https:/doi.org/10.64611/UBGN6725

Pediatric Pulmonary Coccidioidomycosis Presenting as Lung Abscess with Delayed Serologic Positivity

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Conflict of Interest Statement:
The authors declare they have no conflict of interest relevant to this manuscript.

Funding Statement:
No external funding was received for the preparation, research, authorship, or publication of this manuscript

Word Count:
1505

Date of Submission: 06/03/26
Paper includes 1 figure

https:/doi.org/10.64611/UBGN6725

Abstract

Pulmonary coccidioidomycosis is an endemic fungal infection primarily seen in the southwestern United States, presenting with symptoms resembling community-acquired pneumonia. A pediatric case presenting with cavitary disease or lung abscess due to coccidioidomycosis is uncommon and can potentially lead to diagnostic delays if this diagnosis is not on a clinician's radar. This case study presents a 12-year-old male from California's San Joaquin Valley who initially presented with a two-week history of cough, fever, and right-sided chest pain, while early imaging at the hospital displayed a right lung opacity. Upon following computed tomography (CT) imaging, a 6.2-cm cavitary lesion similar to a pulmonary abscess was seen. The patient subsequently met sepsis criteria and was admitted for treatment with intravenous antibiotics and antifungal therapy due to the regional prevalence of Coccidioides. Initial infectious workup and coccidioidal serologies were negative during early hospitalization; however, a repeat coccidioidal serology later in the hospital course showed seroconversion with positive immunoglobulin M antibodies. The patient improved clinically with combined antibacterial and high-dose fluconazole therapy without requiring consultation from the surgical management. Follow-up outpatient imaging displayed a moderate reduction of the abscess. This case displays an irregular presentation of pediatric pulmonary coccidioidomycosis with delayed serologic positivity and highlights the significance of having a continued suspicion in endemic areas when assessing cavitary pulmonary lesions.

Keywords: Coccidioidomycosis, Abscess, Seroconversion, Cavitation, Fluconazole, Sepsis

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Introduction

Coccidioides spp. is a fungus found mainly in desert regions in the western hemisphere in sandy soil. The majority of this species is found in Arizona and California; however, evidence indicates that some cases have occurred outside its endemic range. Coccidioidomyocosis, also known as valley fever, is a fungal infection caused mainly by *Coccidioides immitis* and *Coccidioides posadasii*, with multiple reported cases in the San Joaquin Valley across all age groups.[1] Patients inhale arthroconidia that remodel into spherules, which eventually rupture, triggering acute inflammation. Neutrophils and eosinophils are recruited to the area, ultimately leading to a pulmonary illness similar to community-acquired pneumonia.[2] In pediatric patients, cavitary pulmonary lesions are most commonly associated with bacterial infection, aspiration, or underlying structural abnormalities, whereas adult cavitary disease is more often associated with aspiration, malignancy, tuberculosis, endemic fungal infections, or lung disease related to chronic exposures and lifestyle factors.[3]

Pulmonary symptoms that arise range in severity from mild respiratory symptoms to disease processes such as nodules, cavitary lesions, or disseminated infections.[4] In immunocompetent patients, significant serum IgM levels of coccidioidomycosis usually become present 1 to 3 weeks after symptom onset.[5-6] In pediatric patients, cavitary pulmonary lesions are usually due to bacterial infection or infection instead of a fungal infection. A collection of pus forms from infectious necrosis, forming a lung abscess.[7-8] Large cavitary lesion and air-fluid level on imaging pointed towards a bacterial pulmonary abscess early on in this case study. Laboratory testing is needed to diagnose coccidioidomycosis, but it can be difficult to obtain because serological testing may be falsely negative, as the immune response can take time to

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develop. Thus, if suspicion of coccidioidomycosis is high, physicians should continue to retest even if results are negative.[9]

This case report recounts a pediatric patient from an endemic region who had a large cavitary pulmonary lesion that was initially thought to be a bacterial lung abscess, but was later confirmed to be pulmonary coccidioidomycosis.

