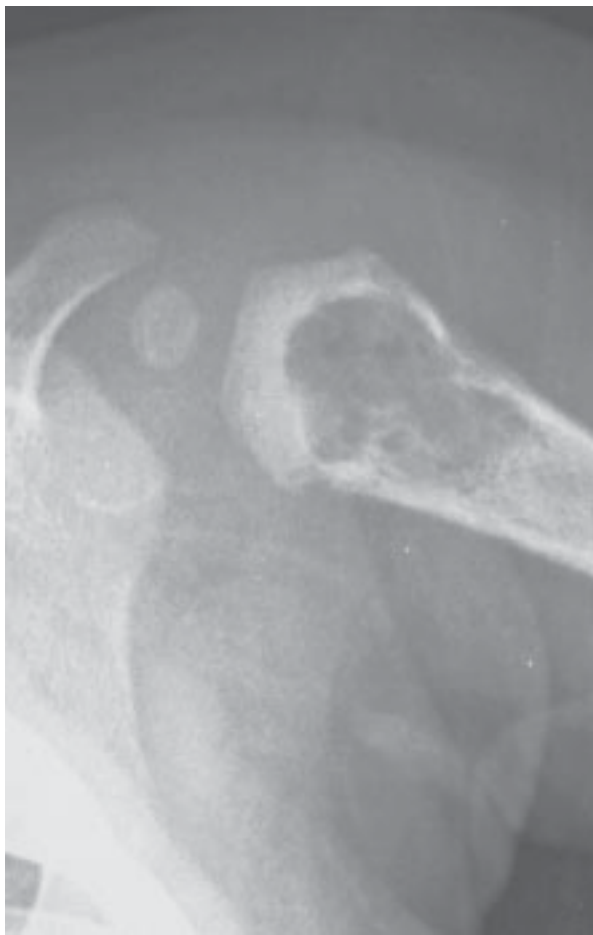


Fig. 1. X-ray film of left proximal humerus showing an intraosseous osteolytic lesion.

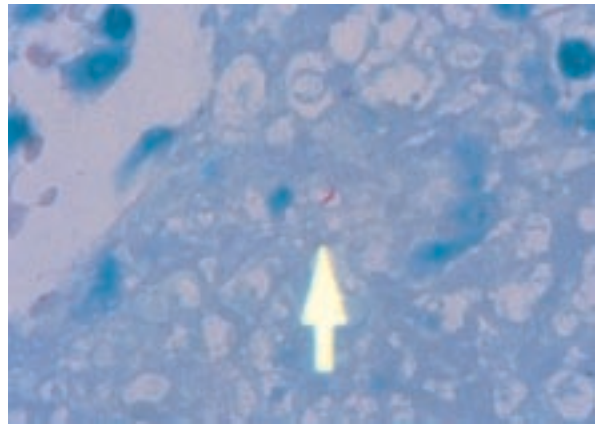


Fig. 2. Histologically, an acid-fast bacillus is shown with acid-fast stain. ( $\times 400$ )

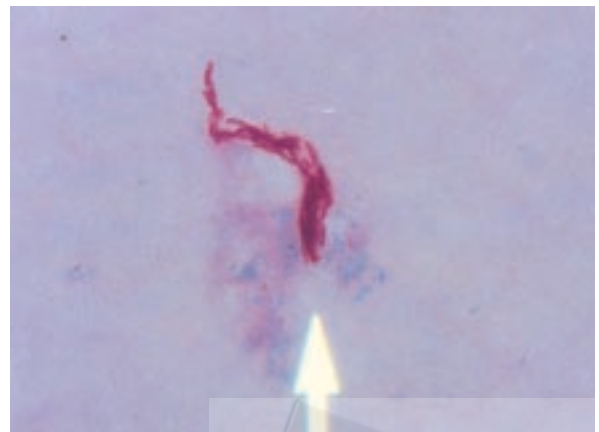


Fig. 3. After the sample was cultured in BACTEC MGIT 960 culture media, acid-fast bacilli were found with acid-fast stain. ( $\times 1000$ )

