

Tuberculous synovitis of the knee with unusually thick synovial granulation tissue: A Case Report

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Citation

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Abstract

Tuberculosis (TB) is no longer confined to undeveloped or developing nations. An increased incidence of patients with TB has been observed even in developed countries due to pandemic human immunodeficiency virus infection, immigration from endemic areas, alcoholism, chronic kidney disorders, immuno-suppressive therapy, drug addiction, intraarticular steroid injection and systemic illness. Tuberculosis (TB) of the appendicular skeleton is an uncommon infection caused by tuberculous bacilli and constitutes 1-3% of all forms of TB. 30% of skeletal TB involves the joints, the knee being the third most commonly affected after the spine and the hip. We report a case of a 15-year old girl with pulmonary tuberculosis as well as tuberculous arthritis of the right knee with unusually thick synovial granulation tissue on MR imaging.

INTRODUCTION

Tuberculosis (TB) of the appendicular skeleton is an uncommon infection caused by tuberculous bacilli and constitutes 1-3% of all forms of TB. 30% of skeletal TB involves the joints, the knee being the third most commonly affected after the spine and the hip. The incidence of skeletal TB is increasing due to the emergence of multi-drug resistant mycobacteria, increase in the number of immuno-compromised patients and the AIDS pandemic. We report here a case of tuberculous synovitis of the knee joint with unusually thick synovial granulation tissue.

CASE REPORT

We report a case of a 15-year old girl who presented with a 3-week history of fever and insidious right knee swelling associated with pain. The patient had no cough or history of recent contact with tuberculous individuals. She also complained of loss of appetite and loss of weight. She was vaccinated with BCG as part of the national immunization programme during childhood. She comes from a low socioeconomic background living in one of the places with the highest prevalence of tuberculosis in Malaysia (1).

Physical examination showed a swollen and erythematous right knee with reduced flexion ability. There was no sinus tract seen. The other joints were normal. Respiratory system examination revealed occasional crepitations in both lung fields. Otherwise the rest of the systemic examination was

unremarkable.

On plain radiography, the affected knee appeared normal other than subtle soft tissue swelling (Figure 1). A synovial biopsy was contemplated for which a preprocedural chest radiograph was done. It showed bilateral diffuse miliary shadows (Figure 2), prompting a diagnosis of tuberculosis. This was further supported by a positive sputum result for acid fast bacilli (AFB).

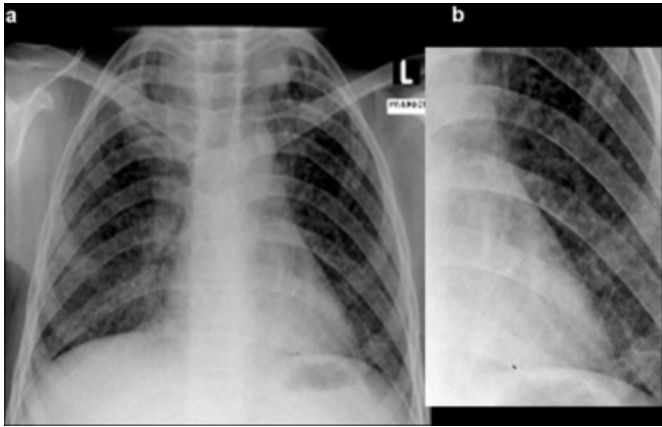
Figure 1

Figure 1: Anteroposterior (a) and lateral (b) radiographs of the knee showing is unremarkable other than a subtle soft-tissue swelling.



Figure 2

Figure 2a: Chest radiograph showing bilateral widespread miliary nodules. 2b. Enlarged image to show the miliary nodules.



MRI was then subsequently performed and showed marked thickening of the synovium measuring 1.8 cm at its thickest extending superiorly up to the distal third of the femur and inferiorly to the upper part of the tibia. This extensive synovial granulation tissue was of low signal intensity on T1 weighting (Figure 3a) and inhomogeneously hyperintense on T2 weighting (Figure 3b). This lesion showed marked enhancement post intravenous injection of gadolinium (Figure 4a). There were patchy areas of articular cartilage destruction and also erosion of the cortical bone on both sides of the joint space, seen as a defect in the hypointense cortical rim (Figure 4a). Bone oedema was also seen as decreased signal intensity on both T1 and T2 weighting and corresponding increase in signal intensity on short tau inversion recovery (STIR) sequence in the mid-tibial plateau (Figure 4b). There was however minimal joint effusion.

