CASE REPORT

A case of acute septic arthritis hip caused by *Brucella melitensis* in an adolescent child

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SUMMARY

Brucella is among the most common zoonotic diseases affecting humans. Although musculoskeletal involvement is seen in a large proportion of patients, the disease is often diagnosed late or misdiagnosed due to its subtle nature and rarity, and lack of awareness among clinicians. In this report, a 12-year-old girl was diagnosed with acute septic arthritis of the hip based on clinico-radiological features, and managed with standard treatment, including arthrotomy. However, the child did not respond to the treatment. Based on the histopathology and local endemicity, *Brucella* was suspected, and confirmed after serological testing. The child subsequently responded to treatment and, at latest follow-up at 1 year, had a full painless range of motion, with no relapse.

BACKGROUND

Human Brucellosis is among the most common zoonotic diseases and has an incidence of over 500 000 worldwide with a prevalence of more than 10/100 000 population in some endemic countries.[1] Although the musculoskeletal system is frequently involved, *Brucella* can mimic various multisystem diseases, which frequently leads to misdiagnosis and delay in treatment, resulting in complications. Although, as reported in the literature, septic arthritis is most commonly caused by *Staphylococcus aureus* in all age groups, there are some cases where a strong clinical suspicion is needed based on the local epidemiology when patients do not respond to standard treatment, as seen in the present case.

CASE PRESENTATION

A 12-year-old girl presented with sudden onset acute pain in the left hip for 10 days. The pain, associated with high grade fever with chills, was non-radiating, severe in intensity and aggravated by movements at the hip, and was only partially relieved with medication. The fever was remittent and was relieved with medication, only to reoccur. There was no history of any trauma, cough, anorexia or pain or swelling in any other joint of the body. The child's medical and family history were non-contributory. There was no significant past history.

On examination, the patient's vitals were stable. She was febrile and had pallor. There was no evidence of lymphadenopathy. During local examination, the child kept her left hip in a flexed position. There was tenderness at the anterior hip region and all movements, active and passive, were painfully restricted. There was fixed flexion deformity of 40°. The other hip joint, and spine and distal neurovascular status were within normal limits. Examination of the rest of the organ systems (abdomen, respiratory and nervous system) was normal.

INVESTIGATIONS

Laboratory examination revealed low haemoglobin (7.7 g/dL) and an increased leucocyte count of 14 400/mL. The differential count revealed 74% polymorphonuclear leucocytes, 14.7% lymphocytes, 8.4% monocytes, 0.8% basophils and 2.1% eosinophils. Erythrocyte sedimentation rate (33 mm Hg in the first hour) and highly sensitive C reactive protein (150.63 mg/L) were increased. The child underwent imaging studies including X-ray of the pelvis with both hips, X-rays of the chest and spine, Ultrasound of the hip region and MRI. The X-rays of the chest and spine were normal.

The X-ray of the pelvis with both hips showed decreased joint space with subchondral lesions on both sides of the left hip joint (figure 1). Ultrasonography of the left hip showed a heterogeneous hypoechoic collection in the iliopsoas muscle in the region of the iliac fossa, extending for a length of about 6.6 cm and measuring 2 cm in maximum thickness (figure 2). MRI showed an altered bone marrow signal intensity area in the left acetabulum, head, neck and shaft of femur, appearing hypointense on T1 and hyperintense on T2 weighted and fat suppressed inversion recovery images, and a collection in the left iliacus muscle extending from pelvis to upper thigh (figures 3 and 4). There was also associated mild left hip joint effusion.

DIFFERENTIAL DIAGNOSIS

- Acute pyogenic septic arthritis
- Tubercular arthritis

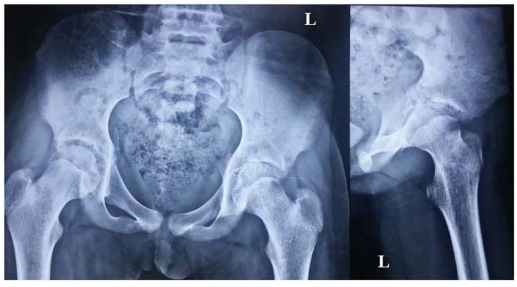

Figure 1 Radiograph of the pelvis with hips and lateral view of the left hip showing decreased joint space with subchondral lesion on either side of the left hip joint.

