Introduction

*Pasteurella multocida* (P. multocida) is a facultative anaerobic gram-negative coccobacillus and a zoonotic pathogen in humans [1]. This bacterium colonizes the normal oral, upper respiratory [1–3], and gastrointestinal flora [4,5] of many animals, and it is estimated that 20–50% of dogs and 70–90% of cats carry the pathogen. Disease transmission primarily occurs via animal bites, scratches, and licks on broken skin [6]. The most common disease manifestation of *P. multocida* includes skin [2,3,8] and soft tissue [2,4,5,8,9] infection and local abscess formation; however, it has also been known to cause pneumonia [2,8], endocarditis [7,9], meningitis [4,5,11,12], osteomyelitis [8], visceral infections [8], bacteremia [2,4,10], sepsis [1,2,7], and other sites [3,8,10].

*P. multocida* meningitis has been reported in all age groups but is particularly noted in neonates and the elderly, with exposure to animals being a common factor [2,4]. Abscesses originating from *P. multocida* infection have also been reported in children and the elderly, two populations that are generally considered to have less-competent immune systems [9]. To our knowledge, there is only one prior reported case of *P. multocida*-induced spinal epidural abscess development post-animal interaction [3]. In this case report, we describe a previously healthy male with a recent history of a cat bite on his forearm who developed an epidural abscess due to *P. multocida* infection and no neurological deficits who was treated with a targeted regimen of IV ceftriaxone. Patients with severe back pain that is unresponsive to steroid injection and algiesic regimen with a recent history of animal contact may have *P. multocida* infection.

Case report

A 66-year-old previously healthy male with a past medical history of hypertension, dyslipidemia, obesity, obstructive sleep apnea, and lumbar radiculopathy presented to the emergency department (ED) for evaluation of unrelenting back pain for four weeks with fever, chills, and severe back spasms over the past day. He was unable to bend secondary to extreme pain and characterized the pain as different from his typical sciatica pain. Two weeks prior to his ED appearance, the patient had seen his primary care provider for the back pain. During this visit, he received an epidural corticosteroid injection at the L3-L4 level for symptomatic management, due to his history of lumbar radiculopathy. The
pain was partially relieved by the steroid injection and a combination regimen of acetaminophen-hydrocodone tablet 325 mg-5 mg, 1 tablet, oral, three times a day as needed and ibuprofen 200 mg, 3 tablets, oral, four times a day as needed for the two weeks leading up to his emergent presentation.

The patient’s medication history included acetaminophen-hydrocodone and naproxen as needed for lumbar radiculopathy, metoprolol and lisinopril for hypertension, and atorvastatin for dyslipidemia. He had no known drug allergies, and his family history was noncontributory. The patient lived with his wife, a dog, and a cat. He mentioned that the cat bit him frequently, about once every two weeks, but that he never sought medical attention and always treated the minor wounds at home. He consumed six beers per week and denied smoking, IV drug use, piercings, tattoos, high-risk sexual behavior, trauma, or a previous history of back surgeries that would increase his risk for spinal infection.

Vital signs were stable on admission and included a temperature of 98.4 °F, heart rate of 80 bpm, respiratory rate of 20 breaths/min, blood pressure of 123/82 mmHg, and oxygen saturation of 95% on room air. Pertinent findings on physical examination included pain on movement of the spine with no pain at rest, tenderness to palpation at the L3-L4 disc space, and two healed puncture wounds on the left distal forearm. Review of systems were otherwise negative. The patient’s vital signs and neurological exam remained stable throughout his stay.

Laboratory workup revealed leukocytosis (19.6 × 10³ cells/µL), mild anemia (hemoglobin: 12.4 g/dL), elevated C-reactive protein (CRP) (5.3 mg/L), and elevated procalcitonin (1.43 ng/mL). However, blood cultures obtained prior to the initiation of antimicrobials showed no growth. Basic metabolic panel (BMP) results were unremarkable, and urinalysis was normal.

To confirm the infective origin for elevated biomarkers of inflammation and infection, additional cardiac testing via electrocardiogram (EKG) and chest X-ray were performed. Both findings were normal. A computed tomography (CT) scan with contrast of the abdomen and pelvis revealed erosive changes in the L3-L4 disc space with adjacent inflammatory changes consistent with discitis and osteomyelitis. Follow-up MRI with and without contrast was highly suggestive of discitis and showed an epidural abscess and paravertebral inflammation at the L3-L4 level (Fig. 1A). The size of the epidural abscess was estimated to be 5 mm anteroposteriorly, 15 mm transversely, and 40 mm cranio-caudally.

Broad-spectrum IV antimicrobials were initiated and later discontinued after consultation with an infectious disease specialist who recommended initiating targeted IV antimicrobial therapy after microbial analysis of the diagnostic aspirate since the patient had no sepsis and was clinically stable. With assistance from neuroradiology, we performed a CT-guided core aspiration of the L3-L4 disc space and paraspinal fluid. Gram stain, an acid-fast stain and culture, and aerobic and anaerobic cultures were ordered for analysis. Aerobic cultures produced light growth of *P. multocida*, and the patient was started on an IV regimen of ampicillin-sulbactam 3 g three times a day. Upon discovering that the anaerobic and acid-fast cultures had no growth, the patient was transitioned to IV ceftriaxone. To facilitate administration of IV antimicrobials, a peripherally-inserted central catheter was inserted, and the patient sent home with instructions to administer 2 g ceftriaxone IV every 24 h for a total duration of eight weeks. After completion of antimicrobial therapy (~two months post-ED visit), a repeat MRI showed improvement in disc fluid at the L3-L4 level with persistent mild endplate edema and diminished epidural component (Fig. 1B).

