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Case Report

Spondylodiscitis due to *Salmonella Typhi*: a series of four cases

Kavitha Saravu[1,2], Shyamasunder N Bhat[3] and Nitin Gupta[1,2,*]

[1]Department of Infectious Diseases, Kasturba Medical College Manipal, Manipal Academy of Higher Education, Manipal, Karnataka, India
[2]Manipal Center for Infectious Diseases, Prasanna School of Public Health, Manipal Academy of Higher Education, Manipal, Karnataka, India
[3]Department of Orthopaedics, Kasturba Medical College Manipal, Manipal Academy of Higher Education, Manipal, Karnataka, India

*Correspondence address. Department of Infectious Diseases, Kasturba Medical College, Manipal Academy of Higher Education, Manipal, Karnataka 576104, India. Tel: +91-9868996079; E-mail: nityanitingupta@gmail.com

Abstract

Salmonella Typhi is very rarely associated with focal bone and joint complications. Classically, they are described in patients with risk factors such as haemoglobinopathies. We report four cases of spondylodiscitis, where the aetiology was found to be *Salmonella Typhi*. All four cases were treated successfully with variable duration of ceftriaxone followed by cotrimoxazole. We report these cases to highlight the importance of obtaining a microbiological diagnosis and the possibility of a rare infection in endemic settings.

INTRODUCTION

Salmonella enterica serotype Typhi (*S.* Typhi) causes a syndrome of fever and gastrointestinal symptoms called enteric fever [1]. Since the transmission occurs by ingesting contaminated food, the disease is predominantly reported in developing countries where overcrowding and poor sanitation are common [1]. Vertebral osteomyelitis is an extremely rare extraintestinal complication of enteric fever [2]. In tropical settings, the common cause of vertebral osteomyelitis includes tuberculosis, brucellosis and pyogenic organisms like *Staphylococcus* spp., *Streptococcus* spp. and *Pseudomonas* spp. [3]. Classically, the cases have been described in immunosuppressed individuals or individuals with haemoglobinopathies, but recent reports have described the possibility of occurrence in immunocompetent adults. In those patients with Salmonella osteomyelitis, long bones and vertebra can be involved. We describe four rare cases of spondylodiscitis due to *S.* Typhi.

CASE SERIES

The first case was a young male who presented with low back pain and a history of intermittent fever (Table 1). Magnetic resonance imaging (MRI) showed spondylodiscitis at the L2–L3 level (Fig. 1A). He was diagnosed with *S.* Typhi spondylodiscitis based on the culture of the biopsy of the affected spine and the positive Widal test ($T_O = 1{:}160$ and $T_H = 1{:}640$). The patients responded clinically to the treatment, and the repeat Widal titres after completion of treatment were negative. A repeat MRI done showed significant improvement. The patient was doing well on follow-up after 1 year of discharge (Table 2).

The second case was a young female who presented with low back pain, a history of intermittent fever and a history of tingling and numbness in the left lower limb (Table 1). MRI done outside showed L5-S1 spondylodiscitis with paravertebral abscess (Fig. 1B). Based on her radiological findings, she was started on anti-tubercular therapy (ATT) but did not show any improvement and was referred to our hospital. She was diagnosed with *S.* Typhi spondylodiscitis based on a positive culture of the intraoperative specimen. She responded clinically and radiologically to the treatment and was doing well on follow-up after 6 months of discharge (Table 2).

The third case was a middle-aged immunocompetent female who presented with low back pains and a history of intermittent fever (Table 1). MRI done in an outside hospital showed D10-D11 spondylodiscitis. She was started on ATT but did not show any improvement and was referred to our hospital. The aerobic culture of the intraoperative biopsy was positive for *S.* Typhi. A postoperative X-ray done at our hospital is shown in Fig. 1C. The patient responded to the antibiotics and was doing

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Table 1. Clinical and radiological findings of cases diagnosed with *Salmonella Typhi* osteomyelitis

	A/G	ISP	LBA	Spine	Power in LL	Sensory LL	Plantar	Psoas abscess	Nv root compression	Spinal canal narrowing
1	20/M	Nil	2 m	L2–L3	Normal	ND	Flexor	Right	Present	Absent
2	13/F	Nil	1.5 m	L5-S1	Normal	Tingling, numbness in left side	Flexor	b/l	Present	Present
3	42/F	Nil	4 m	D10–11	Normal	ND	Extensor	Absent	Absent	Absent
4	51/M	DM	1.5 m	D8–D9	Decreased	ND	Extensor	b/l	Present	Present

A/G, age (years); G, gender; M, male; F, female; DM, diabetes mellitus; ISP, immunosuppression; LBA, low backache (duration); SLR, straight leg raising test (in degrees); Nv, nerve; y, years; ND, no deficits; Lt, left; Rt, right; b/l, bilateral; SI, sacroiliac joint; LL, lower limbs.

Table 2. Treatment and follow-up of patients diagnosed with *Salmonella Typhi* osteomyelitis

	Medical treatment	F/U duration	Clinical improvement at F/u	Radiological improvement at F/U	Baseline ESR	ESR at F/U	Baseline CRP	CRP at F/U
1	Ctx (3w) f/b tmp-smx (12w)	12 m	Present	Present on MRI	36	6	120.7	7.5
2	Ctx (2w) f/b tmp-smx (6w)	6 m	Present	Present on MRI	73	14	19.3	0.94
3	Ctx (3w) f/b tmp-smx (9w)	6 m	Present	Present on MRI	20	9	4.3	0.84
4	Ctx (2w) f/b tmp-smx (6w)	5 m	Present	Present on X-ray	19	8	96.4	0.67

ctx, ceftriaxone; f/b, followed by; tmp-smx, cotrimoxazole; w, weeks; m, months; y, years; b/l, bilateral; ESR, erythrocyte sedimentation rate (mm/hour); CRP, C-reactive protein (mg/l); F/U, follow-up.

well on follow-up after 6 months of discharge (Table 2). Repeat MRI showed significant improvement.

