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Case Report

Pasteurella Multocida Pneumonia in an Immunocompetent Female: A Case Report

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Abstract

Pasteurella multocida, a zoonotic gram-negative coccobacillus commonly found in the oral flora of domestic animals like cats and dogs, is a rare cause of pneumonia, particularly in immunocompetent individuals. This case report describes a 55-year-old immunocompetent woman who presented with a two-month history of worsening shortness of breath, fatigue, low-grade fever, night sweats, loss of appetite, and weight loss, alongside a six-year history of intermittent respiratory symptoms. She reported prolonged close contact with her pet dog and cat and a 20-year history of indoor biomass fuel exposure. Physical examination revealed diminished breath sounds in the right middle lung field and oxygen saturation of 90% on room air. Chest CT showed right middle lobar bronchus stenosis, segmental atelectasis, bilateral bronchial wall thickening, ground-glass opacities, and mild centrilobular emphysema. Bronchoalveolar lavage culture confirmed Pasteurella multocida, sensitive to Amoxicillin-Clavulanate, leading to a diagnosis of P. multocida pneumonia. Treatment with a 10-day course of oral Amoxicillin-Clavulanate resulted in significant clinical improvement, with resolution of respiratory and systemic symptoms and a 2 kg weight gain by day 15. This case underscores the importance of considering zoonotic pathogens in the differential diagnosis of community-acquired pneumonia in patients with animal exposure, even without typical risk factors like immunosuppression or chronic lung disease. It highlights the role of environmental factors, such as biomass fuel exposure, in predisposing to pulmonary infections and the value of early bronchoscopy for definitive diagnosis. Patient education on pet hygiene and avoidance of respiratory irritants is crucial for prevention, emphasizing the need for a thorough exposure history to manage rare zoonotic infections effectively.

Keywords

Pasteurella Multocida, Pneumonia, Ethiopia

1. Introduction

Pasteurella multocida, a gram-negative, non-motile, penicillin-sensitive coccobacillus of the Pasteurellaceae family, is a well-established zoonotic pathogen commonly colonizing the oral, nasopharyngeal, and upper respiratory tract microbiota of various wild and domestic mammals, including dogs, cats, and livestock [1]. Human infections typically result from direct animal contact through bites, scratches, licks on skin abrasions, or exposure to mucous secretions, with domestic pets, particularly cats and dogs, serving as primary vectors [2].

The most common clinical presentation is localized skin and soft tissue infections, characterized by rapid-onset swelling, cellulitis, and purulent or bloody discharge at the

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wound site, often following animal bites [2]. However, P. multocida is also capable of causing severe, invasive infections, including osteomyelitis following a dog bite, infective endocarditis with documented cases involving heart valve pathology, meningitis linked to animal contact such as kissing pets, disseminated intravascular coagulation (DIC) with acute renal failure from cat scratches, and fulminant sepsis even in individuals without underlying liver disease [3-7]. Respiratory tract infections, though less common, are a significant clinical concern, particularly in patients with pre-existing pulmonary conditions such as bronchiectasis, chronic obstructive pulmonary disease (COPD), or other structural lung diseases, with reported cases of bacteremic community-acquired pneumonia and pneumonia with hemoptysis [8-10]. The clinical presentation of P. multocida pneumonia is often nonspecific, with symptoms including fever, malaise, dyspnea, and pleuritic chest pain, which can mimic non-tuberculous mycobacterial infections, leading to diagnostic challenges [11].

While P. multocida infections are predominantly opportunistic, cases in immunocompetent individuals are rare but increasingly recognized. For example, a case of an immunocompetent Indian male with pneumonia linked to pet exposure and another involving disseminated bacteremia highlight the pathogen's potential to cause significant disease in healthy hosts, emphasizing the importance of a detailed exposure history [10, 12]. Recent case reports further highlight the diverse presentations of Pasteurella multocida pneumonia in immunocompetent adults. A systematic review and case report described a male patient with bacteremia but no clear portal of entry, emphasizing the efficacy of penicillins over macrolides as first-line treatment and the need for heightened suspicion in patients exposed to carrier animals [13]. Another case involved a middle-aged woman with no prior lung disease, initially misdiagnosed as Haemophilus infection during an influenza pandemic, underscoring diagnostic challenges and potential transmission via aspiration from an infected cat [14]. Additionally, a rare case of P. multocida pneumonia presenting with hemoptysis in an immunocompetent host highlighted the uncommon nature of this symptom and the importance of animal exposure history [15]. Finally, a report documented P. multocida pneumonia in a patient with pet exposure but without bacteremia or hemoptysis, distinguishing it from other severe presentations [16]. These cases collectively emphasize the need for thorough exposure history and precise diagnostic approaches in managing this zoonotic infection.

