Salmonella Septic Arthritis Involving Multiple Joints in a Girl with Acute Lymphoblastic Leukemia at Diagnosis

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Septic arthritis due to Salmonella has been reported frequently, but multiple joint involvements have rarely been reported in children. A 3-year-old girl presented with Salmonella arthritis involving multiple joints. Laboratory investigations revealed pancytopenia inconsistent with diagnosis of juvenile rheumatoid arthritis or septic arthritis. Bone marrow examination 2 weeks later confirmed the diagnosis of acute lymphoblastic leukemia (ALL). Immunophenotyping studies were consistent with a diagnosis of pre-B ALL. This case illustrates that a delay in the diagnosis may occur when there is an apparent infection focus without classic features of leukemia. Multiple joints involvement of septic arthritis associated with pancytopenia should highlight the possibility of underlying hematologic disorders.

1. Introduction
Prompt diagnosis of leukemia remains a challenge for pediatricians due to the protean presentations. It is important for pediatricians to promptly recognize salmonella septic arthritis as an initial manifestation of childhood acute leukemia because a delay in diagnosis may elicit an adverse effect upon survival. Pancytopenia preceding ALL is a rare occurrence, usually affecting children with subsequent development of B-lymphocyte (B) origin lineage ALL.

2. Case Report
A 3-year-old girl was referred to our hospital in July 2007 due to persistent fever, joint swelling, and joint pain. The arthritis involved the right shoulder, right
elbow and the proximal interphalangeal joint of the left index finger. There was swelling, tenderness and restricted joint motion. The plain X-ray of the right shoulder showed no fluid accumulation within the joint.

On admission, the general condition of the patient was fairly good, but the fever remained. No lymphadenopathy or hepatosplenomegaly was noted. Laboratory blood examinations revealed the following: hemoglobin 7.7 g/dL, white blood cell count 3.9 ×10^9/L, with 55% neutrophils, 32% lymphocytes, 6% monocytes, 7% atypical lymphocytes, and platelet count 98 ×10^9/L with a high C-reactive protein level (171.56 mg/L). The blood culture taken at the local hospital subsequently yielded *Salmonella enterica* serogroup D. However, no organisms were isolated in blood cultures at our hospital. A clotted screen proved normal but the lactate dehydrogenase level was 377 U/L (normal range: 50–150 U/L). Bone scintigraphy was performed to exclude osteomyelitis. The scan showed no areas of abnormal uptake on early and delayed phases. Asymmetrically decreased osseous uptake over the right shoulder joint was noted when compared with the left shoulder.

Simultaneous bone marrow aspirates taken via the left iliac crest reflected hypercellularity with more than 40% of blast cell invasions. Cytoplasm of the blasts was typically relatively clear and indistinct, which exhibited faint periodic acid-Schiff reactivity. Immunophenotypic characterization of the bone marrow leukemic cells revealed expression of CD10 (33.8%), CD19 (71.6%), cytoplasmic μ-chain (11.4%), CD34 (53.9%), and HLA-DR (61.7%), consistent with pre-B ALL. Cytogenetic studies revealed a normal female karyotype. During the same period, the left index finger. There was swelling, tenderness and restricted joint motion. The plain X-ray of the right shoulder showed no fluid accumulation within the joint.

3. Discussion

Septic arthritis is a medical and surgical emergency that if left untreated may lead to permanent joint disfigurement and loss of function. Children less than 3 years of age comprise half of the reported cases of septic arthritis.\(^3\) Joint destruction due to sepsis can occur in a matter of days.\(^4\) Infections in children, such as upper respiratory infections or otitis media, are predisposing factors for septic arthritis. Infections can migrate from the primary site to a distal joint. Septic arthritis has also been seen with skin and soft tissue infections.

Bacteria that cause septic arthritis can enter joints in three different ways.\(^7\) The first way is from a percutaneous puncture that introduces bacteria directly into the joint or from a venipuncture that becomes infected, with the infection traveling to the joint. The second way is hematogenous seeding from a distal site of infection. The third way is by contiguous metaphyseal osteomyelitis that decompresses into the joint capsule. Organisms commonly responsible for septic arthritis are *Staphylococcus aureus*, *Haemophilus influenzae* type b, and streptococci.

Septic arthritis is evidenced by an increase in pain, with local swelling, restricted joint movement, fever and malaise. Increased leukocyte count in the synovial fluid and neutrophilia are usually present in septic arthritis. Additional studies are warranted to examine patients with multiple joint problems related to coexistent hematologic manifestations. To prevent irreversible cartilage and bone destruction, early recognition, timely pathogen identification, and immediate joint washout are indicated.\(^8\)

Bone marrow examination is not performed routinely in the diagnostic work-up in patients with features of pancytopenia and septic arthritis. For such cases, bone marrow aspiration should be requested in the early workup for a diagnosis. Although septic arthritis due to *Salmonella* had been reported in large numbers,\(^9\) this case illustrated that *Salmonella* infections in ALL patients may present with leukopenia or neutropenia, contributing to a delay in diagnosis. Oligo-articular septic arthritis is most often due to *Salmonella* infection.\(^10\) The coexisted *Salmonella* infection and leukemia in present case may be related to the fact that leukemia may result in an immunocompromised condition that may facilitate the invasion of *Salmonella*. Multiple joints involvement of septic arthritis associated with pancytopenia should highlight the possibility of underlying hematologic disorders.

References

Salmonella septic arthritis in leukemia


