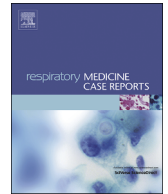




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Case Report

Pneumonia due to *Pasteurella multocida*, case report and considerationsElizabeth Espinosa Vega ^{a,*}, Alfredo Fonseca Negrín ^a, Luis Ángel Iglesias Sánchez ^b^a Department of Internal Medicine, Hospital Nuestra Señora de Guadalupe, La Gomera, Spain^b Clinical Microbiology Laboratory, Hospital Nuestra Señora de Guadalupe, La Gomera, Spain

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ABSTRACT

Community acquired pneumonia is frequent in the elderly but a pathogen is identified in less than fifty per cent of the cases. It is rarely produced by *Pasteurella multocida*, a Gram-negative oral commensal of many dogs and cats. We report the case of an elderly man with chronic obstructive respiratory disease who owned a dog and developed severe pneumonia due to *P. multocida*.

1. Introduction

Community acquired pneumonia is a frequent reason for hospital admission in elderly. A pathogen is detected in less than 50 % of the cases, most commonly *Streptococcus pneumoniae* or viruses such as influenza. We report the case of a man with chronic obstructive respiratory disease who owned a dog and developed severe pneumonia due to *Pasteurella multocida*, a zoonotic bacteria seldom related to human disease.

2. Case summary

A 71-year-old male presented at our emergency department with a two-day history of shortness of breath, cough and yellowish sputum, preceded by five days of sudden diarrhea, weakness and chills. The patient was stable before developing these symptoms and was under treatment for arterial hypertension, type II diabetes mellitus and chronic obstructive pulmonary disease with enalapril-hydrochlorothiazide, metformin, simvastatin and inhaled indacaterol/glycopyrronium. He also used a continuous positive airway pressure (CPAP) machine for an obstructive sleep apnoea-hypopnoea syndrome. A former smoker for ten years, he leads an active, independent life in a small town with his wife and pet chihuahua. He had no recent relevant events or travel and he had not been scratched or bitten by his dog.

On physical examination the patient was febrile, with blood pressure 90/60 mmHg, heart rate 100 beats/min and respiratory rate 28 breaths/min. On auscultation he had crackles throughout the right hemi thorax. Laboratory parameters on admission showed mild leukocytosis (WBC 10.500/mm³ with 85 % neutrophils), impaired renal function (Cr 2.66 mg/dL), hyponatremia (Na 128 mEq/L), high serum C reactive protein (45 mg/dL), and high procalcitonin (99.81 ng/mL). Chest X-ray demonstrated a dense opacity in the right mid-upper lung zone (Fig. 1).

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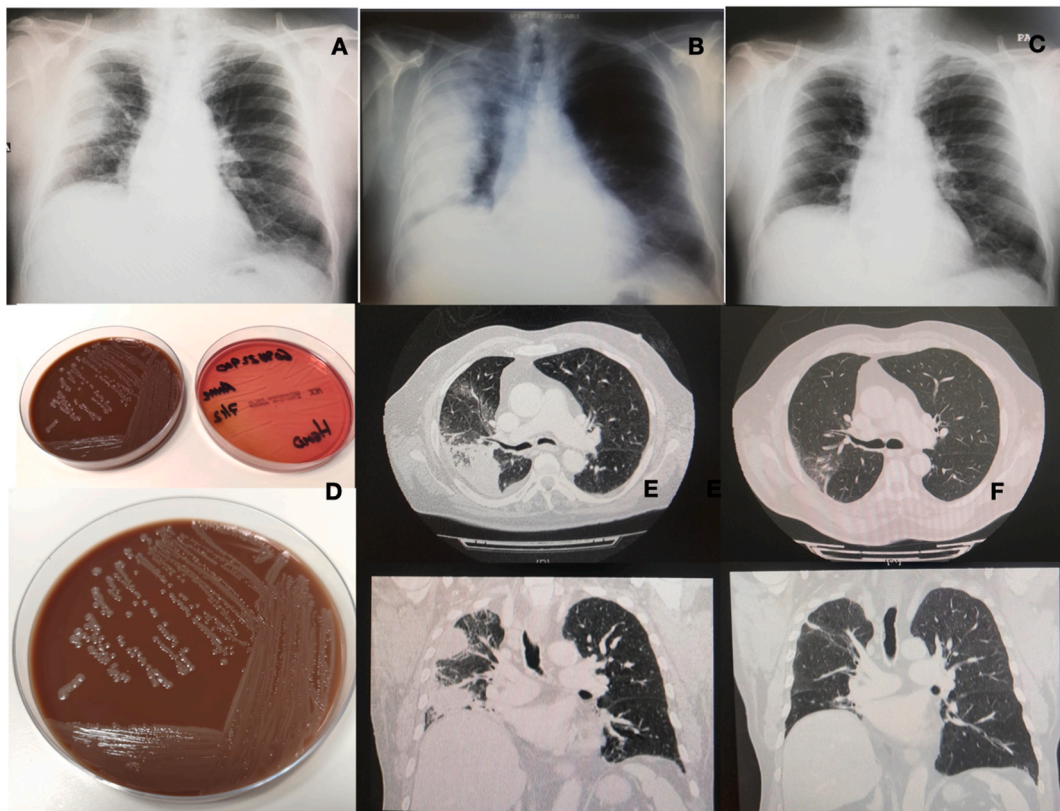


Fig. 1. A. Chest X-ray on presentation day. B. Chest X-ray on day 5. C. Chest X-ray on day 152. D. Microbial colonies of *Pasteurella multocida* on chocolate agar and detail, no growth on MacConkey agar. E. CT Thorax on day 6. F. CT Thorax on day 90.

