



## Case report

## Lumbar *Salmonella* osteomyelitis with psoas muscle abscess in a patient with prostate cancer



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## ABSTRACT

*Salmonella* osteomyelitis is a rare clinical entity more commonly described in grounds of sickle cell disease however some cases has been described in patients without this pathology but an immunocompromised state, which also predisposes to the development of a psoas abscess.

We present the case of a 77-year-old man with persistent hip pain and recent diagnosis of prostate cancer who developed lumbar osteomyelitis and a secondary psoas abscess due contiguous spread. Treatment included a third-generation cephalosporine and fluoroquinolone without surgical drainage with a good prognosis overall.

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## Introduction

*Salmonella* is a genus of rod-shaped Gram-negative bacteria associated with a variety of infections including gastroenteritis, typhoid fever, bacteremia, and an asymptomatic carrier state [1]. *Salmonella* osteomyelitis is a rare entity more frequently described in patients with sickle cell disease, primarily due the functional asplenia [2,3], but it accounts for 0.45 % of all bone infections in immunocompetent patients where the involvement tends to be unifocal [4]. However, there are only a few reported cases of osteomyelitis due to *Salmonella* in patients without sickle cell disease in the literature, and only a minimal cases related with *Salmonella* abscesses in the psoas [1,5–9].

## Case presentation

A 77-year-old man with previous right-hip arthroplasty two years ago and recent diagnosis of prostate cancer was admitted to the emergency department due to a two-week history of left-sided hip pain and high-grade persistent fever. At time of presentation, the patient had a temperature of 38.2°C, blood pressure of 100/70 mmHg and heart rate of 123 beats per minute. Physical

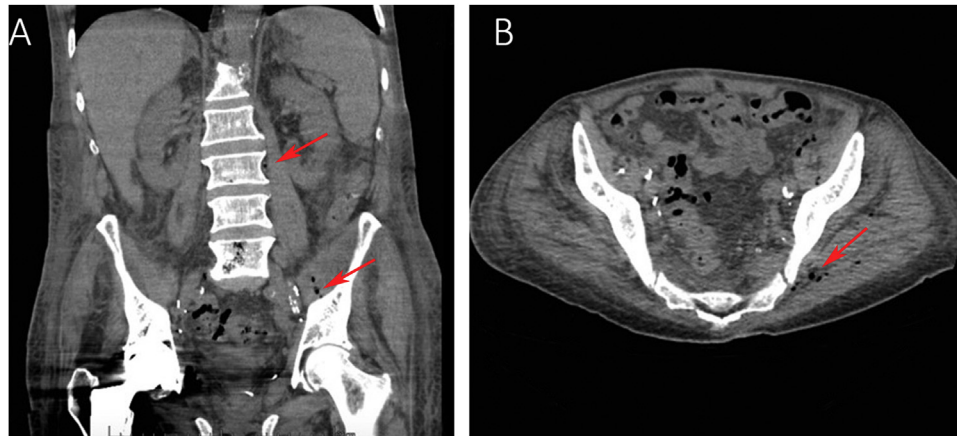
examination only revealed a mild altered mental status and a positive psoas sign (Pain on passive extension of the right thigh).

Further laboratory tests were relevant for normocytic anemia (hemoglobin: 11.9 g/dL. Normal 13.8–17.2 g/dL), thrombocytopenia (platelet count: 14,000/mL. Normal: 140,000–450,000), hyponatremia (Na: 126 mmol/L. Normal: 135–145 mmol/L) and an elevated prostate specific antigen (600 ng/mL. Normal <6.5 ng/mL). Blood cultures were taken from two different sites and empiric treatment with piperacillin-tazobactam (13.5 g per day) was started.

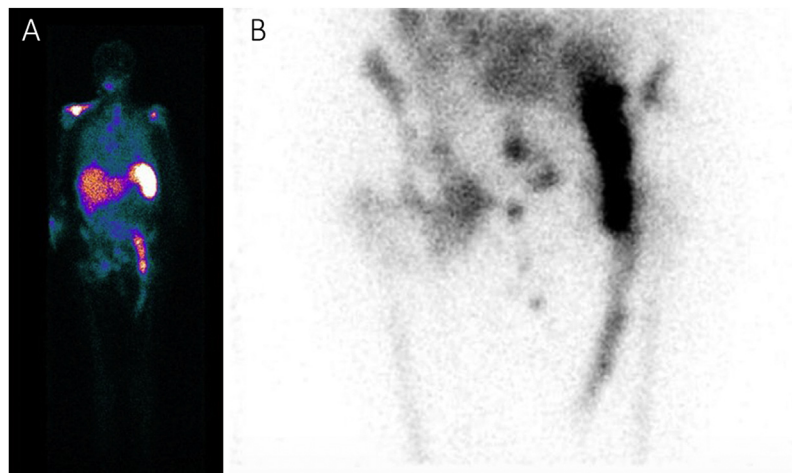
On the third day of admission a computed tomography (CT) of the thorax and pelvis revealed multiple osteolytic lesions in the ribs, right shoulder, right hip, and lumbar vertebrae (L4–L5) suggestive of bone metastases. The CT also showed gas formation in the epidural space at lumbar vertebrae (suggestive of osteomyelitis) with an abscess expanding from the left iliopsoas to the adductor and femoris muscles with inner gas formation (Fig. 1). A further tagged white blood cell scan (WBC scan) confirmed the presence of white blood cell activity in the left iliopsoas muscle (Fig. 2). Due the imaging findings strongly suggestive of a psoas abscess, surgical drainage was advised but it was denied by the patient.