The fourth case was a middle-aged diabetic male who presented with low back pain, bilateral lower limb weakness and a history of intermittent fever and loose stools (Table 1). MRI spine showed D8–D9 spondylodiscitis (Fig. 1D). Based on the microbiology and histopathology of the biopsy specimen, the patient was diagnosed with S. Typhi spondylodiscitis. The patient was treated with antibiotics and did well on follow-up after 5 months of discharge (Table 2). An X-ray done at follow-up showed significant improvement as well.

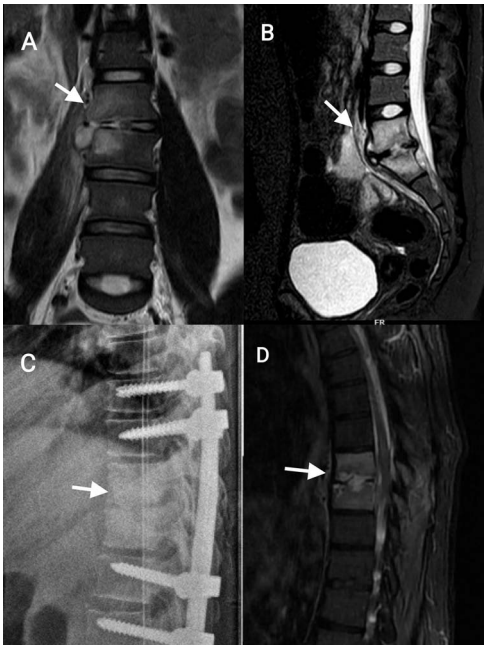

Figure 1. (**A**) Coronal short tau inversion recovery (STIR) sequence on MRI shows spondylodiscitis at L2–L3 level. (**B**) Sagittal STIR spondylodiscitis sequence on MRI shows at L5-S1 level along with a paravertebral abscess. (**C**) Lateral X-ray of the spine shows spondylodiscitis at D10–D11 level with screws in the vertebra above and below. (**D**) Sagittal STIR spondylodiscitis sequence on MRI shows at D8-D9 level.

DISCUSSION

Bone involvement due to *Salmonella* spp. was first described in patients with sickle cell anaemia [4]. Other common risk factors include lymphoma, diabetes mellitus, systemic lupus erythematosus, steroids, trauma, surgery and extremes of ages [5]. In a recent systematic review, cases in individuals without any apparent risk factors have been described as well [2]. Except for the fourth patient who was diabetic, the other three patients had no history of immunosuppression. None of the patients had any history of trauma or intestinal perforation. Complete blood count was normal and peripheral smear did not suggest any morphological forms suggestive of haemoglobinopathies.

Most of the osteomyelitis due to *Salmonella* spp. has been due to non-typhoidal *Salmonella*. Of the 67 cases of *Salmonella* osteomyelitis in a systematic review, only 19 were found to be due to S. Typhi [2]. Cases due to S. Typhi and S. Paratyphi have been reported, mainly from developing countries [6–8]. Like our series, fever is not a consistent finding in patients with *Salmonella* osteomyelitis [6]. The course may be modified further as patients often receive antibiotics or ATT from local physicians before presenting at tertiary care hospitals. The duration of the presentation can vary from several days to months [5–6]. Some authors also hypothesize that the organism after primary infection could lay dormant in the bones and reactivate later [8, 9].

Surgical debridement followed by antibiotics is the treatment of choice [6]. Due to a lack of clinical trials, there is no definite recommendation on the choice of antibiotic and duration of treatment. In the systematic

review by Huang *et al.*, 78% cure rates were noted with a treatment duration of 8–14 weeks [2]. Patients were variously treated with fluoroquinolones, ceftriaxone, chloramphenicol and cotrimoxazole [2]. Fluoroquinolone was not used in our series as all isolates were resistant. As ceftriaxone is the treatment of choice in patients with enteric fever, all patients were initiated on ceftriaxone in our series. In a resource-constrained setting like ours, it is extremely difficult to treat patients with intravenous therapy for long durations. Oral de-escalation therapy has shown to be effective in a previous trial of osteomyelitis [10]. Oral therapy has been shown to be effective for *Salmonella* osteomyelitis in previous reports as well [2]. The patients were therefore de-escalated to oral cotrimoxazole therapy once the patient was stable. Considering the susceptibility, good bone penetration and good oral bioavailability, the patients were shifted to oral cotrimoxazole once their clinical condition was stable. A minimum of 2 months of treatment was given for all patients. All the patients were followed up after 5–12 months and showed significant clinical and radiological resolution. Significant improvement in the erythrocyte sedimentation rate and C-reactive protein was seen in all four patients (Table 2).

We report these four cases of *Salmonella* osteomyelitis to highlight the possibility of a rare infection in tropical settings. These cases also highlight the importance of obtaining a microbiological diagnosis and the perils of empirical antimicrobial therapy.

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None.

CONFLICT OF INTEREST STATEMENT

No conflict of interest.

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None.

CONSENT

Written informed consent was taken separately from all the patients on Oxford University Press consent form.

GUARANTOR

Nitin Gupta.

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