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Case report

Pasteurella multocida vertebral osteomyelitis, myositis and epidural abscess in a diabetic cirrhotic patient

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ABSTRACT

Pasteurella multocida is frequently associated with soft tissue infections related to animal bites or scratches. These infections are usually mild but can lead to serious complications especially in high-risk patients. We present a chronic *Pasteurella. multocida* vertebral osteomyelitis with extensive spondylodiscitis, myositis and epidural abscess in a patient with diabetes and liver cirrhosis. *Pasteurella multocida* should be suspected in bone and soft tissue infections even if the site of infection is distant to the site of the animal bite, scratch or lick, especially in high-risk patients.

Introduction

Pasteurella multocida is a gram-negative bacillus that frequently resides in the upper respiratory tract of many domestic animals, particularly cats and dogs [1,2]. In humans, skin and soft tissues are the most common sites of infection related to *P. multocida*. Other less common types of infections associated with this organism include respiratory tract infections (second most common), central nervous system infections, bacteremia, endocarditis, and intra-abdominal infections such as peritonitis [3–7]. Infections are most commonly associated with cat and dog bites or cat scratches, or by licking of wounds [8,9]. However, infections without any history of animal contact or exposure have been reported as well [10]. Soft tissue infections might lead to serious complications such as arthritis, osteomyelitis, abscess formation, sepsis and meningitis. These complications are frequently described in predisposed hosts including immunocompromised patients (with malignancy, solid organ transplant, autoimmune diseases, HIV/AIDS and elderly), and patients with chronic health conditions such as liver cirrhosis, chronic kidney disease, and chronic obstructive pulmonary disease [3,11–14].

Herein, we report a case of chronic vertebral osteomyelitis secondary to a *P. multocida* infection in a patient with liver cirrhosis. Few cases of *P. multocida* vertebral osteomyelitis distant to the site of injury have been documented in the literature.

Case presentation

A 60-year-old male with a past medical history of hypertension, well controlled type II diabetes mellitus and compensated liver cirrhosis secondary to hepatitis C infection, status post treatment that resulted in sustained virologic response and cure of the disease. He presented with six months of worsening low back pain radiating to his right leg that had increased in intensity over the past week. He denied weakness or numbness in his upper and lower extremities and urinary or bowel incontinence but reported a 30 lb unintentional weight loss over the six months. Two months prior to admission, he reported an increase in the severity of pain and intermittent subjective fevers, chills and night sweats. At that time, his symptoms were attributed to moderate L4-L5 degenerative disease noted on a lumbar spine X-ray (Fig. 1). However, his symptoms persisted, managed with opiates and physical therapy.

The patient denied history of trauma, cigarette smoking, alcohol or intravenous drug use or recent infection. He reported cat scratches on his right hand before the onset of his symptoms, but he did not exhibit any signs of infection of the affected hand.

Vital signs were: temperature, 98.6 F; blood pressure, 157/83 mmHg; heart rate, 87/min; respiratory rate, 16/min. He had

