# *Chlamydophila psittaci* in a 48-Year-Old Man with Respiratory Failure

*Octav Constantinescu, BA*
*Yvette G. Scott, DO*

*Chlamydophila* (formerly *Chlamydia*) *psittaci* is an obligate intracellular bacterium closely related to *Chlamydia trachomatis* and *Chlamydophila pneumoniae*. It is most commonly found in birds but can be transmitted to people through close contact. Once a bird is infected, the feathers and feces may remain contagious many months after the acute illness has resolved.[1] In humans, the bacterium causes psittacosis, an influenza-like infection that can occasionally result in atypical pneumonia. This article describes the case of a man infected with *C. psittaci*, which caused severe atypical community-acquired pneumonia.

## CASE PRESENTATION

### Initial Presentation and History

A 48-year-old man presented to the emergency department (ED) with acute onset of severe dyspnea and productive cough for 12 hours; diffuse, pleuritic chest pain with deep inspiration; mild headache; sore throat; and subjective fever and chills. The patient denied exertional chest pressure or tightness, palpitations, diaphoresis, nausea, vomiting, paroxysmal nocturnal dyspnea, orthopnea, edema, hemoptysis, chronic cough, night sweats, or unexplained weight loss.

The patient's past medical history was significant for a positive tuberculin skin test 20 years prior to admission. At the time, he received isoniazid for 2 months, which was discontinued due to nonspecific gastrointestinal symptoms. He had no history of coronary artery disease, chronic obstructive pulmonary disease, or asthma. The patient was a retired veteran, and he recalled no significant occupational environmental exposures. The patient reported 1 sick family contact, who had nonspecific symptoms of an upper respiratory tract infection. He denied recent travel. He consumed 2 beers per week. The patient had quit smoking 2 years prior to admission, with a previous 30 pack-year history. He denied illicit drug use and any HIV risk factors.

### Physical Examination

Physical examination revealed an ill-appearing man with a temperature of 99.3°F (37.4°C), heart rate of 105 bpm, blood pressure of 160/90 mm Hg, respiratory rate of 24 breaths/min, and oxygen saturation of 91% on room air. Chest examination revealed decreased breath sounds, crackles, and scattered expiratory wheezing bilaterally but more prominent over the left hemithorax. The remainder of the examination was unremarkable.

### Laboratory and Imaging Studies

Results of initial laboratory testing are shown in **Table 1**. An arterial blood gas analysis without oxygen supplementation revealed a pH of 7.41, $P_{CO_2}$ of 35 mm Hg, $P_{O_2}$ of 55.7 mm Hg, bicarbonate level of 21.9 mEq/L, and a calculated oxygen saturation of 88.3%. D-dimer test was negative, coagulation studies were normal, and serial troponin I measurements were unremarkable.

Blood and sputum samples were obtained at presentation prior to initiating antibiotic treatment. Blood culture revealed no growth after 5 days; however, the sputum specimen was contaminated with oropharyngeal flora, and culture was not performed. Acid-fast bacilli smears of 3 induced sputum samples were negative, and the culture remained negative after 8 weeks. Urinalysis was unremarkable and urine culture showed no bacteria or growth over 48 hours.

A chest radiograph revealed bilateral basilar atelectasis and left lower lobe opacity, with no signs of active tuberculosis (**Figure 1**). Ultrasound of the lower extremities showed no signs of superficial or deep venous thrombosis. A computed tomography angiogram revealed no evidence of pulmonary emboli; however, ground-glass opacities were noted bilaterally (**Figure 2**). An electrocardiogram showed sinus tachycardia (109 bpm), with normal intervals and complexes and no evidence of acute ischemia or infarct.

*Mr. Constantinescu is a medical student, and Dr. Scott is an assistant clinical professor; both are at the University of California at Los Angeles, Los Angeles, CA.*

**Table 1.** Results of Initial Laboratory Testing in the Case Patient

| Laboratory Test (Units) | Result | Normal Range |
|---|---|---|
| White blood cells (cells/μL) | 19,900 | 4500–11,000 |
| Lymphocytes (%) | 10.2 | 20–40 |
| Monocytes (%) | 6.4 | 2–10 |
| Neutrophils (%) | 79.7 | 41–85 |
| Eosinophils (%) | 3.3 | 1–6 |
| Basophils (%) | 0.4 | 0–1 |
| Sodium (mEq/L) | 136 | 136–142 |
| Potassium (mEq/L) | 3.91 | 3.5–5.0 |
| Chloride (mEq/L) | 104 | 96–106 |
| Carbon dioxide (mEq/L) | 21.2 | 22–28 |
| Blood urea nitrogen (mg/dL) | 10 | 8–23 |
| Serum creatinine (mg/dL) | 0.7 | 0.6–1.2 |
| Blood glucose (mg/dL) | 158 | 70–110 |
| Calcium (mg/dL) | 9.5 | 8.2–10.2 |
| Magnesium (mg/dL) | 2.0 | 1.5–2.3 |
| Phosphorus (mg/dL) | 3.7 | 2.3–4.7 |

