

A Pneumothorax in the Setting of COVID-19 Associated Pneumatocoeles in a Pediatric Patient

Esther Blondeau-Lecomte¹ and Nancy Joseph¹

¹University of Florida

March 8, 2022

A Pneumothorax in the Setting of COVID-19 Associated Pneumatocoeles in a Pediatric Patient

Esther Blondeau-Lecomte, BA¹, Nancy Joseph, MBBS¹

¹Department of Pediatrics, University of Florida, Gainesville, FL, USA

Corresponding Author:

Esther Blondeau-Lecomte, BA

Medical Student

Email Address: eblondeaulecomte@ufl.edu

To the editor,

A 5-year-old male with no significant past medical history presented to an urgent care with fever, cough, vomiting, and wheezing. He tested positive for COVID and was sent home with an albuterol inhaler due to concern for reactive airway disease exacerbation. He initially improved, but 5 days later, had worsening cough and new acute onset sharp, stabbing right shoulder pain that did not resolve with acetaminophen. This development prompted his mother to bring him to the emergency department (ED). On presentation, the patient appeared in respiratory distress with tachypnea and an SpO₂ 88%. Patient was afebrile. On physical exam, lung sounds were decreased throughout the right lung. Cardiac and abdominal exams were normal.

In the ED, a chest x-ray showed a large partially loculated tension pneumothorax, with consolidation of the right lung and left perihilar interstitial infiltrate (figure 1). The patient was immediately started on enoxaparin, ceftriaxone, remdesivir, and dexamethasone. The patient was subsequently admitted to the intensive care unit, where the pneumothorax was decompressed with chest tube placement. The patient was started on azithromycin. After decompression, the patient became hemodynamically and clinically stable. On a follow-up chest x-ray examination to evaluate chest tube placement and pneumothorax resolution, right lung patchy airway opacities, most notably in the perihilar region, were noted. The patient then underwent computerized tomography (CT) of the chest which showed a multiseptated 6.4 x 5.1 x 4.8 cm cystic right upper lobe mass, with dependent fluid levels and subjacent loculated effusion (figure 2). The findings were concerning for pneumatocele. Pediatric surgery was consulted and determined that surgical intervention was not necessary. Infectious disease and pulmonology also recommended continuing ceftriaxone and oral clindamycin as an outpatient due to the concern for infection. Before discharge, a repeat CT chest showed a large multilobulated cystic pulmonary mass, with multiple septations in the apical and posterior segments of the right upper lobe, similar in size when compared to previous imaging but with decreased internal fluid. The findings were favored to represent an infectious pneumatocele over a traumatic pneumatocele. Of note, patient was retested for COVID on 10 days after his initial positive test and was found to be COVID negative.

In this case, we hypothesize that COVID associated pneumatoceles led to a pneumothorax resulting in the acute presentation of this pediatric patient.

Pneumatoceles are air-filled, thin-walled cysts that form in the lung interstitium. They are often associated with infection, trauma, or with more extensive lung diseases, and are common in the pediatric population¹. There have been increasing reports of pneumatoceles in COVID pneumonia adult patients. The pathophysiology behind COVID-related pneumatoceles is not completely understood, but it is hypothesized that as the virus targets alveolar epithelial cells and triggers a cytokine storm, it can lead to alveoli rupture and subsequent formation of cystic air space lesions².

Although most cases of COVID related pneumatoceles have been reported in adults, there are two cases reported in the pediatric population. The youngest patient described in the literature to have COVID pneumatoceles is a 20-month-old boy who presented to the emergency department with a 6 day history of cough and was found to be COVID positive³. The other case was in a 16-year-old with recurrent B cell acute lymphoblastic leukemia who developed respiratory failure from COVID and required mechanical ventilation⁴.

Our patient therefore serves as an additional documented case of COVID related pneumatocele in children. However, our patient is unique because it is the first documented case of pneumothorax associated with pneumatoceles in a COVID positive pediatric patient. Pneumothoraces are a known complication of pneumatoceles as edema, vascular congestion, or microthrombi can result in the rupture of these thin-walled cysts leading to air accumulation around the lung.¹⁵.

Although COVID likely explains the development of the pneumatoceles progressing to a pneumothorax, we cannot rule out that the pneumatoceles in our patient were a result of the direct impact from the chest tube decompression of a spontaneous pneumothorax. However, the chest tube placement rarely causes pneumatoceles, and the initial radiologic impression favored pneumatoceles from an infectious source.

As aforementioned, this case is likely the first reported COVID related pneumothorax in the setting of pneumatoceles in a child. It is especially interesting given our patient's relatively benign course of COVID. Before the pneumothorax, he was hemodynamically stable at home with only mild symptoms. As we learn more about the presentations of COVID infections, it is important to keep pneumatoceles and their complications on our differential diagnoses. If a patient shows up to the ED complaining of acute onset chest or pleuritic pain and dyspnea in the setting of a COVID infection, it is important to consider pulmonary embolisms due to the COVID induced hypercoagulable state⁶. However, our case also demonstrates that it is also important to consider COVID induced pneumothoraces.

Furthermore, the case serves as a reminder serves as a reminder of the importance of COVID precautions and vaccinations in the pediatric population, as even children with no comorbidities are at risk for long term sequelae and consequences from a COVID infection. Even if this patient cleared the COVID infection within 10 days of testing positive, pneumatoceles remained present and he will require long term antibiotics and follow up with infectious disease specialists.

To summarize, this patient was a 5-year-old boy who presented to the ED and was found to have a pneumothorax in the setting of recently testing positive for COVID. After chest tube placement and lung decompression, the CT chest demonstrated cystic pulmonary mass with multiple septations consistent with pneumatoceles. As there have been previous reports of COVID related pneumatoceles in adults, we hypothesized that this patient's pneumothorax was directly related to the COVID induced pneumatoceles.



References

1. Jamil A, Kasi A. Pneumatocele. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2021.
2. Hamad A-MM, El-Saka HA. Post COVID-19 large pneumatocele: clinical and pathological perspectives. *Interactive Cardiovascular and Thoracic Surgery*. 2021;33(2):322–324. doi:10.1093/icvts/ivab072
3. Özgür C, Doğan C. Multiple pneumatoceles and diffuse ground-glass opacities in a 20-month-old boy with COVID-19 pneumonia. *Respirology case reports*. 2021;9(10):e0842. doi:10.1002/rcr2.842
4. Euroelso 2021 poster abstracts. *Perfusion*. 2021;36(1_suppl):4–81. doi:10.1177/02676591211007763
5. Goldberg C, Carey KE. Bullous lung disease. *The Western Journal of Emergency Medicine*. 2013;14(5):450–451. doi:10.5811/westjem.2013.3.16276
6. Ahuja N, Bhinder J, Nguyen J, Langan T, O'Brien-Irr M, Montross B, Khan S, Sharma AM, Harris LM. Venous thromboembolism in patients with COVID-19 infection: risk factors, prevention, and management.

