LIMPING CHILD: HIP TUBERCULOSIS IN THE DIFFERENTIAL DIAGNOSIS

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Abstract

Osteoarticular tuberculosis is defined as direct infection of the bone and/or joints by the tubercle bacillus. After the spine, the hip joint is the most common site of involvement. Osteoarticular tuberculosis has become rare in industrialized countries, but it is still a common problem in developing countries. Since it has an insidious onset, the diagnosis is usually delayed or it is not included in the differential diagnosis of juvenile idiopathic arthritis. Delay in the diagnosis is an important cause of morbidity because of the nature of the hip joint in a growing child. Although the definite diagnosis is provided by identification of the bacillus in the specimens, this is not always possible in

childhood. Furthermore, the tubercle bacillus grows in only 46% of the obtained specimens. Tuberculosis of the hip must be in the differential diagnosis of a limping child. A detailed family and environmental history for pulmonary tuberculosis, history of tuberculous vaccination, and a tuberculin skin test should be performed.

Introduction

Osteoarticular tuberculosis is defined as direct infection of the bone and/or joints by the tubercle bacillus. Osteoarticular tuberculosis is still an important cause of morbidity in developing countries and the cases in industrialized countries are increasing because of HIV, human migration, poverty and drug resistance. Although the spine is a common target for osteoarticular tuberculosis, the peripheral bones and joints also can be involved. Typically, arthritis arises on a background of pulmonary tuberculosis as indolent, chronic monarthritis, often of the knee or hip, that eventually results in extreme destruction of the joint and surrounding bones. Rarely, the case presents as acute arthritis. (1)

In the differential diagnosis of juvenile idiopathic arthritis, osteoarticular tuberculosis must always be considered because clinical and radiological findings may be very similar. Although synovial membrane biopsy and culture are the preferred methods to confirm the diagnosis, both a family or environmental history of pulmonary tuberculosis and a positive tuberculin skin test should suggest the possibility of tuberculous arthritis (2). The Bacille Calmette Guerin vaccine (BCG) is utilized in many countries and is usually, but not always, protective. In this setting, a positive Mantoux may indicate either exposure to the vaccine or actual TB disease. Because of these reasons, a detailed family history and high clinical suspicion of the disease are key points for the diagnosis. Two cases of tuberculous arthritis with hip involvement are presented here in which the diagnosis was made on clinical, pathological and radiological findings.

Case 1

A four year old boy presented with limping, pain on the posterior side of left knee and excessive sweating at night for six months. The intensity of the pain gradually increased over time, and he was not able to walk at presentation. He had no history of fever, joint swelling, trauma or upper respiratory tract infection preceding the symptoms. He had lost three kilograms of weight during this period.

On physical examination, he was not able to walk and he appeared ill. There was a leg length discrepancy and the left leg was 2.5 cm longer then the right one. Left hip joint movements were restricted on flexion and abduction and there was quadriceps atrophy. He had no BCG (Bacille Calmette Guerin) vaccine scar. The remainder of the physical examination did not reveal any pathological findings.

His white blood cell count was 9500/mm^3 and the sedimentation rate was 133 mm/hr. He had mild anemia (hemoglobin 11.2 g/dl, hematocrit 34.4% and MCV 70.2 fL). Peripheral blood smear, platelet count, urinalysis, Brucella agglutination, liver and renal function tests were unremarkable. Antinuclear antibodies and rheumatoid factor were negative.

A radiograph of the left hip joint showed destruction of the head of femur and a widened joint space due to effusion (Figure 1). A T_2 weighted axial MR image revealed a fluid with high protein content in the coxafemoral joint that could be consistent with the ongoing inflammation (Figure 2a). Contrast enhanced fat suppressed T_1 weighted coronal image of the left hip joint demonstrated abnormal thick synovial enhancement (Figure 2b). In a chest radiograph, a calcified lymph node was noted in the left hilum (Figure 3). Tuberculin skin test revealed a 15x13 mm induration. The detailed family history revealed that his uncle who was in close contact with the patient had received anti-tuberculous therapy for pulmonary tuberculosis five years earlier.

An open drainage of the left coxafemoral joint was deemed preferable to simple joint aspiration. The open drainage was performed and pathological examination of the specimen showed a granulomatous inflammation consistent with tuberculosis. Neither mycobacterium tuberculosis nor any other pathogen could be grown in the cultures of surgical specimens.

