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Case report

Chlamydia psittaci pneumonia complicated with organizing pneumonia: A case report and literature review

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ABSTRACT

A patient with pneumonia had a fever for 2 weeks. After the initial anti-infection treatment failed, he was diagnosed with *C. psittaci* pneumonia complicated with organizing pneumonia, through next-generation sequencing (mNGS) of bronchoalveolar lavage fluid (BALF) and lung biopsy. He was treated with antibiotics and corticosteroids for 2 months.

Introduction

C. psittaci pneumonia accounts for about 1 % of community-acquired pneumonia [1]. Exposure to birds or poultry is a major risk factor for *C. psittaci* pneumonia [2]. The clinical manifestations of *C. psittaci* pneumonia are atypical and can involve different organs or tissues [3], among which, the lung is the most frequently involved organ. Organizing pneumonia secondary to *C. psittaci* pneumonia is rare, and there are some difficulties in diagnosis and treatment. At present, pathologically confirmed cases of secondary organic pneumonia caused by *C. psittaci* have not yet been reported. Several cases of severe *C. psittaci* pneumonia suspected to be organic pneumonia have been reported previously, but they had not been confirmed histologically, and treatment was difficult.

We introduce a rare case of *C. psittaci* pneumonia complicated with organizing pneumonia. The patient received effective treatment and had good prognosis.

Case report

A 56-year-old man was admitted to our hospital on August 28, 2021 with a 2-week history of fever. Two weeks prior, the patient had developed a fever, with a temperature reaching 39 °C, accompanied by cold and chills. He received anti-infection treatment at a local hospital, but the fever persisted. He was then transferred to our hospital. The patient had no recent history of contact with poultry or birds. Physical examination upon admission revealed a body temperature of 37.7 °C, pulse rate of 84 bpm, blood pressure of 165/81 mmHg, respiratory rate of 45 bpm, and no rales in either lung. Laboratory examination indicated white blood cell (WBC) 7.39 × 10^9/L, neutrophil percentage 80.0 %, hemoglobin 130 g/L, platelet 243 × 10^9/L, C-reactive protein (CRP) 127.74 mg/L, erythrocyte sedimentation rate (ESR) 101 mm/h, neuron-specific enolase 24.15 ng/mL, and ferritin 812.28 ng/mL. There were no obvious abnormalities in blood culture, sputum culture, procalcitonin (PCT), liver and kidney function, coagulation function, IgM detection of respiratory pathogens, autoantibodies, electrocardiogram, and ultrasonic cardiogram. Abdominal ultrasonography showed a hypoechoic area in the liver, indicating a heterogeneous fatty liver. Chest computed tomography (CT) showed a patchy high-density shadow spread in the lower lobe of the left lung, as well as the presence of an air bronchogram sign (Fig. 1 **A**).

After admission, the patient was treated with intravenous piperacillin/tazobactam (4.5 g 8-hourly). However, his temperature remained constant. On day 3 of admission, he was switched to biapenem (0.3 g 6-hourly). At the same time, the patient was advised to undergo bronchoscopy, which showed no foreign bodies, neoplasms, caseous lesions, or bleeding. Radial ultrasound bronchoscopy (RP-EBUS) demonstrated a hypoechoic shadow in the left posterior basal segment, and a biopsy was performed. mNGS of BALF showed evidence of *C. psittaci* infection. On day 6 of admission, intravenous moxifloxacin

