Salmonella Osteomyelitis of the Femoral Diaphysis in a Healthy Individual

Byoung-Kook Kim, MD, Jinmyoung Dan, MD, Yun-Seok Lee, MD, Seung-Hee Kim, MD, and Yoon-Sik Cha, MD

Abstract

In reviewing the literature, we found few cases of *Salmonella* osteomyelitis of the femoral diaphysis in a healthy patient. Most are typically associated with sickle cell anemia or immunosuppressed patients. We report on the successful treatment of *Salmonella* osteomyelitis in the mid-diaphyseal region of the femur caused by *Salmonella* species in a healthy individual.

Osteomyelitis is an inflammation of the bone caused by infecting organisms. Among them, *Salmonella* is a rare cause of osteomyelitis.[1,2]

In the literature, *Salmonella* osteomyelitis is commonly associated with hemoglobinopathies, such as sickle cell anemia. It is also found in patients with other medical diseases, such as diabetes, liver disease, alcoholism, malignancy, previous surgery or trauma, and those at extremes of age; it has been seen more frequently in children than in the elderly.[3-6] There are very few case reports of *Salmonella* osteomyelitis in an otherwise healthy individual.[6-8]

The following case is a bacteriologically proven *Salmonella* osteomyelitis on the femur shaft in a patient without history of hemoglobinopathy or other medical diseases. The patient provided written informed consent for print and electronic publication of this case report.

Case Report

A 48-year-old healthy man was admitted to our hospital with significant pain and swelling in the right thigh of insidious onset and 3 months' duration. There was no history of trauma or osteomyelitis in his thigh.

The patient did not have signs of fever in the emergency room, but he had a history of febrile illness of 1-month duration and unknown origin. He had no recent or remote history of diarrhea or abdominal pain. On physical examination, we observed swelling over the lateral aspect of the right thigh with fluctuation and tenderness. The overlying skin was normal, and no discharge was found. The range of hip motion was full passively, but the patient felt pain in the terminal phase of the hip flexion.

Radiographs of the right femur and a computed tomography scan showed a 4.2 × 0.8-cm osteolytic lesion with a demarcated sclerotic change and diaphyseal erosion, as well as periosteal reaction in the diaphyseal area of the right femur (**Figures 1 and 2**). A magnetic resonance image showed signal alteration

Figure 1. (A) Anteroposterior and (B) lateral radiographs of the right femur show osteolytic lesion with a demarcated sclerotic change and diaphyseal erosion as well as periosteal reaction.

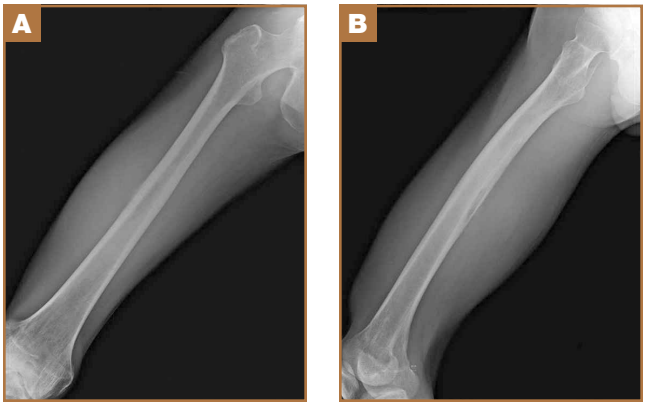
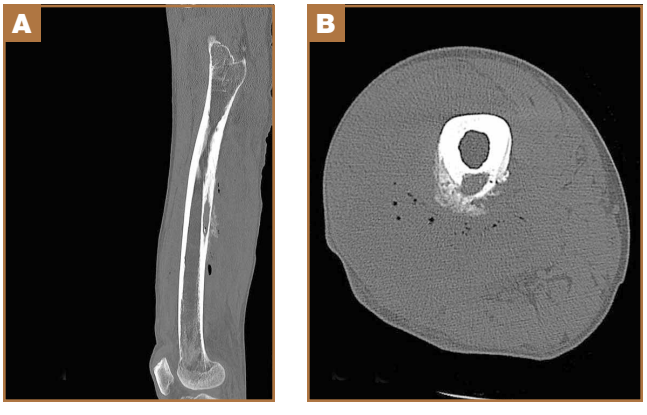


Figure 2. (A) Sagittal and (B) axial computed tomography views of the right femur show osteolytic lesion with demarcated sclerotic changes.



