CASE REPORT

Bug on the back: vertebral osteomyelitis secondary to fluoroquinolone resistant *Salmonella typhi* in an immunocompetent patientPragya Shrestha,¹ Sachin Mohan,¹ Satyaajeet Roy²

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SUMMARY

Although *Salmonella* osteomyelitis is commonly seen in immunocompromised patients, it may occasionally affect an immunocompetent host. Symptoms are usually non-specific, such as fever, abdominal or back pain; hence it should be considered in the differential diagnosis of patients with a history of travel to endemic regions. Fluoroquinolone resistance is rising and non-responsive patients should be treated with ampicillin, trimethoprim-sulfamethoxazole and ceftriaxone. We present a case of acute T8-T11 osteomyelitis with cord compression caused by a fluoroquinolone resistant strain of *Salmonella typhi*.

BACKGROUND

Salmonella osteomyelitis in an immunocompetent patient accounts for 0.45% of all bone infections.¹ Although a rare possibility that might be easily missed, this should be considered in the differential diagnosis of patients residing in or who have travelled to an endemic area, who present with non-specific symptoms such as fever, abdominal pain or other gastrointestinal symptoms and backache.² Until now, no definite consensus is in place for the treatment of *Salmonella* osteomyelitis and the treatment regimen usually depends on local drug sensitivity and resistance.³ We present a case report of acute vertebral osteomyelitis secondary to fluoroquinolone resistant *Salmonella typhi* with features of cord compression in an immunocompetent patient.

CASE PRESENTATION

A 62-year-old Asian man presented to the outpatient office due to intermittent fever with increased sensitivity over the left upper quadrant of the abdominal wall for 1 month. He also reported of fatigue, loss of appetite and unintentional weight loss of about 3.6 kg over the same time period. Careful history-taking revealed that the patient had recently travelled to India for a duration of 4 weeks, during which he had an episode of self-limiting diarrhoea, with intermittent dull aching abdominal pain lasting for 3–4 days. At the time of presentation, the patient had a temperature of 37.3°C, blood pressure 122/68 mm Hg and heart rate 58 bpm. On physical examination, there was mild tenderness to deep palpation of the left upper quadrant with no guarding or rebound tenderness. No pallor or icterus was noted.

INVESTIGATIONS

Laboratory tests revealed a white cell count of 4200/hpf, platelets 168 000/mm³ and haemoglobin 11.8 g/dL. Urinalysis and liver function tests were within normal limits. Ultrasound and CT scan of the abdomen and pelvis did not reveal any acute abnormalities. CT scan of the chest was performed subsequently, which revealed T8-T11 osteomyelitis with paravertebral extension, and moderate cord compression (figure 1A, B). MRI could not be performed due to presence of metal hardware for a left ankle fracture. A tuberculin skin test was negative. A stool test was positive for *S. typhi* infection.

DIFFERENTIAL DIAGNOSIS

Abdominal pathologies were ruled out due to negative imaging. Metastatic disease was thought to be unlikely with a subacute course and imaging not revealing any other mass lesions. Traumatic injury of the spine was unlikely with no history of trauma or osteoporotic risk. A diagnosis of Pott's disease (vertebral osteomyelitis) was considered in the differential, however, it was ruled out with a negative tuberculin skin test.

TREATMENT

The patient was admitted to the hospital and started empirically on intravenous levofloxacin for possible *Salmonella* osteomyelitis. A vertebral bone biopsy and spinal abscess drainage were performed on day 3. Culture and sensitivity results showed *S. typhi* resistant to levofloxacin, and antibiotics were switched to intravenous ceftriaxone and ampicillin. The patient's erythrocyte sedimentation rate and C reactive protein levels settled down to normal range after 14 days of therapy. On day 16 of admission, he underwent laminectomy and spinal fusion (figure 1C, D). The postoperative period was unremarkable and the patient received a total of 6 weeks of intravenous antibiotics with favourable response to treatment.

OUTCOME AND FOLLOW-UP

The patient could resume all of his activities of daily living at 12-week follow-up.

DISCUSSION

Salmonellae are motile, Gram-negative, rod-shaped enterobacteria that cause a broad spectrum of illnesses such as typhoid fever, paratyphoid fever and food-borne illness. Humans are very specific hosts for these bacteria and their usual mode of spread is

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Figure 1 CT scan showing (A) osteomyelitis/discitis at T10/T11 with adjacent localised pachymeningitis; (B) anterior epidural abscess at T10/T11 resulting in mild cord compression with prevertebral/paravertebral phlegmonous changes (highlighted by white arrows); (C and D) postoperative images showing resolution of the abscess after drainage with transperpendicular screws at T8, T9 and T11 (highlighted by black arrows).

contact with a chronic carrier or with contaminated food or water. Extraintestinal dissemination is widely seen, but spinal involvement occurs in only 0.8% of *Salmonella* infections by either haematogenous or contiguous spread. It is usually seen in patients with sickle cell disease, pre-existing bone disease, such as prior bone fractures, and haemoglobinopathies.² Few reported cases can be found in the literature owing to the fact that it is not a reportable disease and is often underdiagnosed.⁴ Ortiz-Neu *et al* reviewed 37 cases of *Salmonella* osteomyelitis and found only eight patients with no underlying medical condition leading to a possible immunocompromised state.⁵