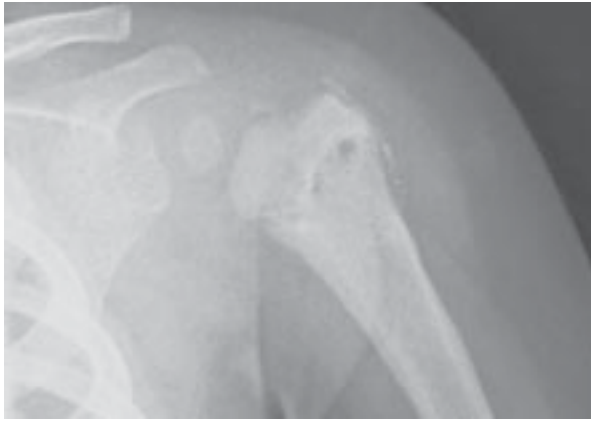


Fig. 4. After debridement and antituberculous medication, the lesion has improved as this X-ray film shows.

tion within the bony lesion was found. This nidus was completely cured after persistent year-long medication (Fig. 4) and her body weight increased from 8.5 kilograms to 13 kilograms. There was no evidence of recurrence after an 18-month follow-up examination.

## DISCUSSION

The natural course of tuberculosis is relatively complicated. Primary tuberculosis is more common in immunodeficient children, HIV-infected patients, diabetic patients and neoplastic patients receiving chemotherapy and corticosteroids. In addition, increased risk of tuberculous infection can be caused by malnutrition, alcoholism and vitamin D deficiency [6].

The 3 most common infectious routes of bony mycobacterial infection are hematogenous, contagious infection via an infected nidus, and direct infection via a punctured wound [3]. A contagious infectious route cannot be proven in this case because there was no other mycobacterial infectious site found after the patient's images were reviewed. However, an injection of BCG vaccine when she was born, which may have induced this proximal humeral tuberculosis, should be ruled out. Owing to the identifying method of Niacin and Nitrate reduction, this proved to be an infection of *M. tuberculosis*, different from the *M. bovis* of the BCG vaccine. A vaccine puncture inducing this mycobacterial infection can also be excluded. Although the chest X-ray films of her family members were all negative for tuberculosis, the hematogenous route cannot be completely ruled out but still needs to be further confirmed.

Skeletal tuberculosis is a rare extrapulmonary manifestation. It accounted for only 1%-3% of all tu-

berculous infections [7]. In a study in Taiwan, skeletal tuberculosis accounted for up to 56% of the tuberculous cases in children less than 5 years of age [8]. This indicates that skeletal tuberculosis is more common in young children. However, due to skeletal tuberculosis being little suspected by physicians and the absence of pulmonary disease and systemic symptoms, the mean duration in delay of diagnosis is up to 6.1 months [9]. The symptoms of skeletal tuberculosis are usually inconspicuous and show marked variation. Mclellan et al [2] reviewed 16 cases of tuberculous osteomyelitis, which demonstrated bony swelling in 81% (13/16) of cases, bone pain in 38% (6/16) and loss of body weight in 31% (5/16). Two of their reported cases presented bony fragmentation, one showed some secretion and another displayed non-union bony tissue with ulceration. Upon diagnoses, curettage specimens for histological study and mycobacterial culture were more diagnostic than chest X-rays, which usually disclosed negative results, as this one presented. Some reports about mycobacterial culture of tuberculous osteomyelitis demonstrated that positive results from aspiration culture reached 57% (4/7), surgical specimens 85% (11/13) and infected tissue 92% (12/13) [2]. In our case, the diagnosis of this humeral tuberculous osteomyelitis used infected tissue for histological study and mycobacterial cultures. However, the most important thing for diagnosis of this disease is the physician's awareness when faced with a patient complaining of bone pain and swelling.

The American Thoracic Society recommends the medical regimen for pediatric intrapulmonary tuberculosis be isoniazid, rifampin and pyrazinamide in the first 2 months, and isoniazid and rifampin for the next 4 months. In addition, ethambutol or streptomycin should also be given as appropriate. In extrapulmonary tuberculosis, the regimen is similar to the intrapulmonary one, although duration of treatment should continue for up to 12 months at least [10-12]. Drug resistance in children was lower than that in adults [8]. The complete debridement and curettage of the bony lesion may help to shorten the period of treatment [9]. It indicates that combined surgical intervention and antituberculous medication should be the choice of treatment for tuberculous osteomyelitis.

In conclusion, humeral tuberculosis is a rare disease. Its diagnosis is based on histological examination or mycobacterial culture of infected tissue. Most cases managed with surgical debridement and antituberculous drugs may attain good results. However, the most important thing is that physicians should recognize that bone swelling and pain can indicate tuberculous osteomyelitis.

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