Case Presentation

A healthy 12-year-old male presented to the emergency department with a two-week history of productive cough and a three-day history of right-sided chest pain, shortness of breath, and post-tussive emesis. The patient's mother reported intermittent fevers, endorsing a maximum temperature of 38.7 °C. One week prior to the presentation, the patient was evaluated at another facility and discharged with an albuterol inhaler without an improvement in his symptoms.

Upon arrival at the emergency department, vital signs were abnormal with a fever of 38.7 °C and tachycardia at 139 beats per minute. Physical examination was unremarkable except for diminished breath sounds over the right lung field. A chest x-ray taken at this visit showed a 7-cm opacity in the right mid-lung region without other abnormalities. Once the patient's fever subsided, he was discharged.

Three days later, the patient returned to the emergency department with persistent fever, worsening cough, and pleuritic chest pain, while repeat imaging displayed a round density with an air-fluid level suggesting a cavitary disease (Figure 1).

Laboratory evaluation showed an elevated white blood cell count of 14.2 x 10^9/L and an elevated C-reactive protein (CRP). Since the patient met the criteria for sepsis, he was admitted to the pediatric unit and given intravenous (IV) fluids and antimicrobial therapy. Initially, the

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patient received IV ampicillin-sublactam for a possible bacterial lung abscess along with fluconazole due to the patient residing in a region known for coccidioidomycosis.

A wide variety of infectious tests were ordered, including respiratory viral panel, tuberculosis testing, HIV screening, blood cultures, sputum cultures, and serological testing for multiple fungal and bacterial pathogens. Initial infectious workup was negative for viral, bacterial, and fungal etiologies, including non-reactive coccidioidal serology.

During the hospital course, the patient experienced intermittent fevers for several days, but slowly improved with therapy. With ongoing concern for possible coccidioidomycosis, Fluconazole was initially started at 400 mg and was quickly increased to 800 mg per Infectious Disease recommendations

Once the patient completed 10 days of IV antibiotics, he was transitioned to oral amoxicillin-clavulanate due to clinical improvement and resolution of fever. After remaining afebrile for more than 96 hours with sustained hemodynamic stability and adequate oxygenation, he was discharged home on oral antibiotics and fluconazole therapy.

During the follow-up outpatient visit a week after discharge, which was 4-5 weeks after symptom onset, the patient had significant improvement in his symptoms with only minimal cough and a single episode of hemoptysis. Repeat serological testing displayed minimally reactive coccidioidal immunoglobulin M antibodies, while chest radiography two weeks after discharge displayed decreased consolidation in the right upper lobe of the lung and a decrease in the cavitary lesion.

At the next follow-up one month after discharge, the patient was fully asymptomatic and was back to normal activities. Repeat imaging showed improvement in the pulmonary abscess,

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and the patient remained on antifungal therapy, with continued follow-up by infectious disease and pulmonology.