Figure 3

Figure 3a: Sagittal T1-W MRI shows thickened synovium which is hypointense (white arrows). 3b. Sagittal T2-W image shows the corresponding lesion to be inhomogeneously hyperintense (black arrows).

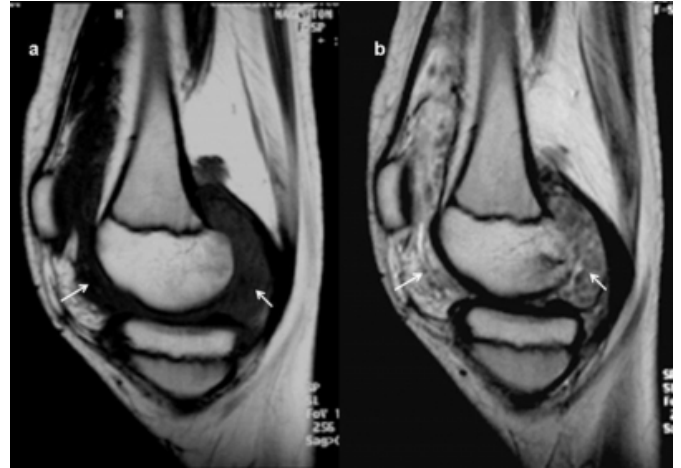
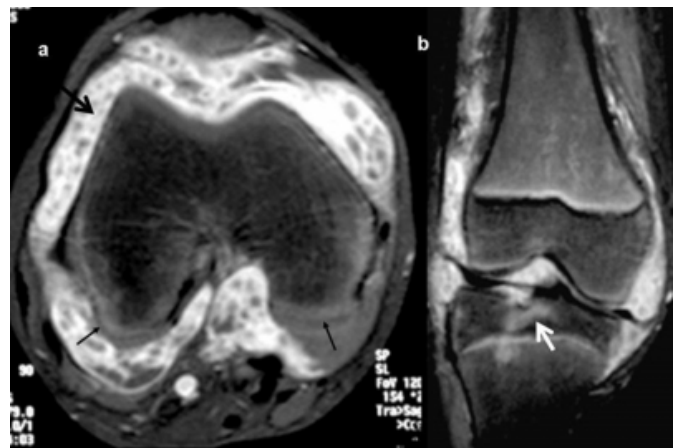


Figure 4

Figure 4a: Axial post contrast T1 MRI with fat suppression, there is marked enhancement of the thickened synovium. (thick black arrow). Cortical erosions are seen at both femoral condyles (thin black arrows). 4b. STIR coronal MRI shows bone oedema in the tibial plateau as depicted by hyperintense areas (thick white arrow). Erosion at the lateral tibial plateau noted (thin black arrow).



We concluded that this patient suffered from a chronic monoarthritis with marked synovitis. In a patient with highly suggestive constitutional symptoms and appropriate risk factors, further supported by a chest radiograph resembling pulmonary miliary tuberculosis, a sputum examination positive for AFB, the diagnosis was almost certainly tuberculous synovitis. The diagnosis of tuberculous synovitis was further confirmed at synovial biopsy which showed caseating granulomatous lesions. The patient was started on anti-tuberculous treatment. After two months of treatment,

the patient showed improvement in her general health as well as reduction in the right knee swelling.

DISCUSSION

Tuberculosis (TB) is no longer confined to undeveloped or developing nations. An increased incidence of patients with TB has been observed even in developed countries due to pandemic human immunodeficiency virus infection, immigration from endemic areas, alcoholism, chronic kidney disorders, immuno-suppressive therapy, drug addiction, intraarticular steroid injection and systemic illness (2). Although no age is exempted, TB usually affects elderly and debilitated patients.

Tuberculous arthritis is usually monoarticular, sparing no joints. The large joints such as the hip and knee are most commonly involved. Lower extremity joints tend to be more frequently involved. Tuberculous arthritis presents usually as chronic pain, swelling, local tenderness, warmth and progressive loss of function. Cold abscesses, sinuses and constitutional symptoms are also common features (2, 3, 4).

