

# A rare complication of COVID-19 infection: bilateral spontaneous pneumothorax and pneumomediastinum

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## Abstract

Coronavirus 2019 (COVID-19) infection has affected the whole world since the end of 2019. Patients with the disease may present with various symptoms and develop various associated complications. Spontaneous bilateral pneumothorax and pneumomediastinum can also be detected in patients with COVID-19 who do not receive positive pressure ventilation support and do present with an intense cough. A case of bilateral spontaneous pneumothorax and pneumomediastinum over the course of the COVID-19 infection in a young male patient is reported.

**Keywords:** COVID-19, Spontaneous pneumothorax, Pneumomediastinum

## Introduction

In late 2019, coronavirus disease (COVID-19) caused by acute severe respiratory syndrome coronavirus 2 (SARS-CoV-2) started in China and rapidly spread worldwide, causing a pandemic. Although most patients with COVID-19 show a course of viral pneumonia with good prognosis, in some cases, the disease progresses rapidly to acute respiratory distress syndrome (ARDS), a severe form of acute lung injury [1]. The first COVID-19 case in Turkey was observed on November 3, 2020; in the following eighteen months, the number of cases exceeded six million, and the number of deaths exceeded 50,000.

The occurrence of bilateral spontaneous pneumothorax (BSP) in COVID-19-associated pneumonia has not been widely reported in the literature so far, except for a few cases [2]. Therefore, our case was documented because BPS is a rare complication that may be encountered in COVID-19 patients.

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## Informed Consent

The authors stated that they reached the relatives of the patient, whose data they shared in the article. A signed consent was obtained from his wife and father.

## Conflict of Interest

No conflict of interest was declared by the authors.

## Financial Disclosure

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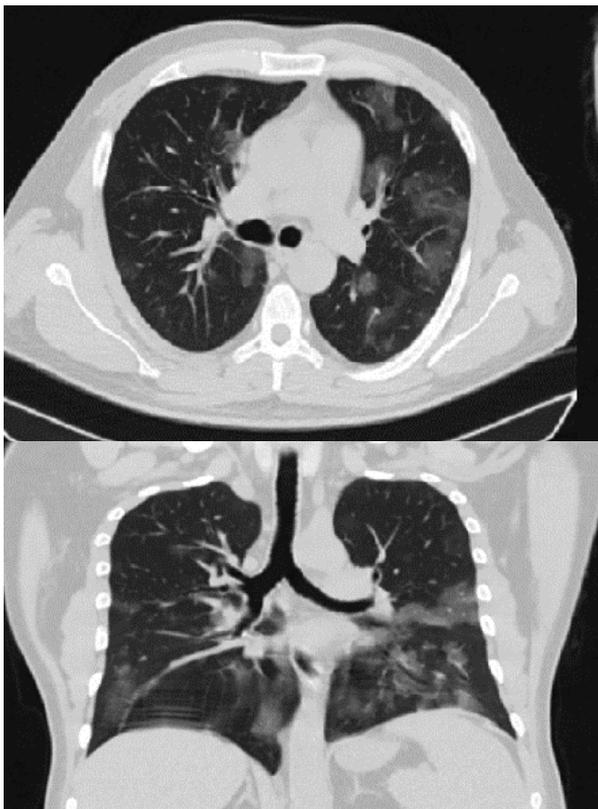
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## Case presentation

This case study presents a 40-year-old male patient with a history of mild creatinine elevation and who was not undergoing any medical treatments. He was admitted to the emergency department with fever ( $> 39^{\circ}\text{C}$ ) and diffuse muscle–joint pain. He was a non-smoker. On physical examination, his general condition was good. His blood pressure was 120/70 mmHg, pulse 110, respiratory rate 16, oxygen saturation 94, and fever  $36.5^{\circ}\text{C}$ . No pathology was found in the respiratory system examination. No shortness of breath or cough was reported. Upon observing patchy ground-glass opacities in both lungs on thorax computed tomography (CT), he was considered at high risk for COVID-19 and then hospitalized (Figure 1). Based on blood test results, fibrinogen was 559 mg/dl, white blood cell (WBC) count was 21.7 K/uL, creatinine 2.84 mg/dl, potassium 5.1 mmol/L, procalcitonin 0.9 ug/L, and C-reactive protein (CRP) 112 mg/L. COVID-19 real-time polymerase chain reaction assay was positive. Azithromycin, hydroxychloroquine, and favipiravir were used for treatment. Anticoagulation was administered with enoxaparin sodium. Positive pressure oxygen support was not given to the patient. Oxygen support was provided with a nasal cannula.

Figure 1: Thoracic CT image at the time of hospitalization. Bilateral diffuse ground-glass opacities were seen.



On the second day, thorax CT was performed again because of respiratory distress and subcutaneous emphysema in the neck. Bilateral pneumothorax, pneumomediastinum, and increased pulmonary infiltrate were observed (Figure 2). A bilateral thorax tube was inserted, and he was taken to the intensive care unit (Figure 3). Because of the worsening respiratory distress, he was intubated, and mechanical ventilator support was provided. The patient, whose general condition worsened gradually and did not respond to further treatment, died on the 27<sup>th</sup> day due to multi-organ failure.

