

# Friend Turned Foe: *Pasteurella multocida* Bacteremia Following a Scratch by an Adopted Pekin Duck

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## Abstract

*Pasteurella multocida* is a gram-negative coccobacillus that colonizes the aerodigestive tracts of cats, dogs, birds, and wild animals. This veterinary pathogen spreads to humans via licking, biting, or scratching. Pekin ducks are known carriers of multiple strains of *Pasteurella* bacteria that can manifest as fowl cholera, eye infection, or duck septicemia. This bacterium is a farmer's nightmare, as it is associated with high mortality rates. Herein, we report a unique case of *P. multocida* bacteremia in an immunocompetent host that shared a house with adopted Pekin ducks.

## Keywords

*Pasteurella multocida*, *P. multocida* bacteremia, gram-negative coccobacilli, Pekin duck

## Introduction

*Pasteurella multocida* (*P. multocida*) is a gram-negative, anaerobic, non-motile, and non-spore-forming coccobacillus.<sup>1–4</sup> This microorganism was first isolated from wild hogs by Kitt in 1878 and was later described by Louis Pasteur as a cause of fowl cholera.<sup>1,5</sup> *P. multocida* usually colonizes the aerodigestive tract of cats, dogs, rabbits, pigs, birds, and wild animals and spreads to humans via licking, biting, or scratching.<sup>1,3,6–8</sup> This pathogen normally causes simple soft tissue infections in immunocompetent hosts.<sup>1,6,7</sup> Immunocompromised individuals may develop pneumonia, bacteremia, peritonitis, endocarditis, or meningitis.<sup>1,6,7,9–11</sup> Pekin ducks are known carriers of *P. multocida*, which can manifest as fowl cholera or duck septicemia.<sup>4</sup> Human inoculation from Pekin ducks is exceedingly rare. Herein, we report a unique case of *P. multocida* bacteremia in an immunocompetent host that had close contact with adopted Pekin ducks.

## Case Summary

A 78-year-old female with a medical history of hypertension and hypothyroidism was brought to the emergency department (ED) for evaluation of hypoactive delirium. The patient was in her usual state of health prior to this incident. On the day of presentation, the patient was found on the bathroom floor by her son looking confused. She was only oriented to self but followed commands. In the ED, the patient denied any recent falls, head trauma, seizure-like activity, tongue-biting, or fecal or urinary incontinence.

In the ED, the patient appeared in no acute distress, and the son reported that she was back to her baseline mentation. The vital signs were significant for a fever of 39.0°C and tachycardia (108 beats per minute). The blood pressure (126/71 mmHg) and oxygen saturation (98% on room air) were within normal ranges. On examination, the patient was interactive and oriented to self, time, and place. Her speech was clear and intelligible, and there were no focal neurological deficits. The patient had superficial abrasions on the right forearm without any signs of local infection. The patient could not recall how she acquired the abrasions, and the remainder of the physical examination was unremarkable.

Triage blood tests were significant for leukocytosis with bandemia (white blood cell count,  $16.8 \times 10^3/\text{mm}^3$ ; 17% bands), anemia (hemoglobin, 10.0 g/dL), thrombocytopenia (platelet count, 67 K/mm<sup>3</sup>), transaminitis (aspartate aminotransferase,

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427; alanine aminotransferase, 426), hypokalemia (potassium 3.2 mEq/L), lactic acidosis (3.4 mmol/L), and an elevated parathyroid hormone level (4.40 ng/mL). An arterial blood gas analysis showed a pH of 7.33, serum carbon dioxide pressure of 24 mmHg, oxygen pressure of 81 mmHg, and bicarbonate level of 12.7 mmol/L. The urine drug screen test, urinalysis, and thyroid-stimulating hormone level were unremarkable. Brain computed tomography (CT) was negative for an acute pathology. Similarly, the chest x-ray was negative for infiltrates, consolidations, and pneumothorax. The patient was empirically treated for sepsis of unclear etiology with vancomycin and piperacillin-tazobactam.

On day 2 of admission, the patient became hypotensive and required transfer to the intensive care unit (ICU) for vasopressor support. The patient was also started on sodium bicarbonate infusion due to worsening non-anion gap metabolic acidosis with lactic acidosis. A CT scan of the abdomen and pelvis was negative for pelvic and intra-abdominal pathologies. In the ICU, the patient's respiratory panel returned positive for rhinovirus, but the bacterial pneumonia panel, sputum, and urine cultures yielded negative results. Owing to the concern for septic shock in the setting of gram-negative bacteria and worsening clinical status, the piperacillin-tazobactam was switched to meropenem. Two sets of blood cultures were positive for *P. multocida* on day 3 of admission, and antibiotics were de-escalated to ceftriaxone based on sensitivity.