The rarity of P. multocida pneumonia in immunocompetent patients, combined with its nonspecific clinical and radiological features, often results in delayed diagnosis, particularly in the absence of underlying lung conditions. We herein report a case of P. multocida pneumonia in a 55-year-old immunocompetent woman with a history of exposure to domestic cats and dogs, underscoring the diagnostic complexities and the critical need to consider zoonotic pathogens in the differential diagnosis of community-acquired pneumonia in patients with animal contact.

2. Case Presentation

A 55-year-old woman presented to our outpatient pulmonary clinic with a two-month history of worsening shortness of breath, a symptom she had experienced intermittently for six years. The recent exacerbation was accompanied by fatigue, intermittent low-grade fever, night sweats, loss of appetite, and significant but unquantified weight loss. She reported living in close proximity to her pet dog and cat for over a decade, with frequent direct contact, including being licked by her pets. Her past medical history was unremarkable for chronic conditions such as hypertension, diabetes mellitus, renal, cardiac, or lung disorders. She denied any history of tuberculosis or COVID-19 infection and had no prior treatment for these conditions. The patient was a lifelong non-smoker but disclosed a significant history of indoor biomass fuel exposure from cooking with open fires for approximately 20 years, suggesting a potential contribution to chronic lung changes. She has no history of recurrent infections, and no recent use of immunosuppressive medications like corticosteroids.

On physical examination, the patient appeared chronically ill. Vital signs revealed an oxygen saturation of 90% on room air, blood pressure of 100/60 mmHg, heart rate of 92 beats per minute, respiratory rate of 19 breaths per minute, and a temperature of 36.6 ℃. Respiratory examination demonstrated diminished breath sounds over the right middle third of the lung field, with no audible crepitations or wheezing. Other systemic examinations, including cardiovascular, abdominal, and neurological assessments, were unremarkable.

Laboratory investigations included a complete blood count, which showed a white blood cell count of 5.85 $\times 10^3$/mm^3 with a differential of 56.5% neutrophils and 36.5% lymphocytes, hemoglobin of 15.1 g/dL, hematocrit of 45.6%, and platelet count of 225 $\times 10^3$/mm^3, all within normal limits. The chemistry panel, including renal and liver function tests, was unremarkable. Serological tests for hepatitis B surface antigen (HBsAg), hepatitis C virus antibody (HCV-Ab), and human immunodeficiency virus (HIV) were non-reactive, ruling out underlying immunocompromising conditions.

A contrast-enhanced chest computed tomography (CT) scan was performed, revealing right middle lobar bronchus stenosis with associated segmental atelectasis and an adjacent nodule. Additional findings included bilateral bronchial wall thickening, ground-glass opacities, peribronchial tree-in-bud nodules, lobar air trapping, and mild to moderate centrilobular emphysema, suggestive of a chronic inflammatory or infectious process superimposed on structural lung changes. Bronchoscopy was subsequently performed, which identified purulent secretions emanating from the right lower lobe. Bronchoalveolar lavage (BAL) was conducted, and the BAL specimen culture grew Pasteurella multocida, with antimi-

crobial susceptibility testing demonstrating sensitivity to ceftriaxone, penicillin, Amoxicillin-Clavulanate (Augmentin), and Clindamycin, but resistance to Chloramphenicol. GeneXpert testing for Mycobacterium tuberculosis and cytological analysis of the BAL specimen were negative, excluding tuberculosis and malignancy as contributing factors.

Based on the microbiological findings and clinical presentation, the patient was diagnosed with P. multocida pneumonia. She was initiated on a 10-day course of oral Amoxicillin-Clavulanate (Augmentin).

3. Outcome and Follow-up

After completing a 10-day course of Augmentin (Amoxicillin-Clavulanate), the 55-year-old female patient showed significant clinical improvement at her follow-up visit on the 15th day. Her shortness of breath, which had worsened over two months, was markedly reduced, allowing improved daily functioning and exercise tolerance. Symptoms including fatigue, low-grade fever, night sweats, loss of appetite, and weight loss resolved. Her weight increased from 57 kg at presentation to 59 kg, reflecting improved appetite and nutritional status.