The patient was diagnosed with community-acquired pneumonia complicated by septic shock. Resuscitation was initiated with intravenous fluids and empiric antibiotherapy, using intravenous ceftriaxone 2 g q24h and levofloxacin 750mg q24h. Progress was partially good, following a return to normal renal function and a drop in acute phase reactants, but ongoing global respiratory insufficiency required non-invasive mechanical ventilation in the short term. A CT scan of the thorax six days after presentation revealed multiple consolidations and necrosis in the right upper and lower lobes (Fig. 1). This was complicated by de novo atrial fibrillation with rapid ventricular response.

Nasopharyngeal PCR swab for SARS CoV2 respiratory virus, influenza A, influenza B and syncytial respiratory virus were all negative. Antigenuria for *Streptococcus pneumoniae* and *Legionella pneumophila* were also negative. Sputum culture showed growth of commensal flora.

Blood cultures were positive four days after incubation and colonies were identified as *P. multocida* using Vitek 2 GN ID (bio-Merieux) card for gram negative organisms (Fig. 1). Susceptibility tests were not performed at our hospital but the laboratory recommended the use of amoxicillin-clavulanic, ceftriaxone, carbapenems, quinolones, cotrimoxazole or doxycycline and advised against cloxacillin, macrolides, aminoglycosides and clindamycin, based on common pattern.

On day 5, antibiotherapy was changed to imipenem 1000 mg ivd q8h daily for 21 days, due to slow recovery of respiratory symptoms and worsening CT scan results. The patient was discharged on day 25 with hypoxemic respiratory insufficiency requiring supplemental oxygen at home, and showed good recovery at follow-up appointments in the following six months.

3. Discussion

Pasteurella multocida is a Gram-negative zoonotic facultative anaerobic bacterium. It is known to live commonly in the normal flora of the respiratory tract, and probably the digestive tract, of many wild and domestic animals, including more than 50 % of dogs and cats worldwide. Sometimes it can be found as commensal in respiratory tract of healthy individuals [1–3].

Humans mostly contract skin and soft tissue infections from bites and scratches, but less frequent infections can affect almost any organ of the body [3,4]. The respiratory tract is the second most frequent site of infection, often unrelated to animal contact, presenting a wide variety of syndromes from otitis or sinusitis to pneumonia, lung abscess and empyema [2,3,5,6]. Endogenous infection from previous colonization of the respiratory tract can have a role. Advance age, immunosuppression, cirrhosis and chronic obstructive pulmonary disease from smoking are important risk factors for severity [2,6–9].

The incidence of pneumonia due to *Pasteurella* remains unknown, mild cases are probably cured by empiric treatment without suspicion. The lung infection tends to present in elderly patients with COPD who reside with cats or dogs [10,11]. It is usually lobar,

slow-healing and frequently complicated with bacteremia (50 %) and empyema (40 %), even with appropriate antibiotherapy. It can be severe and have high mortality rates up to 30 % [9,12].

Pasteurella multocida is easily isolated in blood cultures when they are obtained. Colonies grow well on sheep blood and chocolate agar but not on MacConkey agar, are identified using conventional methods or MALDI-TOF MS. However, in sputum colonies are difficult to distinguish between oral cohabitants and are frequently lost. Treatment is adapted to classical pattern or based on susceptibility tests when done. Despite its benign sensitivity profile, therapy from 2 to 4 weeks is often required to cure *Pasteurella pneumonia* [2,3,5,6,11]. Preferred regimens include amoxicillin-clavunate or ceftriaxone. Levofloxacin and doxycycline are good alternatives, while macrolides should only be used based on sensitivity tests. The latest CLSI and EUCAST provide MIC breakpoints for *P. multocida*, and beta-lactamase detection is preferred when feasible [5,11].

Pasteurella possess numerous virulence factors which are undoubtedly key in severity, being the lipopolysaccharide and the capsule the most significant and best studied to date [4,12]. Mechanisms of protective immunity remain elusive, and detection of high serum levels of IgG antibodies likely indicate chronic infection rather than long-lasting immunity. Because of the relatively low incidence of human infection, most studies have focused on controlling animal disease [12].

A recurrence of *P. multocida* infection is reported in only two cases in the literature several weeks after treatment [2], both regarding skin and soft tissue infections. Neither report indicated whether the patients had animal contact, either before or after the first episode. Reinfection may have occurred, or perhaps initial treatment was just insufficient to definitely cure both cases.

In order to minimize the risk for transmission of zoonosis, patients with comorbidities or immunosuppression are strongly discouraged from having pets. However, considering the limited risk of infection and reinfection alongside the physical and mental benefits of having a pet for many pet owners, we opted for a more specific and moderate advice, focused in avoiding risk behaviors as sharing bed, regularly kiss and be licked by their pets [13].

In summary, we report a case of a man with severe *P. multocida* pneumonia, adding to the literature on invasive infection by this organism. Pneumonia with *P. multocida* is typically lobar in nature and associated with high severity of illness and bacteremia despite appropriate treatment. Asking about animal contact contributes to an early suspicion, but its absence does not rule it out. The infecting organism is identified by the usual methods when appropriate cultures are obtained. Because beta-lactamase producing *P. multocida* isolates has been reported, susceptibility testing is recommended. Patients with underlying comorbid conditions at risk for severe pulmonary infection with *P. multocida* should be aware of zoonotic transmission and consider limiting risk contact with animal reservoirs.

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Ethical approval statement

Written consent was obtained from the patient reported in the case report.

Declaration of competing interest

No conflict.

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