Salmonella typhimurium and *Salmonella enteritidis* are the most commonly implicated strains causing osteomyelitis.⁶ However, osteomyelitis secondary to *S. typhi* infection has been rarely reported. The incidence of *S. typhi* and *S. paratyphi* varies substantially, with a high incidence (greater than 100 cases per 100 000 per year) in south-central Asia and south-east Asia, medium incidence (10–100 cases per 100 000 per year) in Africa, Latin America, the Caribbean, the rest of Asia, and Oceania; and low incidence (less than 10 cases per 100 000 per year) in Europe, Australia, New Zealand and North America.⁷ Symptoms may be non-specific, the most common symptoms reported being neck or back pain (92%), fever (87%), diarrhoea

(16%), abdominal pain (8%) and neurological deficit (8%).⁴ It can affect any bone but the usual sites of infection are long bones (diaphyseal region) such as femur and humerus. Other important sites are lumbar vertebra, radius, ulna, tibia and, occasionally, ribs and sternum. In our case, the patient most likely had enteric fever followed by haematogenous spread involving the thoracic vertebra. However, spinal involvement may occur without active form of disease in the gastrointestinal tract and may present months or even years later.² The most common vertebral levels affected are lumbar (50%) followed by thoracic (20%). Our patient did not have any medical condition pertaining to an immunocompromised state, and his disease only involved a single site, the thoracic vertebra. In contrast, it is important to note that immunocompromised patients usually have involvement of multiple sites.⁶

Laboratory studies may reveal anaemia and leucocytosis or leucopenia, along with raised erythrocyte sedimentation rate, but are non-specific. Serology for *Salmonella* and culture of blood, urine, stool or bone marrow is helpful. Imaging with CT scan or MRI showing destruction of the bone with erosion of diaphysis may aid in localising the lesion and strengthening the diagnosis. However, definitive diagnosis relies on needle or open biopsy and aspirate of adjacent fluid collection.⁴

In the preantibiotic era, only about 25% of patients survived vertebral osteomyelitis.² Mortality has changed drastically with the use of early antibiotics. Until now, fluoroquinolones have been considered the drug of choice for the treatment of enteric fever. However, resistance to this class of antibiotic, especially with *S. typhi* and *S. paratyphi*, in south-east Asia, the Middle East and Africa, has become a serious matter of concern.^{8 9} Ampicillin, trimethoprim-sulfamethoxazole and third generation cephalosporins, can be used for resistant cases, in children and in those who cannot tolerate

fluoroquinolones.⁴ Hence, it is imperative to assess drug sensitivity and adjust the treatment regimen accordingly.⁹ Surgical debridement may be necessary for cases with abscess formation, as in our case.

Contributors PS conceived, designed and wrote the initial manuscript. SM and SR provided intellectual input and revised the final manuscript. PS is the overall guarantor for the final manuscript.

Competing interests None declared.

Patient consent Obtained.

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Learning points

- ▶ *Salmonella* infection can pose a significant personal and public health risk; hence, early identification and proper management should be carried out in order to avoid possible chronic infection and transmission.
- ▶ Aggressive surgical procedures may be required in cases with spinal abscess and cord compression, as in our case.
- ▶ All patients with a history of travel to endemic regions should be kept under high suspicion for the disease, as symptoms such as fever, gastrointestinal symptoms and backache, may be non-specific.
- ▶ Fluoroquinolone resistance should be kept in mind for non-responsive patients and alternative treatment with ampicillin, trimethoprim-sulfamethoxazole and ceftriaxone must be started.

REFERENCES

- 1 Ayeni I V, Calver G. Ciprofloxacin resistant osteomyelitis following typhoid fever. *BMJ Case Rep*. 2012;2012:pil: bcr0320126107.
- 2 Khan FY, El-Hiday AH, Kamel HA. Typhoid osteomyelitis of the lumbar spine. *Hong Kong Med J* 2006;12:391–3.
- 3 Banky JP, Ostergaard L, Spelman D. Chronic relapsing salmonella osteomyelitis in an immunocompetent patient: case report and literature review. *J Infect* 2002;44:44–7.
- 4 Santos EM, Sapico FL. Vertebral osteomyelitis due to salmonellae: report of two cases and review. *Clin Infect Dis* 1998;27:287–95.
- 5 Ortiz-Neu C, Marr JS, Cherubin CE, et al. Bone and joint infections due to *Salmonella*. *J Infect Dis* 1978;138:850–8.
- 6 Tsui HF, Chiu KH, Leung KS. Osteomyelitis of the spine due to *Salmonella* infection—conservative treatment with quinolone: a case report. *Can J Surg J Can Chir* 1997;40:48–50.
- 7 Sánchez-Vargas FM, Abu-El-Hajja MA, Gómez-Duarte OG. *Salmonella* infections: an update on epidemiology, management, and prevention. *Travel Med Infect Dis* 2011;9:263–77.
- 8 Slinger R, Desjardins M, McCarthy AE, et al. Suboptimal clinical response to ciprofloxacin in patients with enteric fever due to *Salmonella* spp. with reduced fluoroquinolone susceptibility: a case series. *BMC Infect Dis* 2004;4:36.
- 9 Abdullah SH, Ata OA, El-Adwan N. Thoracic spinal epidural abscess caused by *Salmonella typhi*. *Neurol Med Chir (Tokyo)* 2008;48:140–2.

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