Physical examination revealed a healthier appearance, with vital signs improved: oxygen saturation at 97% on room air, blood pressure at 112/72 mmHg, heart rate at 76 beats per minute, respiratory rate at 15 breaths per minute, and temperature at 36.7 ℃. Respiratory exam showed normalized breath sounds in the right middle lung field, with no crepitation or wheezing, indicating resolution of prior atelectasis and bronchial obstruction.

No repeat labs were conducted at this visit, given the robust clinical response and confirmed Pasteurella multocida sensitivity to Augmentin from the bronchoalveolar lavage culture. Repeat chest CT at follow-up was not performed due to cost constraints.

The patient was educated on the zoonotic potential of the infection, linked to her long-term contact with her dog and cat, and advised to practice good hygiene, such as handwashing after pet handling. To address her 20-year indoor fire exposure and CT findings of mild to moderate centrilobular emphysema, she was recommended to avoid respiratory irritants and scheduled for a one-month follow-up to monitor respiratory symptoms and assess the need for further imaging or pulmonary interventions.

4. Discussion

Pasteurella multocida, a gram-negative, facultative anaerobic coccobacillus, is a well-documented zoonotic pathogen primarily associated with infections following exposure to domestic animals, such as dogs and cats [2]. While soft tissue infections from animal bites or scratches are the most common clinical presentation, pulmonary infections like pneumonia are rare but increasingly reported, particularly in individuals with chronic lung conditions or prolonged animal contact [1, 8, 10]. My case of P. multocida pneumonia in a 55-year-old immunocompetent woman is notable for its subacute presentation, absence of typical risk factors such as chronic lung disease or immunosuppression, and the significant contribution of environmental and zoonotic exposures. The patient's decade-long close contact with pet dogs and cats, combined with a 20-year history of indoor biomass fuel exposure, likely predisposed her to pneumonia superimposed on chronic lung changes, highlighting a complex interplay of infectious and environmental factors.

The clinical presentation in my case, characterized by a six-year history of intermittent shortness of breath with a two-month exacerbation, accompanied by systemic symptoms including low-grade fever, night sweats, loss of appetite, and weight loss, aligns with the nonspecific features of P. multocida pneumonia described in the literature [1, 9, 11]. Unlike cases with acute onset or hemoptysis, such as that reported by Aida et al. [1], my patient exhibited a subacute course, potentially masked by underlying centrilobular emphysema and bronchial thickening identified on chest computed tomography (CT). The CT findings—right middle lobar bronchus stenosis, segmental atelectasis, bilateral bronchial wall thickening, ground-glass opacities, peribronchial tree-in-bud nodules, and lobar air trapping—are consistent with patterns observed in P. multocida pneumonia and suggest a chronic inflammatory process exacerbated by infection [9, 10]. The patient's prolonged exposure to indoor biomass fuel smoke likely contributed to these structural lung changes, impairing mucociliary clearance and local immune defenses, thereby increasing susceptibility to pulmonary infection [9]. This environmental factor underscores the importance of considering non-infectious exposures in the pathogenesis of atypical pneumonias, a novel aspect not emphasized in many prior reports.

Definitive diagnosis in my case was achieved through bronchoalveolar lavage (BAL) culture, which confirmed P. multocida sensitive to Amoxicillin-Clavulanate, ceftriaxone, penicillin, and clindamycin but resistant to chloramphenicol, consistent with the organism's typical antimicrobial susceptibility profile [2, 9]. Negative GeneXpert and BAL cytology results ruled out tuberculosis and malignancy, reinforcing P. multocida as the primary etiology [11]. The absence of animal bites or scratches suggests inhalation or mucosal transmission, a less common but documented route for pulmonary infections, particularly in individuals with frequent pet contact [1, 8]. The patient's immunocompetent status further distinguishes this case, aligning with rare reports of P. multocida pneumonia in healthy individuals, such as an immunocompetent Indian male with pet exposure or cases with disseminated bacteremia [10, 12]. These findings emphasize the need for a high index of suspicion for zoonotic pathogens in patients with atypical pneumonia and animal exposure, even without overt risk factors.

