

# Polyarticular pain and swelling

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**Test yourself question:** Polyarticular pain and swelling

**Diagnosis:** Polyarticular tuberculosis (positive reaction to purified protein derivative and significant clinical improvement after a course of Isoniazid, Rifampicin, Pyrazinamide and Ethambutol)

## Discussion

Common conditions causing polyarticular pain and swelling in children include juvenile idiopathic arthritis (JIA), Reiter syndrome, psoriatic or hemophilic arthropathy and sarcoidosis [1]. However, there have been recent reports of tuberculosis (TB) mimicking some of these entities, particularly JIA [1, 2], making the diagnosis of TB in a pediatric patient fraught with difficulty.

Musculoskeletal TB accounts for 1–3 % of tuberculous infections [3] and most commonly results from hematogenous or lymphatic dissemination of mycobacteria [3–5]. Although tuberculous spondylitis with involvement of the upper lumbar and lower thoracic vertebrae is the most common osseous manifestation of TB [3], peripheral joint manifestations including osteomyelitis, dactylitis and arthritis may be seen in immunocompromised patients [3, 4, 6], those who live in endemic countries [6], and in the pediatric population [3, 4, 7, 8].

TB osteomyelitis most commonly affects the bones of the extremities including the small bones of the hands and feet [5].

Initial deposition of the mycobacterium, most commonly into the metaphysis in children, results in the formation of a granulomatous lesion [3, 4], which may eventually progress to caseation and liquefaction necrosis, resorption of bony trabeculae, gross osseous destruction [4], transphyseal spread of disease [3], and ultimately, involvement of the joint space or TB arthritis [3–5]. Lesions are rarely seen in the diaphysis [9, 10], although its involvement may lead to development of a periosteal reaction and a periosteal soft tissue mass or collection [9]. The initial radiologic appearance of tuberculous osteomyelitis is similar to that of other types of osteomyelitis and includes foci of osteolysis with varying degrees of sequestration and periostitis, soft tissue swelling, periarticular osteoporosis, and erosions [9]. Cystic TB is a type of tuberculous osteomyelitis that is more commonly seen in pediatric patients [4, 11] and consists of well-defined metaphyseal areas of hyperlucency with variable amounts of sclerosis usually accompanied by soft tissue swelling and periostitis [11]. Fusiform expansion of the diaphysis due to cystic changes is known as tuberculous dactylitis, or spina ventosa, an imaging finding that is most commonly seen in the short bones of the hands and feet [3–5, 8–10, 12].

TB arthritis is typically monoarticular and is seen in large weight-bearing joints such as the hip and knee, although involvement of the small joints of the hands and feet may be observed in children and immunocompromised patients [3]. Phemister triad, consisting of periarticular osteoporosis, peripherally located osseous erosions, and gradual diminution of the joint space [3, 5, 13], although suggestive of TB arthritis [3, 5, 8], is nonspecific and may also be seen in cases of rheumatoid and fungal arthritis [3, 12]. If left untreated, TB arthritis may lead to complete joint destruction and obliteration with fibrous ankylosis of the joint [3].

Although the radiograph is the appropriate initial imaging study for the evaluation of musculoskeletal TB, it may be

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negative early in the disease [3]. Other imaging modalities include ultrasonography, which may demonstrate findings such as soft tissue abscess or joint effusion, and computed tomography (CT) scan, which is particularly useful for evaluating the degree of bone destruction, sequestrum formation and surrounding soft tissue extension [3, 4]. Magnetic resonance imaging (MRI) is the modality of choice for early detection of extra-axial TB as it provides excellent evaluation of bone marrow involvement [4] in addition to demonstrating findings such as synovial proliferation, chondral and subchondral bone lesions and soft tissue abnormalities such as myositis, cellulitis, abscess formation, tenosynovitis, bursitis, and skin ulceration or sinus tract formation [3]. There is no single pathognomonic imaging finding for the diagnosis of tuberculosis [3, 7]; radiographic manifestations must be utilized together with relevant clinical information such as tuberculosis elsewhere in the body, positive reaction to purified protein derivative, and insidious onset of monoarticular or oligoarticular pain in order to arrive at the proper diagnosis [7, 10].

Advanced TB disease may mimic other infections (fungal or pyogenic) [1, 2, 10], juvenile idiopathic arthritis [1] and even metastatic disease (i.e. neuroblastoma) [4, 8, 10, 14]. Monoarticular involvement, insidious onset and chronicity favor a diagnosis of TB over pyogenic arthritis [4, 8]. Radiographic changes due to fungal disease are closely similar to chronic pyogenic osteomyelitis or tuberculosis, also manifesting with lytic bone destruction, periosteal reaction, cortical thickening and sclerosis [13]. Tuberculous involvement of more than one joint may lead to a misdiagnosis of JIA [2] although radiologic changes in TB are much more rapid than one would see in JIA [1]. Clinical findings elsewhere in the body such as fever, palpable abdominal mass and opsoclonus are helpful in distinguishing metastatic neuroblastoma from polyarticular TB [14].

Histopathological examinations, culture identification and polymerase chain reaction (PCR) are among the most accurate methods for TB diagnosis [3]. *Mycobacterium tuberculosis* (MTb) is suggested with acid-fast bacteria on smear and specimen histopathology demonstrating caseating granulomata, but culture of the aspirated or excised specimen establishes the diagnosis [10]. Biopsy of suspicious lesions is recommended in countries in which tuberculosis is not endemic. The diagnosis in endemic areas generally can be made on clinical and radiologic examinations [15]; bone infection with insidious onset is treated as MTb until proven otherwise [10]. Synovial or bone biopsy is more accurate and conclusive than fine-needle aspiration, with sensitivity of 90 % [16]. Although biopsy and culture are considered to be the most conclusive means of reaching the diagnosis, these invasive procedures are not always definitive, in addition to possibly requiring repeated attempts [10].

Although the imaging findings in our patient of soft tissue swelling, osteopenia and demineralization, gross osteolysis and polyarticular bony destruction are nonspecific and may be seen in other infections and in metastatic disease, they are suggestive

of TB disease when combined with the disease's endemic nature in the Philippines, positive reaction to purified protein derivative, history of insidious onset of symptoms and significant clinical improvement after a regimen of anti-TB medications. Polyarticular tuberculosis is a diagnostic challenge in the pediatric population and index of suspicion must remain high to prevent delay in diagnosis, treatment and cure.

#### Compliance with ethical standards

**Grants received** None.

**Disclosures** None.

**Conflict of interest** None.

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