Authors' Disclosure Statement: The authors report no actual or potential conflict of interest in relation to this article.

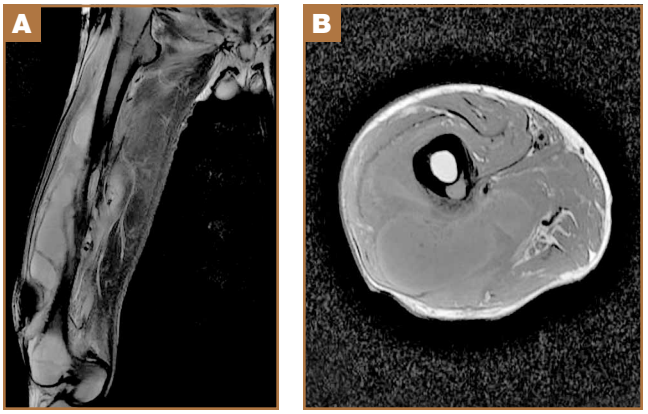


Figure 3. (A) Sagittal and (B) axial magnetic resonance imaging of the right thigh show signal alteration with destruction of posterior cortex in the mid-diaphysis of right femur and abscess formation in surrounding muscle group on T2 images.

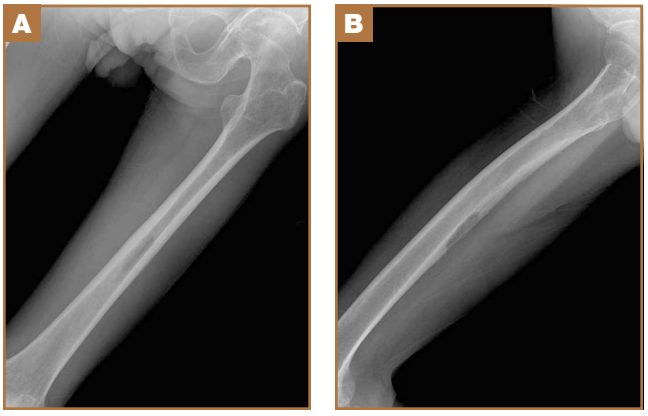


Figure 4. (A) Anteroposterior and (B) lateral radiographs of the right femur at 6-month follow-up show that previous osteolytic lesion with a demarcated sclerotic change and diaphyseal erosion, as well as the periosteal reaction, has healed.

with destruction of the posterior cortex in the mid-diaphyseal region of right femur and abscess formation in the surrounding muscle group on T2-weighted images (**Figure 3**). Personal and family medical histories were negative for hemoglobinopathy or other medical illness.

Extensive immunological work-up ruled out sickle cell disease, connective tissue disorders, and human immunodeficiency virus (HIV). Laboratory findings showed that the patient had leucocytosis and elevated inflammatory titer: white blood cell count, 15.5 × 10^9/L (normal range, 3.4-9.7 × 10^9/L); erythrocyte sedimentation rate, 66 mm/h (normal range, < 20 mm/h); and C-reactive protein, 13.93 mg/dL (normal range, < 0.3 mg/dL). At this time, we had not considered the possibility of *Salmonella* infection and did not perform a Widal test. However, after 3 days of incubation, blood cultures showed a *Salmonella* species.

Because of the patient's huge abscess and sequestrum by osteomyelitis in the right femur, he underwent exploratory surgery and decompression of the right thigh. More than 100 mL of pus were drained through a lateral incision. After curettage of the posterior cortex and the creation of a cortical window, purulent material was drained from the medullar cavity, and we sent specimens of osseous material for culture and sensitivity testing. The causative organism obtained during surgery was identified as one of a *Salmonella* species in microbiologic culture; this was the same organism as seen in the blood cultures, but not *Salmonella typhi*.