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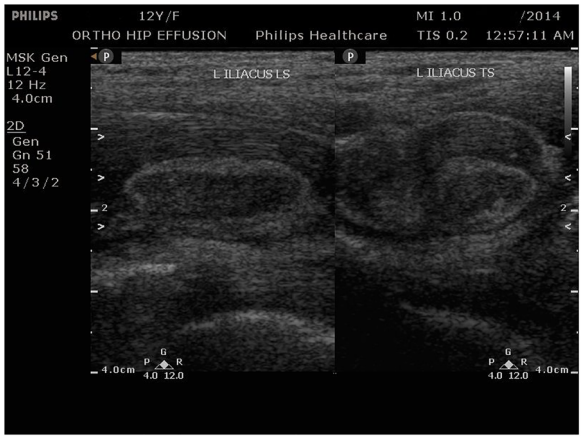

Figure 2 Ultrasonography of the left hip showing a heterogeneous hypoechoic collection in the iliopsoas muscle in the region of the iliac bone, measuring 2 cm in maximum thickness.

TREATMENT

The child was put on empirical intravenous antibiotics (injection co-amoxiclav 1.2 g thrice daily and injection amikacin 250 mg, twice daily) and above knee skin traction. However, the clinical symptoms including low-grade fever persisted. Her hip movements, both active and passive, improved, but remained painful.

After 72 h of admission, the decision was taken to perform arthrotomy of the left hip after taking informed consent from the parents.

SURGICAL PROCEDURE

The child was placed in the supine position with a sandbag under the left pelvis. The Smith-Peterson anterior approach to the hip joint was used. An iliac crest incision was used to erase the iliacus subperiosteally from the iliac bone. The deeper and distal part of the iliacus revealed thick yellowish brown purulent material that appeared to be communicating with the hip joint. The hip joint capsule was exposed by making a plane between the sartorius and tensor fascia lata, and then erasing the straight and reflected head of the rectus femoris. The capsule was observed to be thickened. A T-shaped incision was made to expose the joint. The joint revealed granulation tissue and erosions of the femoral head and neck. Thorough lavage was performed and the wound was closed in layers over a suction drain. The pus was sent for Gram stain and acid fast bacilli (AFB) staining and culture while the granulation tissue was sent for histopathological and culture examinations.

Postoperatively, the child was continued on the same intravenous antibiotics and skin traction. The antibiotics were changed after 2 days when the culture and sensitivity report grew methicillin sensitive *S. aureus* sensitive to cefuroxime and amikacin. The child was afebrile for a period of 2 days after changing the antibiotics. However, she started experiencing low-grade fever again and the pain in the left hip persisted. The histopathology report showed non caseating granulomas that were Ziehl Neelsen (ZN) stain negative with secondary infection.

HISTOPATHOLOGY INTERPRETATION

On gross examination, there were multiple reddish brown and reddish white soft tissue components altogether measuring $4.5 \times 1.5 \times 0.8$ cms.

Microscopic examination showed extensive fibrinous neutrophilic exudate intermixed with lymphocytes, histiocytes including multinucleated histiocytes, macrophages and plasma cells. An occasional non-caseating well-defined granuloma was noted with giant cells (figures 5 and 6). Spicules of necrotic bone, haemorrhage and fibrocollagenous tissue were seen. ZN stain to demonstrate AFB was negative. No fungal profiles were noted.

PRESENT DIFFERENTIAL DIAGNOSIS

- Brucellosis
- Non-tuberculous mycobacteria (NTM)
- Sarcoidosis

Considering that a large percentage of patients with Brucellosis present with musculoskeletal complications including septic arthritis, we had *Brucella* serology performed initially.[2–5] The serology for *Brucella melitensis* was positive with a titre of 1:320 and IgM antibody level of 12.84 U/mL. In addition, the child was anaemic, which is also a common accompaniment of