Treatment with a 10-day course of Amoxicillin-Clavulanate resulted in rapid clinical improvement, with resolution of respiratory and systemic symptoms and a 2 kg weight gain by day 15, demonstrating the efficacy of targeted antimicrobial therapy guided by culture sensitivities [8, 10]. However, the chronic lung changes observed on CT, including emphysema and bronchial thickening, necessitate long-term pulmonology follow-up to manage underlying lung disease and monitor for potential recurrence, as structural abnormalities may predispose to future infections [9]. The absence of severe systemic complications, such as endocarditis, meningitis, or disseminated bacteremia—more commonly reported in immunocompromised individuals or those with comorbidities—underscores the relatively favorable prognosis in immunocompetent patients when diagnosed and treated promptly [3, 5, 6, 8].

The case of Pasteurella multocida pneumonia in a 55-year-old immunocompetent female presents a unique clinical profile that both aligns with and diverges from recent reports in immunocompetent patients, illustrating the diverse manifestations of this zoonotic infection. Like the male patient with bacteremia reported by Pak et al., my patient had significant animal exposure through prolonged contact with pet dogs and cats, emphasizing the critical role of exposure history in diagnosis; however, my case lacked bacteremia and was marked by a subacute presentation over two months, with treatment using Amoxicillin-Clavulanate aligning with their advocacy for penicillins over macrolides [13]. Similarly, the diagnostic challenges in my case, where nonspecific symptoms and CT findings required BAL for confirmation, echo those in Alsaffar et al.'s report of a 47-year-old woman misdiagnosed as having Haemophilus infection during an influenza pandemic, suggesting possible mucosal transmission from pets in both cases [14]. In contrast, Ayas et al.'s case of an immunocompetent patient presenting with hemoptysis—a rare feature—differs markedly from my patient, who exhibited no hemoptysis, indicating less severe acute respiratory involvement despite chronic lung changes from biomass fuel exposure [15]. Marinella's case, describing P. multocida pneumonia without bacteremia or hemoptysis, closely parallels my patient's presentation, yet my case is distinguished by the significant contribution of 20-year indoor biomass fuel exposure, a novel environmental risk factor likely exacerbating chronic lung changes and predisposing to infection [16]. These comparisons highlight the necessity of early bronchoscopy with BAL and a thorough exposure history, including environmental factors, to diagnose P. multocida pneumonia in immunocompetent patients, reinforcing the unique contribution of my case to the literature through its emphasis on biomass fuel exposure.

The findings in this case highlight several critical clinical lessons. First, Pasteurella multocida should be considered in the differential diagnosis of community-acquired pneumonia, particularly in patients with a history of pet exposure, even in the absence of bites or scratches. Second, environmental factors, such as prolonged exposure to biomass fuel smoke, may play a significant role in predisposing individuals to pulmonary infections by causing chronic lung damage. Third, early bronchoscopy with BAL is invaluable for establishing a definitive diagnosis and guiding antimicrobial therapy in atypical pneumonia cases. Finally, patient education on pet hygiene, such as avoiding mucosal contact with pets, and minimizing exposure to respiratory irritants like indoor smoke is essential for prevention, particularly in individuals with underlying lung changes [2, 5]. By integrating a thorough exposure history, advanced diagnostic tools, and targeted therapy, clinicians can effectively manage rare zoonotic infections like Pasteurella multocida pneumonia, improving outcomes in both immunocompetent and vulnerable populations.

Abbreviations

COPD	Chronic Obstructive Pulmonary Disease
DIC	Disseminated Intravascular Coagulation
CT	Computed Tomography
BAL	Bronchoalveolar Lavage
HBsAg	Hepatitis B Surface Antigen
HCV-Ab	Hepatitis C Virus Antibody
SPHMMC	Saint Paul's Hospital Millennium Medical College

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Author Contributions

Ermiyas Berehanu Hayle is the sole author. The author read and approved the final manuscript.

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Conflicts of Interest

The authors declare no conflicts of interest.

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Biography

Ermiyas Berehanu Hayle is a distinguished internist committed to advancing healthcare through exemplary clinical practice and innovative research. With expertise in diverse settings, from resource-limited environments to advanced hospitals, he excels in both private and public sectors. Dr. Hayle's research focuses on improving patient outcomes, while his interests in fitness, nutrition, digital health, and healthcare administration reflect his visionary leadership in shaping the future of medicine.

Research Field

Ermiyas Berehanu Hayle: Internal medicine, Cardiology, Endocrinology, Rheumatology, Nutrition, Digital health, Epidemiology.