Osteomyelitis of the spine due to *Salmonella* infection — conservative treatment with quinolone: a case report

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Although osteomyelitis due to *Salmonella* infection is known to be associated with sickle cell anemia, various hemoglobinopathies and immune suppressive states, it may also occur in normal hosts. A 16-year-old Chinese boy without sickle cell disease or any other condition that would compromise the immune system had osteomyelitis of the lumbar spine caused by *Salmonella enteritidis*. The condition was treated conservatively with ciprofloxacin (quinolone group). This may be the first reported case in which a patient with spinal osteomyelitis due to *Salmonella* infection, who was otherwise healthy, was successfully treated nonoperatively with quinolone.

Même si l'on sait que l'ostéomyélite causée par une infection à la *Salmonella* est liée à la drépanocytose, à diverses hémoglobinopathies et immunosuppressions, elle peut aussi se produire chez des hôtes normaux. Un jeune Chinois de 16 ans sans drépanocytose ni autre infection qui compromettrait son système immunitaire a été atteint d'ostéomyélite de la colonne lombaire causée par la *Salmonella enteritidis*. On a traité le problème de façon conservatrice en lui administrant de la ciprofloxacine (groupe des quinolones). C'est peut-être le premier cas signalé où un patient atteint d'ostéomyélite spinale causée par une infection à la *Salmonella*, qui était autrement en bonne santé, a été traité avec succès au moyen d'une quinolone sans subir d'intervention chirurgicale.

Osteomyelitis caused by *Salmonella* infection is rare. Although it is known to be associated with sickle cell anemia, various hemoglobinopathies and immunosuppressive states,[1,2] it may also occur in normal hosts.[3–5] We report the case of a 16-year-old boy who had spinal osteomyelitis due to *Salmonella*. His condition was successfully treated conservatively with quinolone.

Case report

A 16-year-old Chinese boy, weighing 48 kg, presented with a 6-month history of insidious onset of low back pain and gradual tilting of the back. He was born in Hong Kong and had no history of foreign travel. He had no associated fever, chills, rigor or night sweats, and he denied any gastrointestinal symptoms. Examination revealed mild scoliosis of the lumbar spine, with maximal tenderness over the lower lumbar area. The scoliosis disappeared when he bent forward. He had no neurologic deficit in the lower limbs.

The leukocyte count was normal, but the erythrocyte sedimentation rate was raised (40 mm/h). Radiographs of the lumbar spine showed loss of the L4–5 disc space, with blurring of the end plates and sclerosis of the L4 and L5 vertebral bodies (Fig. 1). Computed tomography (CT) showed that the L4–5 disc space was almost completely obliterated. There was destruction of adjacent L4 and L5 vertebral bodies with a small adjacent paravertebral mass, and the mass appeared separate from the psoas muscles on both sides (Fig. 2). Tuberculous infection was the most likely diagnosis in our locality, so antituberculous drugs were started after a biopsy specimen was obtained under CT guid-

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ance. The biopsy specimen showed granulation tissue with foreign-body giant cell reaction. Culture of material from the specimen grew *S. enteritidis.*

The antituberculous drugs were stopped, and ciprofloxacin (quinolone group), 250 mg every 12 hours intravenously, was started. Subsequent investigations showed that there was no hematologic and serologic evidence of immunosuppression. Hemoglobin electrophoresis was normal. The agglutinin titres for *Salmonella* were elevated. Stool cultures were negative for *Salmonella* spp. Intravenous administration of ciprofloxacin was continued for 4 weeks. Then ciprofloxacin, 500 mg orally every 12 hours, was prescribed for another 8 weeks. The boy wore a knight brace and was not confined to bed during the course of treatment.

Clinically there was progressive improvement. The low back pain had largely subsided by the 4th week of treatment. The erythrocyte sedimentation rate dropped to 5 mm/h at 5 weeks after the start of treatment. Radiographs of the lumbar spine at 3 months showed fusion of the L4 and L5 vertebral bodies although there was a mild increase in the degree of collapse (Fig. 3). Repeat CT demonstrated that the paravertebral mass had disappeared (Fig. 4). There was no recurrence of the symptoms after 2 years of follow-up. The erythrocyte sedimentation rate remained low, and the radiographs of the lumbar spine showed solid fusion of the L4 and L5 vertebral bodies.

Discussion

Salmonella osteomyelitis is rare, occurring in only 0.5% of all cases of osteomyelitis.[6] However, in patients with sickle cell disease, over 70% of cases of osteomyelitis are due to *Salmonella*.[7] Another distinct difference between these 2 groups is that in the majority of patients with sickle cell disease, osteomyelitis due to *Salmonella* infection involves multiple sites whereas in those without compromise of the immune system involvement is usually unifocal.[8] *Salmonella typhimurium* and *S. enteritidis* are the common serotypes involved when the infection is in bone.[6] *Salmonella* osteomyelitis occurs by hematogenous spread after an episode of bacteremia. In some cases, a history of infection with *Salmonella* is recalled or suspected. However, our patient had no such history.[6]

Salmonella osteomyelitis of the spine is rarer than infection at other sites. In a series of 37 patients with *Salmonella* osteomyelitis over 15 years, only 4 had spinal involvment, and only 1 of these had an underlying disease.