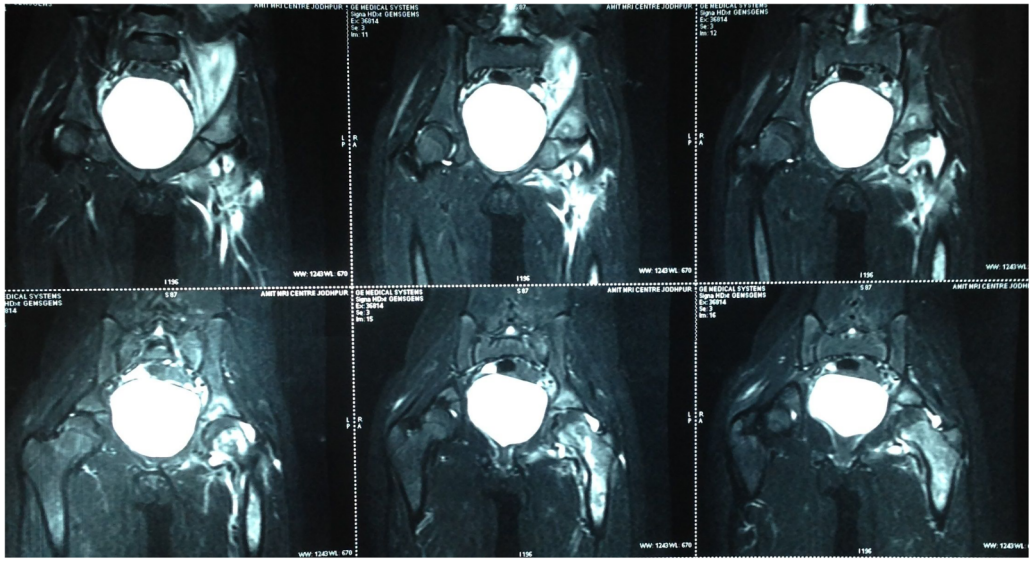

Figure 3 MRI of the pelvis with both hips (coronal section) shows altered bone marrow signal intensity area in the left acetabulum, head, neck and shaft of the femur appearing hyperintense on T2-weighted images.

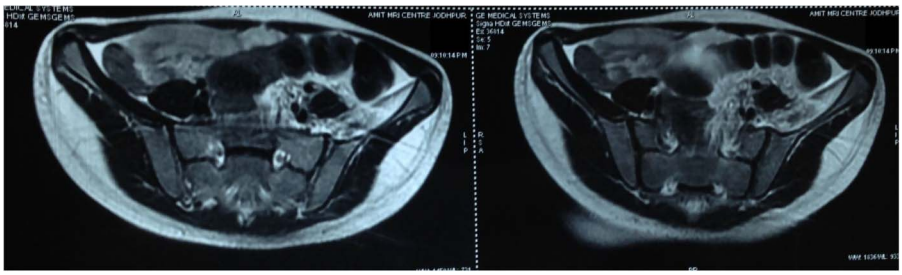

Figure 4 MRI of the pelvis with both hips (transverse section) showing collection in the left iliacus muscle.

Brucella affection of the musculoskeletal system. The blood culture for NTM was negative and chest X-ray was normal.

DIAGNOSIS

Acute septic arthritis of left hip with left iliac abscess with osteomyelitis of proximal left femur, caused by *B. melitensis*.

OUTCOME AND FOLLOW-UP

The child was started on intravenous gentamycin for 7 days and oral doxycycline and rifampicin, which were continued for 8 weeks. The child responded to the treatment and, at the latest follow-up at 1 year, was asymptomatic and had painless full range of motion of the involved hip.

DISCUSSION

Brucella is among the most common zoonotic diseases, and presents with skeletal complications in 11–85% cases, in various studies.[2–5] The most common presentation is with fever, arthralgia and monoarthritis.[6] The peripheral joints, including hip and knee, are more commonly involved in children than is the axial skeleton.[7–9] In the present case, the child presented with fever, arthralgia and peripheral monoarthritis of the hip. On imaging studies, there were features of acute osteomyelitis with septic arthritis of the hip. Contrary to the standard observation of increased medial joint space on radiography in acute septic arthritis of the hip, this patient had decreased joint space, probably an observational variation due to the flexion deformity of the hip. MRI was performed to determine the extent of involvement of the pathological process, as the duration of symptoms in the patient was almost 2 weeks, the sonography report predominantly showed an iliac abscess and the child did not respond to empirical antibiotic therapy. The diagnosis was suspected when the child did not respond to the emperical antibiotic therapy, the symptoms persisted even after arthrotomy and the histopathology showed granulomas without caseous necrosis. The diagnosis was, however, confirmed with serology showing positive titres for *B. melitensis*. It is to be noted that, although multiple different surgical treatment protocols have been mentioned in the literature for septic arthritis, such as daily ultrasound-guided aspirations, arthroscopic irrigation and drainage,[10] we chose to perform an open arthrotomy and drainage, as the infection was not only limited to the hip but also involved the iliac region as well as the proximal third of the femur.

