

Non-typhoidal *Salmonella* Osteomyelitis of the Femoral Neck in an Immunocompetent Child

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Abstract

We report a case of *Salmonella* osteomyelitis of the femoral neck in a healthy child. Such an occurrence in an immunocompetent child is extremely rare and has not yet been reported in the English literature. *Salmonella* should be considered among the causative agents in acute osteomyelitis. Prompt antibiotic treatment is pivotal for preventing complications and decreasing the disease burden.

Keywords: Non-typhoidal *Salmonella*; Osteomyelitis; Immunocompetent child

Introduction

The non-typhoidal *Salmonella* serotype (NTSS) is one of the most important enteric pathogens in Taiwan, which most often results in self-limited acute gastroenteritis. However, approximately 5-7.6% of patients develop bacteremia [1,2]. *Salmonella* osteomyelitis is common in children with hemoglobinopathies, such as sickle cell disease, but it is an extremely rare consequence of *Salmonella* bacteremia in healthy children [3-5]. We encountered a case in which acute osteomyelitis of the femoral neck caused by *Salmonella enterica* occurred without gastro-intestinal manifestations in a healthy 9-year-old boy.

Case Presentation

An otherwise healthy 9-year-old boy initially presented to our pediatric emergency department with complaints of intermittent fever and pain at the left hip of three days duration. The left hip pain was associated with a limp, but without recent trauma. Laboratory findings included a total leukocyte count of 4,000/ μ L, hemoglobin level of 12.0 g/dL, and platelet count of 139,000/ μ L. The C-reactive protein (CRP) level was 16.9 mg/L. Liver function test values were slightly elevated: aspartate aminotransferase, 46 U/L (normal, 13-40 U/L) and alanine aminotransferase, 49 U/L (normal, 7-40 U/L); other laboratory data were normal. Blood cultures were obtained. The boy was discharged to home without a certain diagnosis and was prescribed antipyretics. Because of a persistent fever, the patient returned to our pediatric emergency department two days later. At the time of admission, he was febrile to 39.9°C and in pain. Physical examination results were normal except for those of the musculoskeletal system. Local examination showed tenderness over the left hip joint but without localized heat, erythema, or swelling. Other positive findings included a limping gait and restriction of movement in the left hip, particularly in flexion and external rotation. Other joints had no limitation of mobility. His medical history was unremarkable. He mentioned that he had played in the river four days before fever onset. Significant laboratory values

on admission were a total leukocyte count of 5,200 with a left shift, microcytic anemia (hemoglobin: 12.7 g/dL and Mean corpuscular volume (MCV): 76 fL) and increasing inflammatory markers (CRP: 61.3 mg/L). The previously obtained blood culture yielded positive results for *Salmonella enterica* serogroup B. Magnetic resonance imaging (MRI) of the pelvis was performed, which demonstrated confluent bone marrow edema of the left femoral neck, suggesting osteomyelitis (Figure 1).

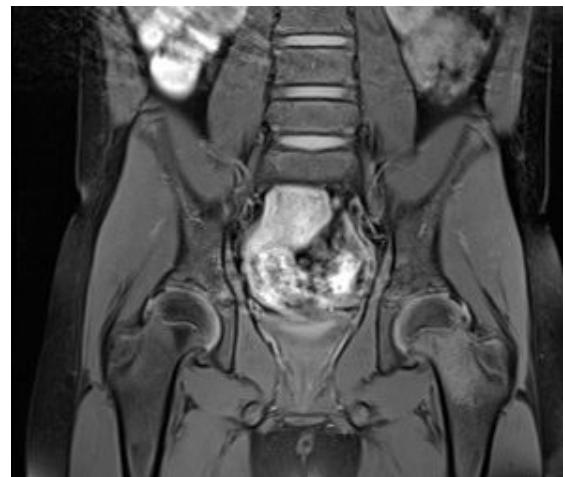


Figure 1: MRI of the pelvis region.