### Clinical Course

In the ED, the patient was treated with albuterol and ipratropium nebulizers, with peak expiratory flow measurements in the 200 to 299 L/min range. Intravenous (IV) azithromycin 500 mg and intramuscular ceftriaxone were administered. The patient remained short of breath, and he was admitted to the intensive care unit for close monitoring, where supplemental oxygen, the bronchodilator, and empiric IV antibiotic treatment were continued.

The patient remained stable over the first 24 hours, and he was transferred to an isolated medical ward room for further work-up and treatment. On further questioning by the general medical team, the patient admitted that he had cared for his sister's parakeets 2 weeks prior to admission. The patient had cleaned the bird cage on a number of occasions without wearing a protective mask.

Based on this information, several diagnostic tests were performed and sent for analysis to an outside facility, but the results of these tests became available after the patient was discharged from the hospital. An immunofluorescence assay (IFA) for *C. trachomatis* or other cross-reactive species (eg, *C. psittaci*) showed *Chlamydia* IgG antibody titers of 1:1024 (no exposure, < 1:8; probable past exposure, 1:8–1:128; recent exposure, > 1:128). IFA for anti–glomerular basement membrane antibodies IgG and IgA was negative. Similarly, *Coccidioides* antibody quantified by complement fixation (CF) was negative. *Histoplasma* antigen was negative. *Legionella pneumophila* serogroup 1 antigen in urine was negative. A hypersensitivity pneumonitis II panel was negative for *Aspergillus fumigatus* 2 and 3, *Saccharomonospora viridis*, *Thermoactinomyces candidus*, and *T. sacchari*. Cytoplasmic-staining antineutrophil cytoplasmic antibody (ANCA), perinuclear-staining ANCA, and atypical ANCA testing were also negative (< 1:20).

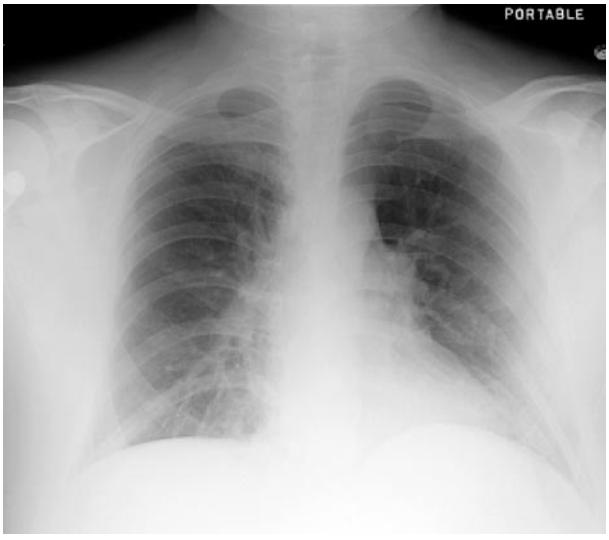


**Figure 1.** Chest radiograph of the case patient on admission showing bilateral basilar pulmonary infiltrates.

Once the patient's leukocytosis normalized, the IV antibiotic treatment was converted to oral doxycycline 100 mg twice daily for presumptive treatment of psittacosis while also covering for other atypical organisms. The patient improved markedly and was discharged on hospital day 3. At discharge, a chest radiograph showed minimal residual left lower lobe opacity (**Figure 3**). A provisional diagnosis of psittacosis was made. The patient completed the course of oral doxycycline as an outpatient and was symptom-free on follow-up visit.