After a 24 h period of incubation at 37 °C from two sets of blood cultures taken on admission and repeated on the third day a smooth, straight-edged, lactose-negative, oxidase-negative colonies were isolated. These colonies were identified as *Salmonella enterica* by VITEK<sup>®</sup> 2 (bioMérieux Inc., Durham, NC, USA)

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**Fig. 1.** Computed tomography with abscess expanding from the left iliopsoas to adductor and femoris muscles.



**Fig. 2.** Anterior view. WBC showing captation in left iliopsoas muscle.

automated microbiology system. The organisms were found to be susceptible to ampicillin (MIC  $\leq 8$ ), ciprofloxacin (MIC  $\leq 0.5$ ), trimethoprim-sulfamethoxazole (MIC  $\leq 2$ ), chloramphenicol (MIC  $\leq 8$ ), ceftazidime (MIC  $\leq 1$ ), and ceftriaxone (MIC  $\leq 1$ ) by the antibiotic susceptibility testing of VITEK<sup>®</sup> 2 (bioMérieux Inc., Durham, NC, USA) automated microbiology system.

Due the antibiotic profile of the isolated pathogen prompt treatment with intravenous ceftriaxone (2 g/day) was started and then switched 10 days later to intravenous levofloxacin (750 mg/day) for three weeks, followed by five weeks of oral levofloxacin (750 mg/day). After completion of the antibiotic regimen the patient achieved complete recovery, without fever nor residual pain. A subsequent CT scan performed eight weeks later confirmed the absence of the psoas abscess. The patient was discharged and followed by the oncologist for the management of his prostate cancer.

## Discussion

*Salmonella enterica* (SE), a major cause of invasive infections worldwide, may be broadly grouped into the typhoidal species, which are further divided in *Typhi* and *Paratyphi* serotypes, and non-typhoidal species, which includes other serotypes [10]. It has been described that the overall incidence rate is 1.02 per 100,000

for all the serotypes bacteremia and 0.21 per 100,000/year for typhoidal serotypes bacteremia and 0.81 per 100,000/year for non-typhoidal disease [10].

Although salmonella clinical spectrum predominantly includes four syndromes: enteric fever, acute gastroenteritis, bacteremia with or without metastatic infection and the asymptomatic carrier state); it is an infrequent cause of osteomyelitis, accounting 0.8 % of all *Salmonella* infections [11]. *Salmonella* osteomyelitis constitutes 0.45 % of all types of osteomyelitis, being *Salmonella typhimurium*, *Salmonella typhi*, and *Salmonella enteritidis* the most common associated strains [12].

*Salmonella* osteomyelitis is more common in patients with sickle cell disease [12] but cases has been described in conditions in which immune function is altered, such as chronic lymphocytic leukemia, collagen disease, malignancy, alcoholism, and acquired immunodeficiency syndrome [13]. In these scenarios, the diaphysis of the long bones, usually the femur and humerus, are the most common sites of infection [14]. In our case, the age of the patient and his active prostate cancer could be the main factors that altered the normal immunity and predispose him to this rare manifestation of *Salmonella* in both the bone and the muscle.

In regard of the Psoas abscess, *Staphylococcus aureus* is the most common bacteria related to this entity, however *Salmonella spp* is a rare causative agent, more commonly described in

immunocompromised patients such as diabetics [14]. Psoas abscesses tends to occur from either hematogenous spread or by local infection of the neighboring organs and/or tissues. In the case presented above the radiographic findings, air in the epidural space, strongly suggest that the osteomyelitis was the primary source and the infection further spread to the neighboring left psoas muscle.

Finally it is worth to mention that despite no current guidelines exists for the management of salmonella osteomyelitis, nor salmonella psoas abscess, several antibiotics regimens has been suggested which included fluoroquinolones [15], ampicillin, trimethoprim/sulfamethoxazole and ceftriaxone [4], with or without surgical drainage [6]. In our case surgical drainage was avoided because of the patient's decision and aggressive antibiotic regimen was started with a combination of third-generation cephalosporine and fluoroquinolone due the described antibiotic susceptibility profile, with a good overall prognosis.

### Declaration of Competing Interest

None.

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