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(0.4 g daily) was administered. Re-examination showed the following: WBC, 4.87 × 10^9/L; CRP, 12.73 mg/L; and ESR, 66 mm/h. The patient had no fever, and was discharged after 4 days. After discharge, moxifloxacin (0.4 g daily) was administered orally. On day 4 after discharge, bronchoscopic lung biopsy revealed chronic inflammation of the respiratory tract mucosa with submucosal fibrovascular hyperplasia, and the surrounding lung tissue showed changes of organizing pneumonic (Fig. 2). Re-examination of chest CT indicated that the pneumonia had progressed to more severe disease (Fig. 1 **B**). The patient was diagnosed with *C. psittaci* pneumonia secondary to organizing pneumonia and was re-hospitalized. The patient was treated with intravenous moxifloxacin (0.4 g daily) and methylprednisolone (40 mg daily for 7 days, 20 mg daily for 7 days) for 2 weeks. Re-examination showed that CRP had returned to normal level, and he was discharged. After discharge, moxifloxacin (0.4 g daily) was administered orally for 1 week. Then, he was switched to clarithromycin (0.5 g daily) orally for another 1 month. Simultaneously, the patient continued oral methylprednisolone (16 mg for 2 weeks, then gradually reduced). The total course of moxifloxacin sequential clarithromycin and glucocorticoid therapy was 2 months, and the patient stopped taking the medication by himself. The white blood cell count and CRP levels were normal upon outpatient re-examination, and chest CT suggested gradual absorption of the lung lesions (Fig. 1 **C–F**). The patient was followed up for 6 months and reported no discomfort.

Discussion

C. psittaci pneumonia is a zoonosis caused by the spread of *C. psittaci* from birds to humans. Its symptoms include fever, headache, myalgia, dry cough, changes in consciousness, photophobia, hepatosplenomegaly, and pharyngitis [4]. Severe cases may include rhabdomyolysis [5], severe pneumonia [6]. In this case, the patient did not have other organ dysfunction, but did present with organizing pneumonia, which has been rarely reported.

The imaging manifestations of *C. psittaci* pneumonia are nonspecific and can be characterized by massive or bilateral pneumonia [7], consolidation with bronchial inflation signs, or a small amount of pleural effusion [8]. The patient presented with a patchy high-density shadow on one side with an inflatable bronchial sign, which was consistent with the above characteristics. *C. psittaci* is an intracellular Gram-negative bacterium that is difficult to culture. mNGS can be used as an early and effective method for diagnosing *C. psittaci* pneumonia [9]. The treatment of *C. psittaci* should include antibiotics with strong Gram-negative activity in cells, such as tetracycline, macrolides, and quinolones. In Chinese patients, the resistance rate to macrolides and tetracyclines has increased, and some reports have suggested that quinolones are effective [10]. In this report, the patient was diagnosed with *C. psittaci* pneumonia complicated with organizing pneumonia, and moxifloxacin and clarithromycin were used successively, with remarkable effects.

Organizing pneumonia secondary to *C. psittaci* pneumonia is a rare condition, and the time boundary between infection and organizing pneumonia is unclear. The diagnosis of organizing pneumonia mainly depends on pathological examination. Currently, the treatment mostly refers to glucocorticoid treatment of interstitial lung disease, which has a significant effect [11], but the reduction process is prone to relapse. It has been reported that macrolides can achieve good results in patients with mild organizing pneumonia [12]. In our case, the patient was ultimately switched to clarithromycin for 1 month. The total course of moxifloxacin sequential to clarithromycin and corticosteroids was 2 months, and the prognosis was good during follow-up.

Although there have been some reports of *C. psittaci* pneumonia and organizing pneumonia worldwide, to the best of our knowledge, few histologically confirmed cases of secondary organizing pneumonia caused by *C. psittaci* have been reported. Several cases of severe *C. psittaci* pneumonia suspected to organizing pneumonia have been reported previously [13,14]. However, they had not been confirmed histologically.

In conclusion, we present a case of *C. psittaci* pneumonia complicated with organizing pneumonia. He was successfully treated with moxifloxacin sequential to clarithromycin combined with corticosteroids for 2 moths, and the prognosis was good.

CRediT authorship contribution statement

Yidan Gao designed the report and was responsible for writing articles; Ling Gong and Jing liu collected case materials and accessed to literature; Gongying Chen, and Xiangbo Zhang were responsible for