The patient was then treated with intravenous ceftriaxone 1700 mg twice daily for one month. The patient became afebrile by the fourth day after antibiotic treatment, and the pain in his hip gradually improved. His erythrocyte sedimentation rate (ESR) was elevated to 30 mm/h by the seventh day after hospitalization. His CRP and ESR levels normalized within ten days after treatment. Tests for sickle cell disease and hemoglobinopathy included hemoglobin electrophoresis and blood smear, and the results were negative. Results of an immune

evaluation were all normal, including humoral immune panel, T-cell subset, quantitative immunoglobulins, complements, anti-nucleus antibodies, HLA B27, and oxidative burst tests. He was discharged to home after 30 days on intravenous ceftriaxone twice daily. He recovered completely without sequelae. Follow-up radiography showed no residue from the osteomyelitis.

Discussion

The NTSS is one of the most important enteric pathogens worldwide. Despite its high prevalence, only approximately 5-7.6% of cases develop *Salmonella* bacteremia in adults and children [1,2]. The development of *Salmonella* bacteremia is related to host and microbial factors. The pathogenic potentials of *Salmonella* species differ substantially based on their serotypes [2,6]. Known host factors associated with *Salmonella* bacteremia were identified in a previous report, such as an immunocompromised status, malignancy, and the receipt of corticosteroid therapy or treatment with other immunotherapy agents [1].

In children, acute osteomyelitis is often hematogenous in origin and can affect any bone. Twenty-one cases of *Salmonella* osteomyelitis in healthy children were reviewed from 1978 to 2012, of which nine had involvement of the long bone [7]. The femur is the most common site of involvement. The most common pathogen underlying osteomyelitis is *Staphylococcus aureus*, followed by the *Streptococcus* species [4,8]. *Salmonella* species are common etiologic agents for osteomyelitis among patients with hemoglobinopathies, especially sickle cell anemia [3,4]. Several plausible theories, such as intravascular sickling and capillary occlusion, have been suggested to explain the relationship between *Salmonella* osteomyelitis and sickle cell anemia [3,4]. Except for sickle cell anemia, the risk factors for *Salmonella* osteomyelitis have been previously reported in the literature, including previous surgery, connective tissue disorders, and hematological neoplasms, such as lymphoma or leukemia [9]. Healthy children are not easily vulnerable to *Salmonella* bacteremia. Grisaru-Soen et al. reported that warm weather, previous gastrointestinal illness, and pre-exposure to antibiotics are risk factors for development of non-typhoidal *Salmonella* bacteremia in previously healthy children [10].

Among the imaging modalities, MRI is often considered the best tool for diagnosing osteomyelitis [5,7,8]. MRI can also help physicians achieve an earlier diagnosis earlier compared to that with plain radiography [7,8]. Early findings on plain radiography may not be obvious until two to three weeks after the onset of symptoms and signs [7,8]. Bone scintigraphy also plays an important role in osteomyelitis,

especially when symptoms are not localized precisely. Ultrasonography is of minor importance, but is helpful in differentiating septic arthritis from osteomyelitis when fluid is accumulated in the joint space.

Our case is singular because it reports a unique case of femoral neck osteomyelitis in an otherwise healthy child. In the previously published English literature, we did not identify a report of a healthy child with *Salmonella* osteomyelitis involving the femoral neck with no gastrointestinal manifestations throughout the entire course. Our patient had no risk factors, malignancy, an immunosuppressed status, previous antibiotic treatment, or trauma. In our case, an infectious focus was immediately identified on admission. To decrease the disease burden, early detection and awareness is of great importance for preventing potential complications, such as chronic infection, septic arthritis, limb-length discrepancies, and growth abnormalities.

In summary, although *Salmonella* osteomyelitis involving the femoral neck in an immunocompetent child is rare, physicians should be aware of it in order to begin prompt antibiotic treatment and prevent complications.

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