Based on history, radiological and pathological findings, tuberculous arthritis was diagnosed and he was treated with rifampin, isoniazid and pyrazinamide for nine months. There was a remarkable improvement in the gait of the patient and in the radiological findings at the follow up examination.

Case 2

A two year old boy presented with pain on the posterior aspect of right knee and limping. His symptoms started one month before and he had no history of fever, joint swelling, trauma or upper respiratory tract infection. On physical examination, movements of the right hip joint were painful and restricted on flexion and abduction. He had no BCG vaccine scar. The remainder of the physical examination was unremarkable.

The sedimentation rate was 15 mm/hr and the white blood cell count was 12,900/mm^3. Other laboratory tests including hemoglobin, platelet count, peripheral blood smear, urinalysis, Brucella agglutination, liver and renal function tests were in normal range. Antinuclear antibodies and rheumatoid factor were negative.

Radiographs of the hip joints showed a cystic lesion in the right proximal metaphysis. A periarticular osseous structure was also radiolucent (Figure 4). T_2 weighted axial image of the right hip showed increased heterogeneous signal intensity on the metaphysis of the femur. There was no irregularity or pathological fracture in the bone and the appearance of the epiphyseal bone was normal. There was a minimal capsular effusion (Figure 5a). There was decreased signal in the same region of the femur on T_1 weighted coronal image (Figure 5b). The chest radiograph was unremarkable. The tuberculin skin test revealed a 13x13 mm induration.

A detailed family history revealed that a grandfather who was in close contact with the patient had received anti-tuberculous therapy for pulmonary tuberculosis two years ago. Rather than joint aspiration, definitive diagnosis and treatment began with a surgical curettage. Pathological examination revealed a granulomatous inflammation consistent with tuberculosis. There was no growth of tubercle bacilli or any other pathogens in the cultures of surgical specimens.

He was treated with rifampin, isoniazid and pyrazinamide for nine months. At follow up examination, there was a distinct improvement in his gait and in the radiological findings.

Discussion

Peripheral osteoarticular tuberculosis represents 1-5% of cases of tuberculosis at any site (3). The incidence of tuberculosis is rising, even in industrialized countries (4). Poor socioeconomic conditions constitute a major risk factor (5). Under these conditions, contact with adult tuberculous patients and failure to receive the BCG vaccine are the most important risk factors. Although dozens of BCG trials have been reported in various human populations, the most useful data have come from several controlled trials. Some demonstrated a great deal of protection from BCG vaccines, but others showed no efficacy at all. A recent meta-analysis of published BCG vaccination trials suggested that BCG is 50% effective in preventing pulmonary tuberculosis in adults and children. The protective effect for disseminated and meningeal tuberculosis appears to be slightly higher, with BCG preventing 50-80% of cases (6). In our cases, neither received a BCG vaccine and there were adult patients in their families who received anti-tuberculous treatment.

The tubercle bacillus can reach the joint from an adjacent tuberculous osteomyelitis or by hematogenous spread from a pulmonary lesion (7). Most of the cases with osteoarticular tuberculosis are reported to have tuberculosis at other sites, usually the lungs (1, 8). In childhood hip tuberculosis, the chest radiographs are positive for active or healed tuberculosis in 42% of the patients (9).

The disease has an insidious onset. Pain, restriction of motion in the region of the hip and limping are the usual presenting symptoms. Sometimes the child complains of pain in the knee. This is referred pain and is often misleading, as in both of our cases. There may be constitutional symptoms such as loss of appetite, loss of weight, low-grade fever and easy fatiguibility during physical activities.

Hip and knee joints are the most common sites of involvement. Teklali and Ellis et al. reported hip or knee involvement in 63% and 87% of their patients respectively (1, 10). Elbow and ankle involvement were next most common in their series. In our cases, both children had hip involvement. In 1983, Shanmugasundaram classified hip tuberculosis into the following clinico-radiological types; 1) normal type, 2) Perthes type, 3) dislocating type, 4) arophic type, 5) aetabular protrusion type, 6) mortar and pestle type. This classification is of prognostic value and helps in the choice of management. Since there was no finding of atrophy or dislocation in the hips of our two cases, the radiological appearance of both cases was classified as the normal hip type.

The radiological appearance of the tuberculous hip at presentation almost invariably predicts the outcome. Hips of normal, Perthes and dislocating types have a good result but hips of atrophic, protrusion-acetabular and mortar-pestle types have a poor result (9). Both of our patients had a normal clinico-radiologic type of hip disease and the results with early, aggressive anti-tuberculous treatment appeared to be excellent.