The organism was susceptible to quinolones. The patient was given intravenous ciprofloxacin 400 mg twice daily for 3 weeks, followed by 3 weeks of oral ciprofloxacin 400 mg twice daily.

Six weeks after surgery, the white blood cell count, erythrocyte sedimentation rate, and C-reactive protein were normal. Six months after curettage, plain radiographs showed that the osteolytic lesion with a demarcated sclerotic change and diaphyseal erosion and the periosteal reaction had healed (**Figure 4**). One year after surgery, the patient was able to walk with full range of motion of the right hip and knee, and there were normal local findings in the cicatrix area.

Discussion

Salmonella species usually cause gastroenteritis and enteric fever, but various tissues, including bones, may be involved.[2] *Salmonella* osteomyelitis is a rare condition, accounting for 0.8% of all *Salmonella* infections and only 0.45% of all types of osteomyelitis.[9] Most commonly, this infection spreads hematogenously, and the most frequent site of *Salmonella* osteomyelitis is the diaphysis of long bones, such as the femur and humerus.[10] Other bones commonly involved are the tibia, radius, lumbar vertebrae, and ulna.[10,11]

The association of *Salmonella* osteomyelitis with sickle cell anemia and other hemoglobinopathies is well recognized.[2] Further, it is commonly associated with other medical diseases, such as malignancy, liver disease, alcoholism, and diabetes; advanced or very young age; and surgery or trauma.[3-5] The incidence of *Salmonella* osteomyelitis in otherwise healthy individuals is much lower, and only a few cases have been reported.[7,8] Arora and colleagues[8] have reported a case of *Salmonella* osteomyelitis in an otherwise healthy adult man treated with antibiotics.

The duration of symptoms can range from a few months to several years,[12] and multifocal involvement occurs in 15% of reported cases of *Salmonella* osteomyelitis.[9] The symptoms of *Salmonella* osteomyelitis are pain and variable swelling of the affected limb; high temperatures are rarely noted.[2,3] The erythrocyte sedimentation rate is usually elevated, and the blood culture is reported as positive in 71% of patients.[13] Radiographs typically show diaphyseal erosion and sclerosis with destruction of the bone, with or without sequestrum formation. Periosteal reaction may or may not be present.

Salmonella osteomyelitis has been treated conventionally by surgical débridement combined with antibiotics.[4] Lawrie[13] reported treating a chronic *Salmonella* osteomyelitis of the femur with surgical débridement and antibiotic therapy. Bettin and

colleagues[14] reported treating a chronic osteomyelitis of the humerus with corticotomy and insertion of gentamicin beads.

Conclusion

Physicians should consider the possibility of *Salmonella* osteomyelitis in patients who have a history of prolonged continuous fever of a few weeks' duration, even though the patient may not have any underlying diseases. We recommend a treatment regimen of surgical débridement with antibiotic therapy, administered intravenously and orally for 4 to 6 weeks or more, as clinically indicated.

Dr. Byoung-Kook Kim is Professor, Dr. Dan is Associate Professor, Dr. Lee and Dr. Seung-Hee Kim are Assistant Professors, and Dr. Cha is Resident, Department of Orthopedic Surgery, Gumi CHA Hospital, College of Medicine, CHA Medical University, Gumi-si, Kyeongsangbuk-do, Korea.

Address correspondence to: Jinmyoung Dan, MD, Department of Orthopedic Surgery, Gumi CHA Hospital, College of Medicine, CHA Medical University, Sinsi-ro 10 Gil 12, Gumi-si, Kyeongsangbuk-do, Korea 730-040 (tel, 82-54-450-9700; fax, 82-54-450-5098; e-mail, osjmdan@gmail.com).

Am J Orthop. 2014;43(10):E237-E239.

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