## DISCUSSION

The case patient presented with acute respiratory symptoms, which responded well to antibiotic therapy. The initial differential diagnosis was broad. Given the acute nature of symptoms and hypoxia, pulmonary embolism was highly suspected. However, the history of a productive cough and ill contacts in the presence of a leukocytosis made an infectious etiology more likely. A computed tomography angiogram found no evidence of pulmonary emboli; however, ground-glass opacities were noted bilaterally (Figure 2), raising suspicion for pulmonary hemorrhage (limited Wegener's granulomatosis or Goodpasture's syndrome), atypical infection (eg, *Chlamydia*, *Mycoplasma*, *Legionella* species), or hypersensitivity pneumonitis (*Aspergillus* species). After

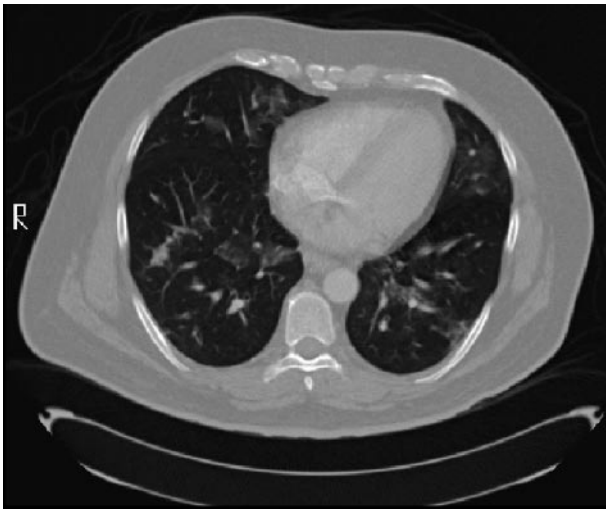


**Figure 2.** Computed tomography angiogram of the case patient showing bilateral ground-glass opacities.

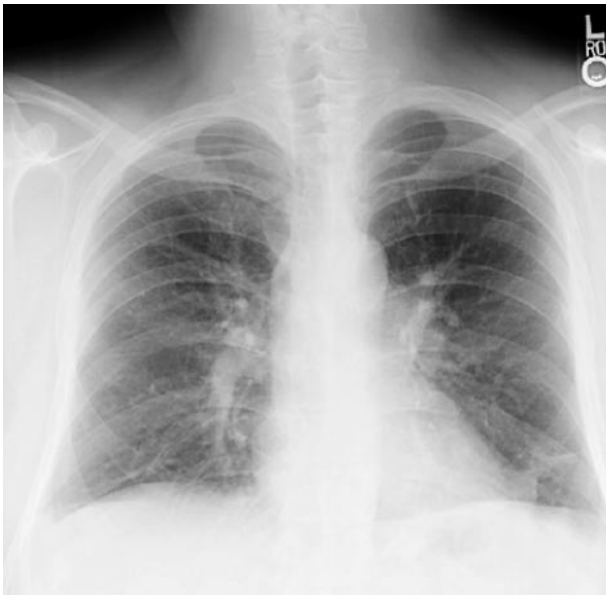

**Figure 3.** Chest radiograph of the case patient at discharge showing minimal residual left lower lobe opacity.

obtaining a thorough social history, atypical pneumonia became the most likely etiology, specifically pneumonia caused by *C. psittaci*. The other possible etiologies were ruled out based on the laboratory investigation. Pulmonary hemorrhage was unlikely because the patient rapidly improved with antibiotic treatment, and his hemoglobin and hematocrit values were stable throughout his hospital stay. Without objective evidence of hemoptysis or bloody sputum, we decided against performing an invasive diagnostic procedure, such as bronchoscopy or lung biopsy. Based on the patient's pertinent history of bird exposure, his clinical presentation, laboratory and imaging findings, and the rapid clinical improvement with antibiotics, we made the probable diagnosis of psittacosis.

## PSITTACOSIS

Psittacosis is thought to be rare, with only 813 cases reported to the Centers for Disease Control and Prevention from 1988 to 1998;[2] since a confirmed diagnosis requires serologic testing, this figure may grossly underestimate the true incidence of the disease. Exposure to infected pet birds, especially psittacine (parrot-type) birds, is the most important risk factor for psittacosis. Infection typically occurs by inhalation of aerosolized dried feces. Many animals, including dogs, cats, horses, sheep and cattle, can become infected with *C. psittaci*; however, mammal-to-person or person-to-person transmission is exceedingly rare.[2,3] Most cases of psittacosis are sporadic, yet outbreaks have been reported in association with pet shops, wild bird infections, and poultry processing plants.[4,5]

**Table 2.** Incidence of Signs and Symptoms of Psittacosis in the United States, 1975–1984

| Sign/Symptom | Patients (%) |
|---|---|
| Fever | 72 |
| Cough | 44 |
| Headache | 38 |
| Weakness/fatigue | 33 |
| Chills | 25 |
| Myalgias | 14 |
| Nausea/vomiting | 13 |
| Anorexia | 11 |
| Diaphoresis | 11 |

Adapted from Kirchner JT, Boyarsky SA. *Chlamydia psittaci*—an uncommon cause of community-acquired pneumonia. Arch Fam Med 1993;2:999.