Once optimized in the ICU, the patient informed the infectious disease physician that she had adopted 4 rescue Pekin ducks from a local petting zoo into her home. Two of the ducks were handicapped and frequently scratched the patient's forearms during handling. There were no other animals or pets in her household. The patient was diagnosed with *P. multocida* septicemia acquired from a Pekin duck. The patient was weaned off the vasopressors and transferred to the general medical floor on day 5 of admission. The repeat blood cultures were negative for any pathogens. The patient completed a 7-day course of intravenous antibiotics and was discharged with a 7-day course of oral amoxicillin-clavulanate (875-125 mg, twice daily) to complete a 14-day course of antibiotic therapy. Upon discharge, the patient was encouraged to take her ducks to a veterinarian to prevent reinfection.

## Discussion

*P. multocida* is a versatile gram-negative bacterium that causes various infections in both animals and humans. *P. multocida* has been classified into 5 serogroups (A, B, D, E, and F) based on its capsular and outer membrane composition.<sup>1,3,5,6,8,10</sup> Serogroups A and D are the most virulent and cause most of the infections.<sup>1,3</sup> Most of the infections occur following a bites, licks, or scratches from dogs and cats.<sup>1,6,7</sup> In the United States, 4 to 5 million cases of animal bite wounds are reported annually, and approximately 7%

of these cases end up in the ED.<sup>1</sup> Bacterial pathogens have been isolated in approximately 50% of the cases.<sup>1</sup> Peng et al<sup>6</sup> performed a systematic search of *P. multocida* cases in PubMed from 1975 to 2022. The search yielded 330 cases, most of which were associated with exposure to cats and dogs. *P. multocida* infection preceding an injury from infected birds, particularly a Pekin duck, is extremely rare. In healthy hosts, this veterinary pathogen causes soft tissue infections that can be treated with penicillin-based antibiotics. Immunocompromised individuals may experience pneumonia, bacteremia, endocarditis, or meningitis.<sup>11</sup> Herein, we describe a peculiar case of *P. multocida* bacteremia and encephalopathy in an immunocompetent geriatric patient after a scratch by an adopted Pekin duck. The patient adopted the ducks from a local petting zoo and lived with them in her house. Two of the ducks were handicapped and frequently scratched the patient's forearms during handling, predisposing her to infection.

Following a pet bite, *P. multocida*-associated soft tissue infections typically manifest as erythema, edema, pain, or purulent discharge.<sup>1,2</sup> Invasive infections may present with systemic signs and symptoms, such as fever, chills, cough, dyspnea, lung abscess, joint pain, bacteremia, or encephalopathy.<sup>1,2,7</sup> Our patient presented with confusion and superficial abrasions on the right forearm caused by a duck attack. *Pasteurella* spp. infections have a rapid course, and a detailed medical history, including animal exposures, can aid in early diagnosis. Once suspected following dog or cat exposure, a *P. multocida* infection can be diagnosed via wound, sputum, blood, synovial, or cerebrospinal fluid cultures.<sup>1,2,7,10</sup>

Local wound infections from pet bites warrant debridement, incision, and drainage to remove necrotic tissue and bacteria.<sup>1,2</sup> Prompt initiation of penicillin or its derivatives is associated with good prognosis.<sup>1,11</sup> Doxycycline, ciprofloxacin, levofloxacin, cefuroxime, penicillin V, or trimethoprim/sulfamethoxazole can be considered in patients with resistant strains.<sup>1,7</sup> More invasive infections, such as bacteremia, pneumonia, and septic arthritis, require parenteral antibiotics, such as ampicillin-sulbactam, piperacillin-tazobactam, or carbapenems.<sup>1,7,8</sup> The treatment duration is usually 5 to 14 days for optimal therapy but can be prolonged in case of delayed therapeutic benefit or severe disease.<sup>1,2</sup> Some patients with systemic infections may require adjunctive treatment with intravenous fluids, vasopressors, or oxygen.

## Author Contributions

L.B. and H.C. conceptualized the idea of this case report and contributed equally to its writing. L.B. and H.C. share first authorship as designated by the asterix. S.P. and J.S.S. fact-checked, edited, and proofread the final version of the manuscript.

## Data Availability

Further inquiries can be directed to the corresponding author.

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## Ethics Approval

Our institution does not require ethical approval for reporting individual case reports.

## Informed Consent

Verbal informed consent was obtained from the patient for her anonymized information to be published in this article.

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