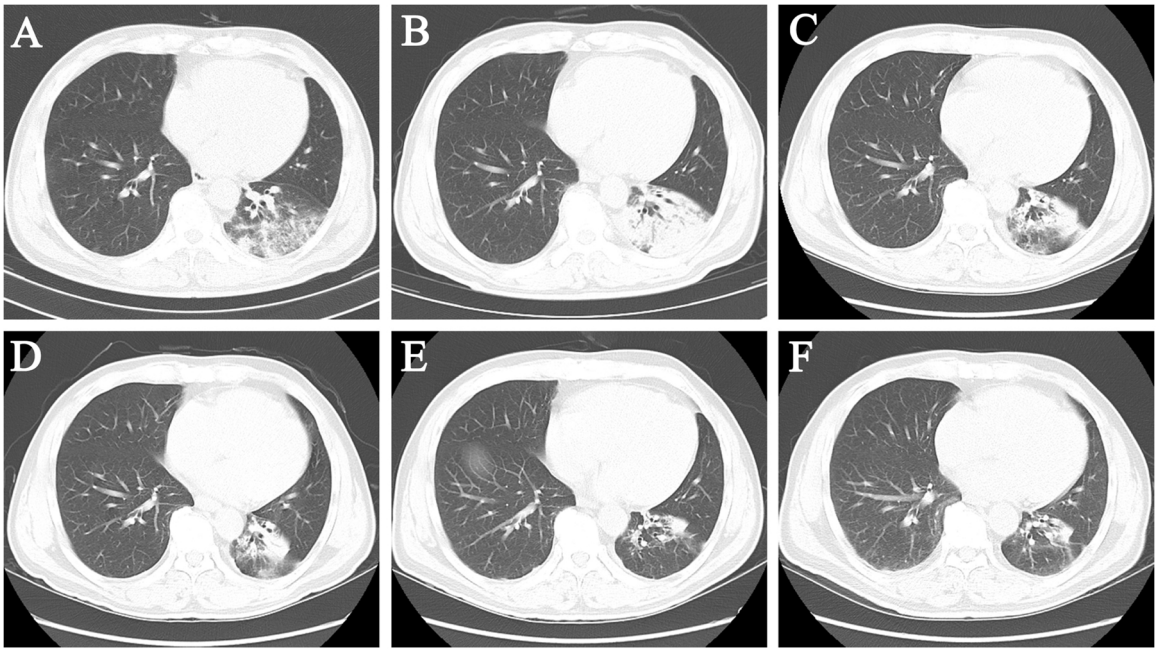

Fig. 1. Chest computed tomography scan at admission (**A**), 12d later (**B**), 21d later (**C**), 33d later (**D**), 40d later (**E**), and 54d later (**F**).

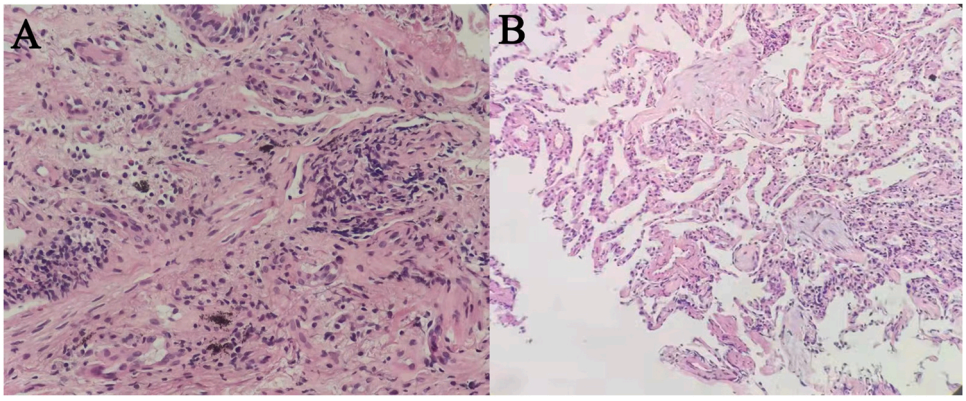

Fig. 2. Pathologic examination showed (hematoxylin-eosin staining, **A:** x 400, **B:** x 100): chronic inflammation of the respiratory tract mucosa with submucosal fibrovascular hyperplasia, and the surrounding lung tissue showed changes of organizing pneumonic.

analyzing and supplementing medical records; Xiang Zhou evaluated and reviewed articles. All authors read and approved the final version of the manuscript.

Ethical approval

We hereby confirm that we have read and complied with the policy on ethical consent.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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Declarations of Competing Interest

We declare that we have no competing interest associated with this manuscript.

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