The differential diagnosis considered initially was acute pyogenic septic arthritis and tubercular arthritis. The short history, signs and symptoms, and imaging studies, were consistent with acute pyogenic septic arthritis. However, the child not responding to the definitive antibiotic therapy even after performing arthrotomy, and non-caseating granulomas on histopathology, were against this diagnosis. Tubercular arthritis was kept as a differential diagnosis as the disease is endemic in this country and the presentation can be acute in cases of associated secondary infection. However, ZN staining and culture of pus and granulation tissue were negative and the histopathology report was also not consistent with this diagnosis. Based on the histopathology interpretation, the differential diagnoses considered were *Brucella*, NTM and sarcoidosis. Although non-caseating granulomas can be seen in all the above diseases, a literature review showed that osteoarticular complications were most commonly associated with Brucella.[2–5] NTM infection involving the musculoskeletal system is uncommon and usually acquired by direct inoculation of pathogen as a consequence of surgery, penetrating trauma or injections. The clinical course of the disease is typically protracted with average time from the onset of symptoms to diagnosis being 10 months.[11] Clinically, patients present with signs and symptoms similar to tubercular arthritis, with pain, swelling, stiffness and constitutional symptoms. However, the

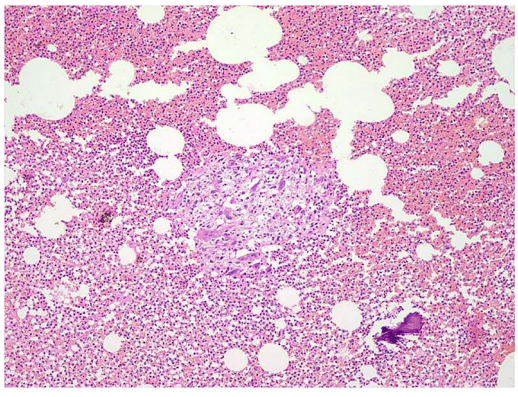

Figure 5 Epithelioid cell granuloma with spicule of necrotic bone and background dense neutrophilic inflammation, H&E stain, ×100.

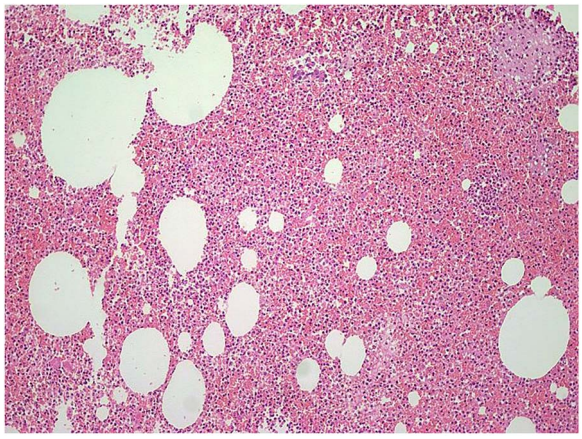

Figure 6 Dense neutrophilic inflammation, H&E stain ×100.

definitive diagnosis requires a positive culture, which was negative in our case. Similarly, involvement of the musculoskeletal system in sarcoidosis is very rare, accounting for 3–13% cases, and most commonly involves the small bones of the hands and feet.[12] When symptomatic, patients usually present with pain, palpable mass, chronic myopathy or acute myositis. In the majority of patients, chest involvement is also seen.[13] In the present case, the history was not consistent with the diagnosis of sarcoidosis, and the chest X-ray was normal. ACE levels were not measured as investigations had already revealed positivity for *Brucella* serology.

There are four *Brucella* species known to cause disease in humans; of these, *B. melitensis* is the most prevalent and virulent, and causes the most severe and acute cases of brucellosis.[14 15] Childhood brucellosis accounts for 10–30% of all cases and most commonly involves children older than 5 years of age.[16–20] The main source of infection is consumption of raw milk and milk products, and, to a lesser extent, contact with infected animals or their waste products. Clinically, the most common presentation is with fever, arthralgia, sweating and peripheral monoarthritis involving the hip or knee. The involvement of the axial skeleton and sacroiliac joint is rare in children as compared to in adults.[17 21–24] The diagnosis of *Brucella* can be performed with certainty by isolating the species from blood, bone marrow and other tissue fluids. However, the rate of isolation in culture remains very low. So, the standard agglutination test remains the best diagnostic modality with titres >1:160 suggestive of acute infection. The treatment of *Brucella* requires a regimen consisting of a combination of agents that can penetrate the cells; prolonged treatment is suggested so as to achieve eradication of the disease. Treatment with a single agent or combination of agents given for less than 4 weeks is associated with a high risk of relapse.[25–28] In children older than 8 years, the regimen involves doxycycline with either rifampicin, streptomycin or gentamycin.

Learning points

- *Brucella* is an unusual cause of acute septic arthritis of the hip in adolescents and should be considered in the differential diagnosis, particularly in endemic regions.
- The present case report highlights the importance of sending tissue for culture as well as for histopathology in all cases of septic arthritis.
- Treatment for *Brucella* should include more than one drug and be given for more than 4 weeks to prevent relapse.

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Patient consent Obtained.

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