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Case Report

Round pneumonia due to *Chlamydia pneumoniae* in a child

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ARTICLE INFO

Article history:

Received 24 December 2018

Revised 8 January 2019

Accepted 13 January 2019

Available online 18 January 2019

Keywords:

Round pneumonia

Chlamydia pneumoniae

Child

ABSTRACT

Round pneumonia is a disease commonly recognized in the pediatric age group, especially under the age of 8 years. *Streptococcus pneumoniae* is the most common agent causing this characteristic type of pneumonia. We herein report a case of a 6-year-old boy with only mild cough and low-grade fever who was then diagnosed with round pneumonia due to *Chlamydia pneumoniae*. He had multiple round opacities in the right lower lung field, and the symptoms subsided soon after oral administration of antibiotics.

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Introduction

Round pneumonia is a term referring to round or oval densities on chest X-ray, and often recognized in the pediatric age group, especially under the age of 8 years [1,2]. Round pneumonia is well known to radiologists, but it is rare for the pediatricians to encounter the patients with this characteristic shape of pneumonia mimicking lung mass. Therefore it is a burden for physicians to differentiate round pneumonia from other diseases such as bronchogenic cysts, carcinoma, or neoplasm metastases [2–4]. Herein we report a case of a child with round pneumonia, which was diagnosed as *Chlamydia pneumoniae* (formerly called *Chlamydophila pneumoniae*) with the increase of serum antibody titer.

Case report

A 6-year-old Japanese boy presented to his primary care physician with 2 days history of low-grade fever and cough during night. He reported no recent travel, sick contacts, or environmental exposures, and did not have any severe medical history. His physician performed a chest X-ray in the clinic, which was abnormal, and the patient was referred to our institution for diagnostic work-up.

The patient's body weight was 17kg, and temperature was 37.1°C. His physical examination was unremarkable except for decreased breath sound on right lung field. His white blood cell count was 5200 cells/ μ L (57% neutrophils, 36% lymphocytes, and 5% monocytes). Serum lactate dehydrogenase and

Competing Interests: The authors declare that they have no conflicts of interest associated with this case report.

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<https://doi.org/10.1016/j.radcr.2019.01.010>

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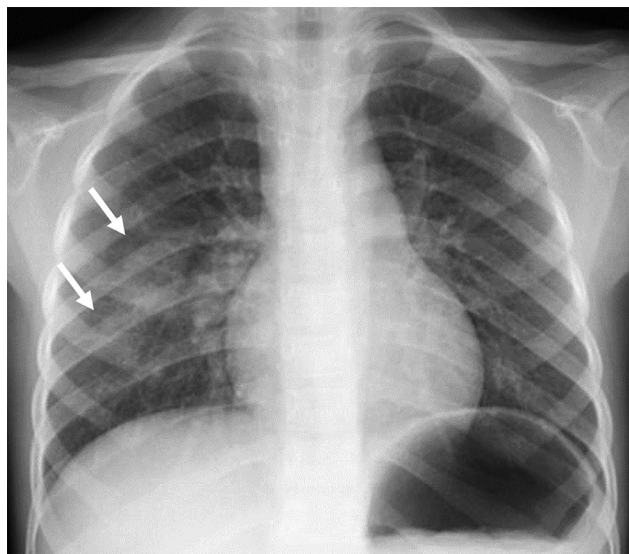


Fig. 1 – Chest X-rays at presentation showed 2 round opacities in the right lower lung field (white arrows).

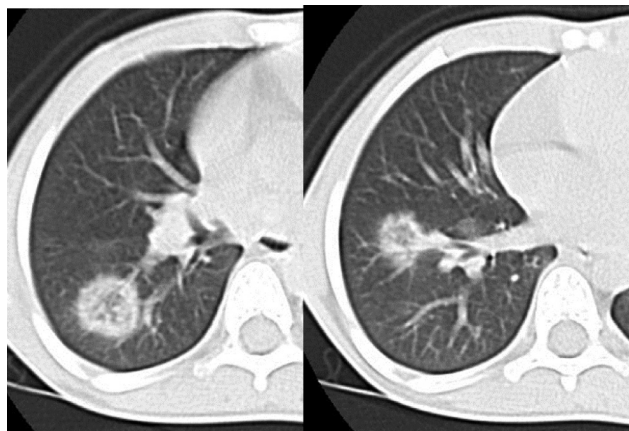


Fig. 2 – Two nodular high-density shadows with fuzzy boundaries were seen in lower lobe of the right lung on chest CT scan.

C-reactive protein were 270 U/L and 0.05 mg/dl, respectively. Chest X-ray at his primary physician's clinic revealed 2 round-shaped opacities with clear margins in the right lower lobe (RLL) (Fig. 1)

Upon arrival to our facility, the patient underwent a CT scan that demonstrated 2 lesions of air space consolidation in the RLL (Fig. 2). These findings raised the concern of a tumor in the chest. However, we considered the lesions to be highly likely pneumonia because his respiratory symptoms were without ill appearance and there were no significant abnormalities on laboratory data such as the elevation of serum lactate dehydrogenase. In addition, bacterial pneumonia due to *S. pneumoniae* had been thought to be less likely because there were neither leukocytosis nor elevation of

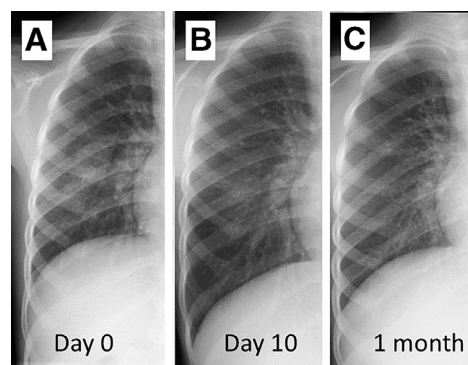


Fig. 3 – Serial follow-up of chest X-rays (A) at presentation, (B) day 10 and (C) 1 month after the first visit. Note the gradual resolution of round pneumonia (white arrows).

