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Pasteurella multocida Bacteremia Due to Obstructive Pneumonia in an Immunocompromised Patient[☆]

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Abstract

Background: *Pasteurella multocida* is a gram-negative pathogen commonly associated with soft tissue infections caused by bites or scratches from household animals. However, *P. multocida* infections have been reported without prior zoonotic exposure or associated soft tissue or skin infection in immunocompromised individuals.

Case: A 73-year-old patient with history significant for multiple malignancies including lung cancer presented to the emergency department with a fever, chills, and rigor. Patient denied any zoonotic exposure and did not have any soft tissue or skin structure infection. Laboratory testing and imaging revealed sepsis secondary to pneumonia and further lower respiratory cultures grew *Pasteurella*. Subsequent laboratory cultures indicated *P. multocida* bacteremia.

Conclusion: This case aims to advance awareness of the possibility of *P. multocida* infection in patients who do not have any known zoonotic exposure or identifiable skin or soft tissue infection. Nasopharyngeal colonization in immunocompromised individuals could be a source for invasive infection. Patients who have a pre-existing lung disease are susceptible for developing *Pasteurella* pneumonia, which can serve as the source of bacteremia.

Keywords: Bacterial zoonoses, *Pasteurella multocida*, *Pasteurella* infections, Sepsis

1. Background

Pasteurella multocida is a gram-negative, penicillin-sensitive pathogen that is usually transmitted through bites or scratches from common household animals, such as dogs or cats. It commonly causes infection of the soft tissue, such as cellulitis or abscess.¹ Rare cases have been reported in which the pathogen causes respiratory infection or invasive infection such as bacteremia or endocarditis; these systemic infections tend to occur in immunocompromised individuals.^{1–3} While signs of soft tissue infection with *P. multocida* include a rapidly progressing inflammation and fluctuance at the site of injury, the more invasive infections do not have any features specific to the pathogen that could assist with diagnosis.¹

2. Case report

A 73-year-old male presented to the emergency department with complaints of fevers peaking at 104 °F, chills, and rigors for 4–5 days. The patient's past medical history was significant for oropharyngeal squamous cell carcinoma treated with resection and adjuvant radiotherapy, hypopharyngeal squamous cell carcinoma treated with laryngopharyngectomy and neck dissection with tracheostomy, prostate cancer, and melanoma. Per the patient, he did not have any pets and did not have any other zoonotic exposure. The patient resided in the city (urban environment) and had retired from his job as a construction worker 15 years earlier. The patient reported that several days prior to the onset of symptoms, he had started a new chemotherapy regimen for his squamous cell carcinoma. He also

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reported a chronic intermittent productive cough that was old. The rest of the patient's review of systems was negative.

The patient's vital signs upon admission were as follows: temperature of 39.2 °C, heart rate of 109 beats/minute, blood pressure of 99/70 mmHg, and respiratory rate of 26 breaths/minute, with a SpO₂ of 100%. Physical examination yielded a gentleman who was lying comfortably in bed and was warm to the touch, with a tracheostomy in place. The tracheostomy appeared clean, non-erythematous, and free of discharge. Pulmonary auscultation revealed breath sounds decreased in the right lung, as well as coarse crackles.

Lab results were as follows: white blood cell count 13.4 K/ μ L with 88% neutrophils and 9% bands, hemoglobin 12.2 g/dL, platelet count 114 K/ μ L, albumin 2.9 g/dL, and lactic acid 1.4 mmol/L. A urinalysis was performed, which was unremarkable. A chest x-ray showed a new right mid lung nodule and right basilar opacity suggestive of pneumonia or mass.

Blood cultures were drawn, and the patient started empiric antibiotic therapy with intravenous cefepime, vancomycin, and metronidazole, which was subsequently switched to ampicillin/sulbactam, for presumed sepsis secondary to pneumonia. Two of the four blood culture bottles grew *P. multocida* sensitive to amoxicillin/clavulanic acid, tetracycline, and penicillin G. A subsequent computed tomography scan of the chest showed multiple lung masses which were suspicious for metastases. A transthoracic echocardiogram showed no signs of infective endocarditis. After consultation with pulmonology and infectious disease, antibiotics were switched to amoxicillin/clavulanic acid 875 mg–125 mg twice daily by mouth. Lower respiratory cultures were done which showed gram negative bacteria and later showed *Pasteurella*. This was considered consistent with blood cultures and the source for infection was considered secondary to obstructive pneumonia due to multiple lung masses. Speciation was not available from the lower respiratory cultures. Nasopharyngeal swab was not done.

The patient continued to improve, and the repeat blood cultures after 48 h were negative. As the patient did not have any new cardiovascular abnormalities and repeat blood cultures were negative with medical therapy, infectious disease did not recommend a transesophageal echocardiogram. The patient was discharged with amoxicillin/clavulanic acid 875 mg–125 mg twice daily by mouth to complete a 14-day course.

3. Discussion

P. multocida has long been known to cause rapidly progressing infection of soft tissues, normally after a bite or scratch from a common household animal, such as a dog or cat.¹ Immunocompromised individuals are also susceptible to systemic infections with this pathogen, including bacteremia, sepsis, and endocarditis.^{1–4} Although *Pasteurella* spp. bacteremia remains mostly a zoonotic infection with soft tissue as the nidus of disseminated infection, other sources are possible.

Pneumonia has been identified as the source of infection in multiple cases.^{5–9} A clear zoonotic exposure may be identified in some patients with soft tissue as the source of entry.^{10,11} However, in patients with a remote chronic exposure to cats or dogs, nasopharyngeal colonization may be a source.¹² In patients who have *P. spp.* pneumonia and bacteremia with no clear source of infection, a nasopharyngeal swab can be beneficial to delineate the cause. Another crucial factor to consider in patients with suspected *P. spp.* pneumonia is the presence of underlying respiratory disease. *P. spp.* pneumonia can occur in patients with pre-existing lung conditions^{7,8} and when *P. spp.* is present, patients should undergo further testing to rule out underlying disease.

P. spp. bacteremia is associated with high mortality, with poor baseline status and underlying comorbidities as common contributing factors. In a study by Chatelier et al., patients with major comorbidities accounted for 83.9% of the patients who died after developing *P. multocida* bacteremia.² This study found an overall mortality of 31.1% in patients with *P. multocida* bacteremia. Due to the high mortality, *Pasteurella* in blood cultures should not be considered a contaminant, irrespective of an evident soft tissue or skin structure infection and/or a negative history for zoonotic exposure.

4. Conclusion

Due to the high mortality associated with *P. spp.* bacteremia, immunocompromised individuals, especially those with underlying lung pathology, should be advised and educated about exposure to animals. Even in the absence of a bite or scratch, being in the vicinity of animals, however infrequently, may cause nasopharyngeal colonization and increase the risk of invasive infection. In immunocompromised patients presenting with respiratory infections, *P. spp.* should be considered

in the differentials, even with no history of prior zoonotic exposure or a skin or soft tissue infection.

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Conflict of interest

There are no conflicts of interest regarding any author.

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