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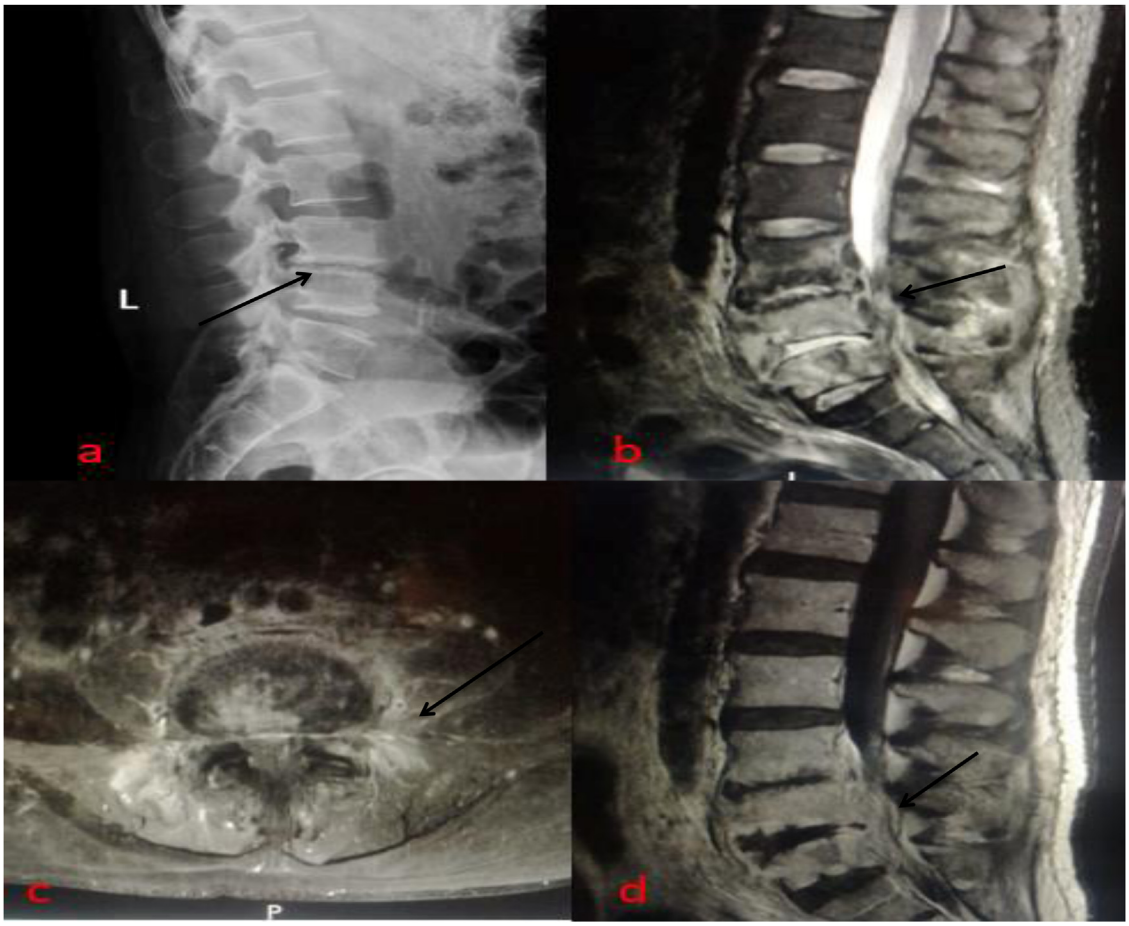

Fig. 1. Moderate L4-L5 degenerative disease seens on Lumbar spine X ray; b, d: MRI (T2 flair and T1 post contrast respectively) of the lumbar spine shows osteomyelitis with extensive endplate and osseous erosions at L4-5 and L5-S1 plus severe constriction of the thecal sac and cauda equine compression at L5-S1 with epidural abscess; c: MRI (T2 axial) shows para-spinous and bilateral psoas myositis.

tenderness over the lumbar spinous processes and para-spinal muscles in the L4-L5 region. There was no skin lesions, erythema or rash. He had no motor or sensory deficits and tendon reflexes were normal. The white blood count was 4700 cells/μL; platelets, 150000/μL, and creatinine and liver function tests were normal. The erythrocyte sedimentation rate (ESR) was > 100 mm/h and C-reactive protein (CRP) was 17.6 mg/dL. Brucella serology, T-spot and HIV tests were negative. Two sets of blood cultures were sterile with normal echocardiography.

Magnetic resonance imaging of the lumbar spine with gadolinium revealed spondylodiscitis with extensive associated endplate and osseous erosions at L4-L5 and L5-S1 with severe constriction of the thecal sac and cauda equine compression at L5-S1, associated with early epidural abscess formation and inflammatory soft tissue infiltrates into the L5-S1 and S1-S2 neural foramen, with paraspinous and bilateral psoas myositis (Fig. 1). Subsequently, a CT guided bone biopsy of the L4-L5 disc with culture yielded gram-negative coco-bacilli identified as *Pasteurella multocida*. Mycobacterial and fungal cultures were negative.