Surgical débridement with prolonged administration of antibiotics is the treatment of choice in *Salmonella* osteomyelitis,[3,4,9] although in Nigeria some patients have been treated successfully without hospital admission.[8] Although conservative treatment with antibiotic was chosen in our patient, this does not imply that antibiotic therapy alone, without surgical débridement, should be the standard treatment. Our patient had no systemic signs and symptoms. The amount of soft-tissue swelling on the CT scan was small. Close monitoring of the patient's symptoms and signs with repeated checking of the erythrocyte sedimentation rate and radiography are necessary. In the event of deterioration, conservative treatment should be abandoned for operative intervention.

Although in-vitro sensitivity to other antibiotics has been shown, we chose ciprofloxacin, which belongs to the quinolone group. It has a low minimal inhibitory concentration and minimal bactericidal concentration for *Salmonella* spp.[10] It has also been shown to be effective in the treatment of acute and chronic osteomyelitis caused by gram-negative bacilli.[11,12] It is well absorbed orally and appears to be well tolerated. The bone concentration is good even when ciprofloxacin is taken orally.[13] We chose the intravenous

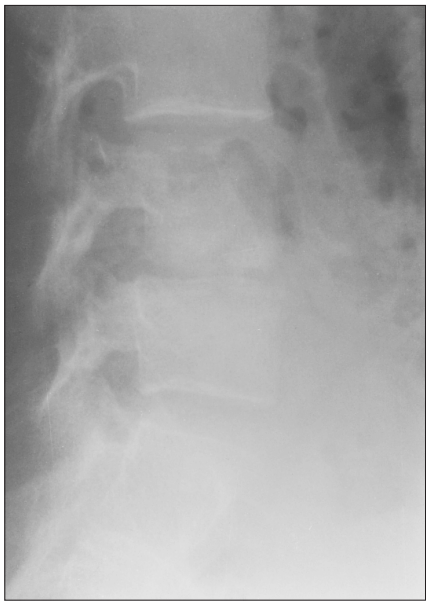

FIG. 1. Lateral radiograph of the lumbar spine showing loss of L4–5 disc space, with blurring of the end plates and sclerosis of the L4 and L5 vertebral bodies.

FIG. 2. Computed tomography (CT) scan at the L4 level showing destruction of the vertebral body, and a small paravertebral mass.

route of administration for the first 4 weeks of treatment because we thought it would give a higher chance of success even without surgical débridement. This might not have been necessary, because oral ciprofloxacin has been reported to give a good clinical result in the treatment of osteomyelitis.[11–13] Intravenous ciprofloxacin is also much more expensive to administer than the oral form. We chose a smaller dosage since our patient was of a small build, weighing only 48 kg.

Quinolones are not without side effects. Animal studies have shown that quinolones can produce cartilage erosions in young animals. Quinolones are not recommended for use in children and pregnant women. The potential of this toxicity in children needs further evaluation.[5] Our patient, although only 16 years old, had not grown for 2 years and was skeletally mature. He did not suffer from any of the other known adverse reactions, which include gastrointestinal symptoms, central nervous system symptoms and dermatologic reactions.

Quinolone (ofloxacin) in combination with ampicillin and débridement has been reported to be successful in treatment of a case of *Salmonella* osteomyelitis of the tibia.[9] Our case may be the first one reported in which spinal osteomyelitis due to *Salmonella* infection was managed successfully by a course of ciprofloxacin alone.

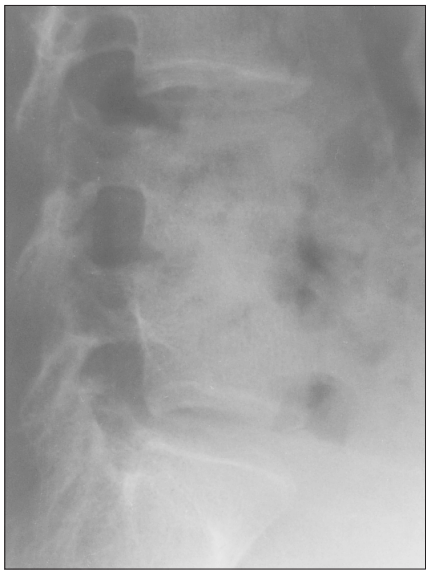

FIG. 3. Lateral radiograph of the lumbar spine showing fusion of L4 and L5 vertebral bodies at 3 months.

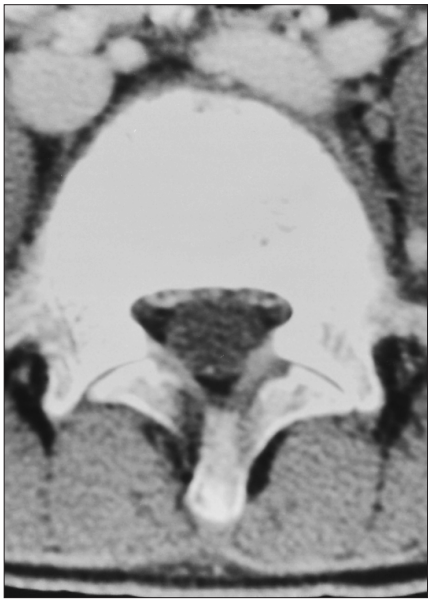

FIG. 4. CT scan at the L4 level showing disappearance of the paravertebral mass at 3 months.

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