### Clinical Presentation

Clinical symptoms of psittacosis typically arise after an incubation period of 5 to 14 days or more. Patients usually present with acute onset of fever, chills, headache, malaise, and myalgias (**Table 2**). A gradual onset of symptoms is also possible, or the patient may remain entirely asymptomatic. Patients may have a nonproductive cough; however, more severe infection can cause blood-streaked mucus and shortness of breath, and the symptoms may progress to pneumonia and subsequent respiratory failure.

Physical examination may reveal hepatomegaly

**Table 3.** Diagnostic Characteristics of Psittacosis

| | |
|---|---|
| Clinical description | An illness characterized by fever, chills, headache, photophobia, lower or upper respiratory tract disease, and myalgias |
| Laboratory criteria | Isolation of *Chlamydophila psittaci* from a clinical specimen, or fourfold or greater increase in psittacosis complement fixation antibody titer (≥ 32) between specimens obtained at least 2 weeks apart |
| Case classification | Probable: a clinically compatible illness linked to a confirmed case or with supportive serologic test results (complement fixation antibody titer ≥ 1:32 from ≥ 1 specimens after onset of symptoms) |
| | Confirmed: a clinically compatible illness that is laboratory-confirmed |

Adapted from Kirchner JT, Boyarsky SA. *Chlamydia psittaci*—an uncommon cause of community-acquired pneumonia. Arch Fam Med 1993;2:1000.

(10%), splenomegaly (70%), a macular rash (Horder's spots), splinter hemorrhages, erythema marginatum, urticaria, and erythema nodosum. Endocarditis and myocarditis are rare but known complications.[1,2] White blood cell count may be elevated, often with a left shift and an increase in neutrophils. Acute-phase reactants, such as C-reactive protein and erythrocyte sedimentation rate, are almost always elevated and can be used to differentiate bacterial from viral infections. The most common radiographic findings are lobar consolidation, interstitial opacities, or no abnormalities.

### Diagnosis

Characteristics for diagnosis of psittacosis are summarized in **Table 3**. A probable diagnosis of psittacosis can be made in an adult patient with pneumonia or flu-like illness if there is a history of recent bird contact and marked clinical improvement with doxycycline treatment.[4] Definitive diagnosis of psittacosis is more difficult to obtain, but several techniques are available. Serum can be tested for chlamydial antibodies by CF. A diagnosis can be established by obtaining acute-phase and convalescent-phase specimens 2 weeks after onset of symptoms. All serum specimens should be analyzed simultaneously by the same laboratory. Notably, *C. trachomatis* and *C. pneumoniae* can also produce high antibody titers on CF, but *C. psittaci* can then be distinguished with microimmunofluorescence or polymerase chain reaction.[6,7] Culture of *C. psittaci* from the patient's sputum, pleural fluid, or blood is discouraged because transmission to laboratory personnel is possible and the process is technically difficult.[2]

### Treatment and Prognosis

The first choice of therapy for treating psittacosis is doxycycline 100 mg administered orally twice daily or tetracycline 500 mg 4 times daily given for at least 10 to 14 days to prevent relapse. Severely ill patients can be treated with IV doxycycline at 4.4 mg/kg/day, divided into 2 infusions per day.[2] Erythromycin is less effective than doxycycline but can be used in cases where tetracyclines are contraindicated (eg, tetracycline allergy, pregnancy, children). The prognosis for treated psittacosis is excellent, with a mortality rate of less than 1%.[4]

## CONCLUSION

This case underscores the importance of obtaining a thorough social history. Without the history of parakeet exposure, psittacosis likely would not have been diagnosed in this patient. Although the number of confirmed psittacosis cases reported annually in the United States is very small, undiagnosed psittacosis may be much more common. A confirmed case of psittacosis requires definitive diagnosis through costly and time-consuming laboratory tests, which may be impractical in clinical practice. Antibody titers are rarely obtained when empiric antibiotic treatment is successful, and microimmunofluorescence or polymerase chain reaction assays are largely of academic interest and are not routinely performed. In this case, *Chlamydia* antibody titers were obtained 24 hours after admission to make a definitive diagnosis, once the patient's exposure to birds was revealed. Confirmed cases of psittacosis should be reported to the Centers for Disease Control and Prevention. **HP**

*Corresponding author: Yvette G. Scott, DO, VA Greater Los Angeles Healthcare System, 11301 Wilshire Boulevard (10-C1-PACC), Los Angeles, CA 90073; yvette.scott@med.va.gov.*

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