Identification of the tubercle bacillus in the specimens is the gold standard method in diagnosis (11), but this is not always possible in children. Histopathological findings, such as granulomatous inflammation, combined with clinical findings should suggest tuberculosis in synovial biopsy specimens. In the study of Teklali et al., the diagnosis was obtained by identification of tubercle bacillus in only 46% of patients and by histopathological findings in 77% of cases (1). There was no growth of tubercle bacilli or any other pathogens in the cultures of our cases. Although we could not use PCR for mycobacterium and ELISA testing of gamma interferon, the diagnosis of our cases were supported by the clinical, histopathological and radiological findings.

Plain radiographs are very important for diagnosis, but they can be normal early in the disease (12-13). Since it is difficult to distinguish tuberculosis from other diseases, such as inflammatory disease or neoplasia, CT or MRI should be useful for these cases. In both of our cases, MRI findings were consistent with ongoing inflammation and these MRI findings resolved with anti-tuberculous treatment.

The differential diagnosis of tuberculous arthritis includes transient (or toxic) synovitis, traumatic synovitis of the hip, septic arthritis, Perthes disease, oligoarticular juvenile idiopathic arthritis (JIA), enthesitis-related JIA, and diseases that cause a granulomatous inflammation.

In both our cases, transient synovitis was not considered because there was no history of a preceding upper respiratory tract infection and duration of the symptoms was longer. In addition, radiological examination was not consistent with transient synovitis, which usually causes only a minimal widening of the joint space. Neither of our patients had a history of a recent trauma.

Bacterial septic arthritis was excluded mainly by the absence of toxic appearance of the children and the lack of findings of acute inflammation on histological examination of tissue from the affected joint. It should be noted that when TB appears to be the mostly likely cause of an osteoarthritis, joint aspiration should be bypassed in favor of the more definitive surgical curettage and drainage.

Juvenile idiopathic arthritis is one of the most important diseases that should be considered in differential diagnosis of these cases. All the symptoms and radiological findings of the patients could be seen in the oligoarticular type of juvenile idiopathic arthritis, (including spondyloarthopathy), but the pathological examination of the specimens were consistent with granulomatous inflammation and the response to anti-tuberculous treatment was excellent. Malignant or benign lesions were also excluded by pathological examination of the specimens. Although the clinical presentation of case one was similar to the Perthes disease, radiological and pathological findings were not suggestive. In addition to tuberculosis, granulomatous inflammation may also be found in a few other pathological states, including infections, foreign body reaction, silicosis and sarcoidosis. Among these conditions, tuberculosis should be the first to be considered in differential diagnosis in children.

In conclusion, tuberculous arthritis is by no means rare in the world, especially in developing countries. The diagnosis of hip tuberculosis is not easy, and if not diagnosed in the early stages of the disease, it is an important cause

of morbidity in growing children because of the nature of hip joint. In the differential diagnosis of oligoarticular type juvenile idiopathic arthritis, hip tuberculosis must always be considered because of its clinical and radiological similarity and different treatment implications. Synovial membrane biopsy and culture are the gold standard to confirm the diagnosis of joint TB. However, it is not always possible in young children to obtain this confirmation because tubercle bacillus can only be grown in less than 50% of childhood cases of tuberculous arthritis. The history of receiving a BCG vaccine and supposed protection from TB can be misleading. Therefore, in the evaluation of a limping child, if there is the history of an adult with tuberculosis in the family and the child has a positive tuberculin skin test (whether or not the child has received BCG), the clinician should be aware of the possibility of hip tuberculosis and appropriate assessment should be immediately performed, especially radiologic studies and tissue attainment.

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Figures:

Figure 1: A radiograph of the left hip joint demonstrates destruction of the head of femur and a widened joint space due to effusion.

Figure 2a: An MRI with a T_2 weighted axial image reveals a left coxafemoral joint effusion.

Figure 2b: An MRI showing an abnormal thickened synovium utilizing contrast enhancement of the left hip joint on T_1 weighted image.

Figure 3: An anteroposterior chest radiograph shows a left hilar calcified lymph node.

Figure 4: An anteroposterior right hip radiograph shows a radiolucent, well defined cystic lesion on the right femur metaphysis.

Figure 5a: T_2 weighted axial MRI image of the hip joints demonstrates an increased signal on the right femur metaphysis.

Figure 5b: T_1 weighted coronal image shows hypointense signal of the same region.