Given the absence of neurologic deficits, neurosurgery recommended a conservative medical management with antibacterial(s) therapy. He initially received a five days of intravenous (IV) antimicrobial(s) consisting of cefepime and vancomycin which were switched to levofloxacin 750 mg orally daily. He was then discharged home on oral antibacterial(s) along with pain medicines. Four weeks later, he presented to the clinic for follow up. He was feeling better, no fever, chills, or sweating, but he remained complaining of back pain that was alleviated with opiates. Repeat ESR showed significant improvement 28 mm/h. Patient had continued levofloxacin for a total of eight weeks with notable amelioration.

Discussion

The majority of the osteomyelitis cases caused by *P. multocida* reported in the literature are secondary to either direct inoculation of the organism at the time of the bite or contiguous spread of the infection from the skin. Osteomyelitis secondary to hematogenous spread is much less common and is usually seen in high-risk patients with comorbidities. Bone and joint infections are divided into 3 different categories: arthritis, osteomyelitis and combined arthritis with osteomyelitis. The knee is the most common involved joint, while the upper extremities bones (mainly the wrist and hand) are frequently involved [15].

Sixty-two cases of osteomyelitis have been reported in the English literature [3,11–14,16–37]. Of these, 50 cases were related to direct inoculation of the organism or by contiguity. The rest were infections at a distant anatomical site [3,11–14,16–19] of which 11 were secondary to bacteremia and the remaining one was caused by contiguous spread form the oropharynx [14]. Only eight cases of *P. multocida* vertebral osteomyelitis have been reported (3, 12–14, 16–18) of which, seven cases were attributed to hematogenous spread (3, 12, 13, 16–18). Six cases reported cervical vertebrae infection but only two cases described lumbar vertebrae involvement (1316).

We report a unique case of chronic *P. multocida* vertebral osteomyelitis that was characterized by extensive multilevel spondylodiscitis, bilateral paraspinal and psoas myositis and early

epidural abscess formation. Paravertebral abscess and myositis secondary to *P. multocida* hematogenous spread have been reported in two cases (13, 16), but no cases have been reported with epidural abscess and extensive multilevel involvement of the lumbar spine. What is also notable about our case is that the patient was not bacteremic on presentation. However, we assume that the pathogenesis of spondylodiscitis was secondary to transient bacteremia shortly after the cat scratch in a patient at risk due to his diabetes and cirrhosis.

P. multocida is known to be very susceptible to multiple antibacterials including penicillin, amoxicillin-clavulanic acid, piperacillin-tazobactam, fluoroquinolones, cephalosporins (third generation and later), carbapenems, doxycycline and trimethoprim-sulfamethoxazole; however, there are no comparative data to support the use of one of these antibacterials over the others [38–40]. Since beta-lactamase activity is detected in some strains, susceptibility testing for *P. multocida* is preferred, especially in areas of known *Pasteurella* resistance and in case of deep tissue involvement (40). Aminoglycosides, oxacillin, first generation cephalosporins, and clindamycin should not be considered a treatment options, as they have poor in-vitro activity against this organism [38–40]. Our patient was initially treated with empirical therapy and then was switched to oral levofloxacin.

In conclusion, *Pasteurella multocida* should be suspected in bone and soft tissue infections even if the site of infection is distant to the site of the animal bite, scratch or lick of an open lesion, and any positive history of exposure should be taken seriously especially in immunocompromised patients with liver cirrhosis.

Consent for publication

Informed consent was signed by the patient.

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CRediT authorship contribution statement

Alexandre E. Malek: Conceptualization, Methodology, Writing - original draft, Writing - review & editing. **Johny E. Fares:** Writing - original draft. **Issam I. Raad:** Conceptualization, Supervision, Writing - review & editing. **Charles Ericsson:** Conceptualization, Supervision, Writing - review & editing.

Declaration of Competing Interest

All authors declare that they have no competing interests.

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