C-reactive protein. Thus we decided to start therapeutic trial with oral antibiotics. He was given oral clarithromycin effective for atypical pneumonia for 10 days.

Two days later, the patient became afebrile, and cough improved. On the tenth day after antimicrobial agent began, the RLL opacities became less dense. One month later after his first visit to our institute, follow-up chest X-ray showed complete resolution of the RLL lesions (Fig. 3). Serum titers for mycoplasma were negative, as were serum antigen of cryptococcus and candida. At this point, he was diagnosed as having round pneumonia due to *C. pneumoniae* based on the confirmation of increased serum IgM and IgG titers of anti-*C. pneumoniae* antibody.

The patient was lost to follow-up, and unable to sign consent after multiple attempts to contact the patient and parents. All personal identifiable information has been removed in this article.

Discussion

Round pneumonia is identified by spherical or oval lesions distributed nonsegmentally on chest X-ray, which sometimes mimics those of lung masses. This characteristic pneumonia is generally thought to be a disease in children younger than 8 years, because of their underdeveloped interalveolar connections (pores of Kohn, channels of Lambert) that may cause the centrifugal spread of inflammation and make the consolidation spherical with sharp margins [1-5].

For diagnosis of round pneumonia, it is generally thought that CT should be avoided in children because of the radiation exposure, and must be reserved only for specific situations where there is diagnostic uncertainty [1-3]. In a series of 109 children with round pneumonia described by Kim and Donnelly, almost all the patients had solitary lesions (98%) and the borders of the lesions had been well defined (70%) [1]. In our case, chest CT scan was performed to confirm the diagnosis, because chest X-rays showed multiple (2) round lesions with unclear boundaries. CT revealed that there were 2 round densities in the right lower lobe with air

bronchograms within, barely touching the pleura, and were no adenopathy. These findings were thought to be compatible with round pneumonia. The patient's good condition permitted us to take a therapeutic trial with oral antibiotics. As the respiratory symptoms improved soon after the antimicrobial therapy started and the lesions completely resolved, the diagnosis of round pneumonia was confirmed. The CT findings in our patient, which suggested a very low likelihood of malignancy, were helpful not to do further examinations. Although the indication of CT should be decided strictly, we do not need to hesitate to take it even when there are unusual findings.

The etiology of round pneumonia is thought to be bacterial, and *Streptococcus pneumoniae* is the most common agent [2–4]. To our knowledge, no cases of round pneumonia due to *C. pneumoniae* have been reported in English literature to date. In our patient, blood culture and urinary antigen test were not done. Therefore the possibilities of *S. pneumoniae* involvement in this case were not denied. However, we diagnosed him as having *C. pneumoniae* pneumonia because of 3 reasons. First, the test kit for *C. pneumoniae* IgM had a sensitivity of 95.3% and specificity of 91.8% [6], thereby indicating a high likelihood of *C. pneumoniae* infection in this child. Second, most of *S. pneumoniae* detected in our hospital were resistant for clarithromycin effectiveness. Our patient had resolved soon after antibiotics therapy. Finally, *C. pneumoniae* is one of the usual pathogens of community acquired pneumonia in Japan [7,8], for which clarithromycin is effective. *Mycoplasma pneumoniae* is also a common pathogen of community-acquired pneumonia, and sensitive to clarithromycin. The possibility of *Mycoplasma pneumoniae* pneumonia was serologically denied. We believed that both of these laboratory test results and his clinical response to oral antibiotics strongly supported our diagnosis.

Difficulty to establish a definitive diagnosis of *C. pneumoniae* is one of the problems because cell culture and PCR-assays are not available in daily practice, and there are no rapid antigen tests for it. It is recommended to observe the significant increases in IgM and IgG antibody titer between paired sera [9], but we need an interval of 2–3 weeks after the onset of illness in this diagnostic procedure. Most of the patients with respiratory tract infections caused by *C. pneumoniae* are reported to have minimal symptoms [10], so it may be judged that there is no need for second laboratory tests a couple of weeks later. Our experience suggested that *C. pneumoniae* should be taken into consideration when the patient's respiratory symptoms are mild, or when antimicrobial therapy for *S. pneumoniae* does not work.

In conclusion, we have reported a first case of pediatric round pneumonia with 2 lesions due to *C. pneumoniae*, the diagnosis of which had been serologically established. Infection with *C. pneumoniae* should be added to the lists of the agents causing round pneumonia. Multiple lesions and symptoms resolved after the introduction of oral antibiotics therapy.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.radcr.2019.01.010](https://doi.org/10.1016/j.radcr.2019.01.010).

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