**Discussion**

Approximately four to five million animal bite wounds are reported in the United States each year: 80–90% by dogs and 5–15% by cats [13]. These bites account for 300,000 or 1% of the total ED visits annually [14]. Many animal bite wounds are treated at home, and if a *P. multocida* infection occurs, serious health consequences can result, particularly in patients that are immunocompromised or at the extremes of age, such as children and the elderly [1,2,4,6,8,11]. Approximately 70% of adult cases of *P. multocida* meningitis occur in patients over 55 years of age, and in patients are over the age of 60, mortality is as high as 63% [4]. Therefore, it is important that people with animal bites, even those from domestic animals, seek medical attention.

![Fig. 1. Sagittal sectioned magnetic resonance images before and after IV antimicrobial treatment for *P. multocida* infection. Note the discitis with epidural abscess and paravertebral inflammation at L3-L4 prior to antimicrobial treatment in (A) and significant improvement in the same region two months post-initiation with IV ceftriaxone though with persistent mild endplate edema and diminished epidural component (B).](image-url)
Central nervous system infection due to *P. multocida* can occur in four different ways: [1] direct inoculation via animal bite [2], contamination from contagious wounds or trauma after neurosurgery [3], extension from an adjacent infected site by retrograde spread through lymphatics and veins, and [4] bactereemic seeding of the meninges or of a pre-existing intracranial hematoma [3,5,12]. Previous studies have reported that the majority of these infections occur due to animal bite wounds [6,10]. For example, *P. multocida* meningitis was reported in a 93-year-old female following a cat bite that, via hematogenous spread, reduced the patient to an invalid state [6], and Smišková et al. encountered a 75-year-old female with *P. multocida* bacteremia after a cat bite [10].

There is also evidence that exposure to animal feces or saliva is enough to transmit *P. multocida*. Armstrong et al. reported a 52-year-old male who was found deceased in his home soiled with dog feces; his death was attributed to purulent meningitis in the cranial vertex and the base of the brain due to *P. multocida* [11]. In 2010, Huseyin et al. described a 15-year-old male who presented with meningitis and epidural, subdural, and subgaleal abscesses after being licked by a pet rabbit [3]. Additionally, Smišková et al. described a 62-year-old female who had frequent contact with pets yet was not bitten who was diagnosed with acute bacterial meningitis, multiple brain abscesses, and transient expressive aphasia due to hematogenous spread of bacteria [10].

Here, we present a case of *P. multocida* spinal epidural abscess in an immunocompetent, 66-year-old male with a pet cat that hit the patient approximately once every two weeks. On presentation, the cat bite on his left distal forearm was healed and showed no signs of infection. Only one other case report by Oh et al. has detailed a spinal epidural abscess in an immunocompetent individual: a 68-year-old female with an acute attack of back pain symptoms that mimicked aortic dissection [3]. As with our patient, this woman had a dog that bit her frequently, and her bite wounds, on presentation, were healed. This case, when taken into consideration with information presented by Oh et al., indicates that *P. multocida* infection can present with isolated back pain and accompanying spinal epidural abscesses in an otherwise immunocompetent person. vDue to the patient’s history of an epidural steroid injection only two weeks prior to his ED visit, injection site contamination was also considered as a possible, but unlikely, portal of entry for the *P. multocida*—especially given the patient’s frequent exposure to cat saliva.

In order to appropriately manage a spinal epidural abscess, immediate aspiration and culture of abscess fluid is necessary to initiate targeted IV antimicrobial therapy. Once cultures are obtained and the presence of *Pasteurella* confirmed, penicillin or ampicillin could be used as treatment though the recorded mortality of patients on a penicillin or ampicillin regimen is around 50% [6]. Alternative therapies, including second- and third-generation cephalosporins, tetracyclines, and chloramphenicol, may also be considered, as in our patient, who exhibited substantial improvement in spinal anatomy with a two-month targeted IV antimicrobial regimen of ceftriaxone [1,2,6].

**Conclusion**

Frequent inoculation of *P. multocida* in skin and soft tissues can manifest as a spinal epidural abscess in an immunocompetent individual. Obtaining a detailed history regarding previous spinal injections and animal contact in patients with severe back pain that is minimally responsive to steroid injection and analgesics is necessary for timely identification and aspiration of spinal abscess (s) for appropriate selection of IV antimicrobial therapy.

**Consent**

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

**Credit authorship contribution statement**

Fahad Aftab Khan Lodhi: Conceptualization, Investigation, Writing - original draft. Sophie L. Shogren: Visualization, Writing - original draft. Najiya Haque: Writing - review & editing. Muhammad Ishaq: Writing - review & editing. Ateeq Rehman: Supervision.

**Declaration of Competing Interest**

None to disclose.

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