Skeletal tuberculosis is caused by the human strain of *Mycobacterium tuberculosis*. Musculoskeletal involvement is through haematogeneous spread often from a primary focus frequently the lungs as in this case. Rarely the primary focus could be in the kidneys or lymph nodes although direct inoculation has also been reported (5, 6). No pulmonary radiographic change can be identified in approximately 50% of the patients. The presence of pulmonary miliary nodules in this patient further strengthen the fact that her concurrent monoarthritis was most likely to be tuberculous in origin. In children, TB arthritis usually occurs as a result of metaphyseal TB osteomyelitis crossing the epiphyseal plate into the joint. This transphyseal spread is characteristic of TB and is not seen in pyogenic arthritis. In children more than 1.5 years old, the transphyseal vessels disappear and extension into the epiphysis and joint becomes uncommon (3, 5, 6).

After lodging in the joint synovium or the metaphysis there is marked joint effusion and thickening of the synovial membrane. The ensuing granulation tissue expands inwards from the joint periphery causing erosions at the bare area of the bone as well as the free surface of the articular cartilage. If left untreated, further erosions can occur and later progress to destruction of the articular surfaces. As the cartilage and bone destruction ensue, sequestrum formation occurs which involves both sides of the joint and hence is called a 'kissing sequestrum' (4, 5). Further extension to the paraarticular soft-

tissue may occur with formation of cold abscesses and sinuses.

Plain radiographic findings of tuberculous arthritis are only seen after a latent period of about 3-4 weeks. Joint effusion and soft-tissue swelling are the only findings in early stages. In the late stages, the classic 'Phemister triad' of joint space reduction, juxta-articular osteoporosis and peripheral osseous erosions are described (4, 5). The relative preservation of joint space which is a classical feature is due to the lack of proteolytic enzymes in *M. tuberculosis*. Another typical feature is lack of sclerosis or periostitis in the early stage except in children, in whom a delayed periosteal reaction is seen. The end stage of tuberculous arthritis is characterized by severe joint destruction and eventually sclerosis and fibrous ankylosis. Bony ankylosis is only occasionally seen, but this sequel is more frequent in pyogenic arthritis (3, 4).

Early changes are better demonstrated on MRI which has now become the mainstay of imaging in musculoskeletal tuberculosis. Joint effusion is hyperintense on T2-weighting, but internal debris, septations, loose bodies and haemosiderin deposits due to bleeding may be hypointense on both T1 and T2-weighting (3, 4). Synovial thickening shows low to intermediate signal intensity on T2-weighting and is hyperintense on T1-weighting due to caseous material, which is atypical of other bony infections. This finding could be an important clue (4). Cellulitis is seen as replacement of subcutaneous fat signal on T1-weighting, high signal intensity on T2-weighting and enhancement post-gadolinium. Myositis is seen as enlarged muscle bulk with high signal intensity on both STIR and T2-weighted sequence. A tuberculous abscess typically shows a hyperintense centre on T2-weighting with a high signal rim on pre-contrast T1-weighting and peripheral rim enhancement post-gadolinium. Sinus tract displays linear high signal intensity on T2-weighting with tram-track enhancement post-contrast. Tuberculous osteomyelitis is seen as low signal lesion replacing the normal high fat marrow signal on T1-weighting, presence of bone oedema as high signal intensity on T2-weighting and varying amount of enhancement on post-contrast T1-weighting. A STIR sequence is extremely helpful in detecting early bone oedema (4, 5).

Other differential diagnoses to be considered would be pyogenic arthritis, pigmented villonodular synovitis (PVNS) and juvenile rheumatoid arthritis (JRA). However, JRA

demonstrates earlier loss of articular space and is polyarticular in distribution. Pyogenic arthritis with a short course of illness can be differentiated on clinical grounds. PVNS shows intraarticular hypointense haemosiderin deposits on T2-weighting and absence of significant extra-articular soft-tissue changes.

To achieve a definitive diagnosis, it is essential to identify *M. tuberculosis*. Bone and joint tuberculosis are however paucibacillar. Many a time Ziehl-Nielsen test is negative and it becomes necessary to wait for the Löwenstein culture results. Synovial biopsy is also an important and diagnostic method to ascertain the causative pathogen (7).

CONCLUSION

Musculoskeletal tuberculosis may have subtle radiological manifestations, and may mimic other infections or even malignancy. Presently with the AIDS pandemic, the radiologist should be aware of the possibility of musculoskeletal TB especially in the appropriate clinical

settings to facilitate diagnosis and to instill early treatment.

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