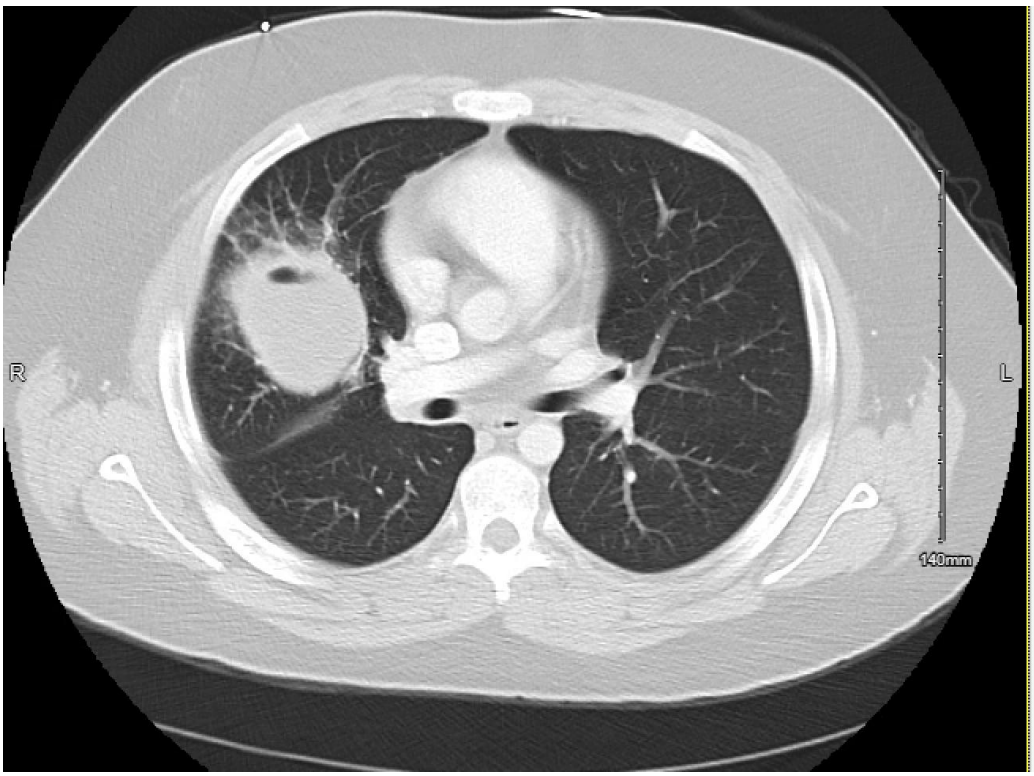

Figure 1. **CT Axial slice of the chest.** The chest CT demonstrates a 6.2-cm thick-walled gas-and-fluid collection in the right upper lobe, consistent with a pulmonary abscess.

Discussion

This case highlights important diagnostic and management challenges in pediatric cavitary pulmonary disease in regions endemic for coccidioidomycosis. Although cavitary lung lesions in children are initially approached as a bacterial lung abscess, persistent symptoms despite appropriate empiric therapy should prompt reassessment of the differential diagnosis. In endemic regions, clinicians should maintain a high level of suspicion for coccidioidomycosis despite its relative rarity in the pediatric population.

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A key takeaway from this case is that early serologic testing for coccidioidomycosis may be falsely negative, particularly before a detectable immune response has developed. Therefore, a negative initial serology should not exclude the diagnosis when clinical suspicion remains high. In this patient, coccidioidal antibodies became minimally reactive only 4- 5 weeks after symptom onset, thus supporting the importance of continued reassessment based on clinical suspicion and epidemiological risk.[5-6]

This case also demonstrates that medical management alone may be effective in selected pediatric patients with cavitary pulmonary coccidioidomycosis. The patient improved clinically after treatment with broad-spectrum antibiotics and fluconazole, with resolution of fever, improvement in respiratory symptoms, and an interval decrease in the cavitary lesion on follow-up imaging. Surgical intervention was therefore not required. In endemic regions, this clinical course supports consideration of early antifungal therapy in addition to empiric antibacterial coverage when clinical suspicion for coccidioidomycosis remains high, particularly in patients with persistent symptoms, epidemiologic risk factors, or a delayed response to initial therapy.[10] This clinical course demonstrates the potential role of early antifungal therapy, close clinical monitoring, and serial imaging in guiding management decisions.

Overall, this case emphasizes the need for broad differential diagnosis, careful re-evaluation of early serological testing, and ongoing reassessment when pediatric cavitary pulmonary disease does not follow the expected clinical course. Multidisciplinary care and close outpatient follow-up are essential for assessing clinical response and guiding the duration of medical therapy.

Conclusion

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Pediatric pulmonary coccidioidomycosis can present with cavitary lesions and delayed serologic positivity, making early diagnosis challenging. In endemic regions, clinicians should maintain a high index of suspicion in pediatric patients with persistent respiratory symptoms or cavitary lung disease, even when initial serologies are negative. Repeat serological testing should be pursued when clinical suspicion remains high. This case highlights that initial serologic testing for coccidioidomycosis may be negative due to delayed seroconversion and that early medical management with antibacterial and antifungal therapy can lead to clinical improvement and a reduction in cavity size without surgical intervention. This case recognizes that early recognition, initiation of appropriate empiric therapy, and close clinical monitoring are essential to optimize outcomes.

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