Figure 2: An increase in ground-glass opacities, bilateral pneumothorax and pneumomediastinum are observed in thoracic CT taken on the second day of the treatment.

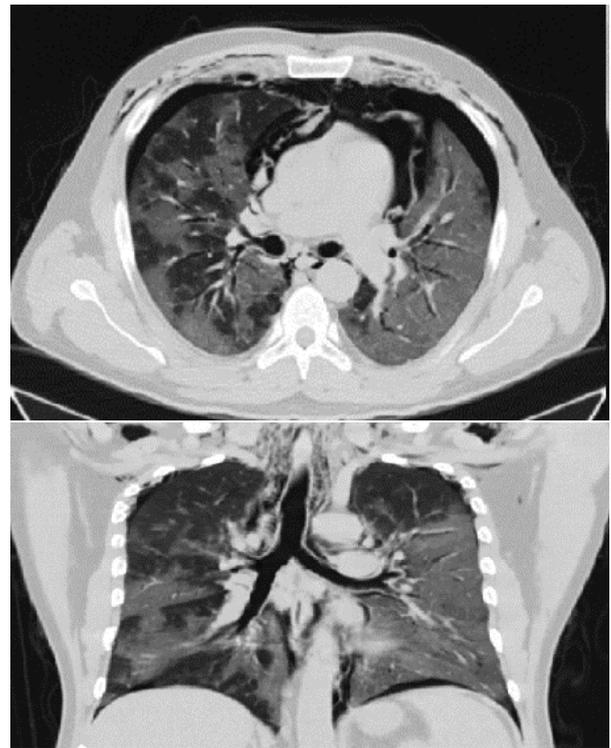


Figure 3: X-ray imaging after bilateral tube thoracostomy.



## Discussion

Many pulmonary pathologies have been postulated as causes of spontaneous pneumothorax. Although the exact component of spontaneous pneumothorax appearance in COVID-19 is obscure, it may be connected to several processes. Infiltrated areas caused by COVID-19 infection in the lung may facilitate the development of pneumothorax. As a result of widespread alveolar damage caused by severe COVID-19 pneumonia, the alveoli may be susceptible to rupture. Pneumothorax may develop in these patients without non-invasive or invasive respiratory support. In addition, patients have a pronounced cough that may induce alveolar rupture. Rafiee et al. [3] reported that strong cough and pre-existing chronic obstructive pulmonary disease (COPD) were possible risk factors for the patients in their report. In our case, bilateral spontaneous pneumothorax and pneumomediastinum developed in a patient without either one of these conditions.

Mediastinal emphysema is caused by a sudden increase in alveolar pressure, causing an air leak with alveolar rupture and

interstitial emphysema and can be seen in ARDS cases [1]. Bilateral spontaneous pneumothorax and pneumomediastinum developed in our patient who did not present excessive coughing and did not receive positive pressure ventilation support. We think that the dissection of the broncho-vascular structures with air (Macklin's effect) caused this situation [4] due to the deterioration of the wall structure of the alveoli, which developed intense infiltration caused by the COVID-19 infection.

Radiological imaging is used in patients who develop sudden respiratory distress. As an imaging method, an X-ray can be used primarily because of its easy and fast accessibility. On the other hand, we think that thoracic CT imaging can provide more detailed information regarding pulmonary infiltration and mediastinal evaluation. Among the most characteristic CT findings in COVID-19 pneumonia are ground-glass and consolidated opacities and septal thickening [2]. In some cases, these lesions can progress despite treatment and may lead to complications.

### Conclusion

In case of sudden worsening of dyspnea and decrease in respiratory sounds in unilateral or bilateral hemithorax, a pneumothorax should be considered and treated with appropriate methods. When bilateral pneumothorax is detected in patients diagnosed with COVID-19, we recommend performing a bilateral tube thoracostomy and immediately draining intrathoracic air. After drainage of intrathoracic air, regression of the pneumomediastinum is expected. However, it should not be overlooked that COVID-19 infection may affect multiple systems, and patients may die due to multi-organ failure.

### References

1. González-Pacheco H, Gopar-Nieto R, Jiménez-Rodríguez G-M, Manzur-Sandoval D, Sandoval J, Arias-Mendoza A. Bilateral spontaneous pneumothorax in SARS-cov-2 infection: A very rare, life-threatening complication. *The American Journal of Emergency Medicine*. 2021;39:258. E1-. E3.
2. Vega JML, Gordo MLP, Tascón AD, Vélez SO. Pneumomediastinum and spontaneous pneumothorax as an extrapulmonary complication of COVID-19 disease. *Emergency radiology*. 2020;27(6):727-30.
3. Rafiee MJ, Fard FB, Samimi K, Rasti H, Pressacco J. Spontaneous pneumothorax and pneumomediastinum as a rare complication of COVID-19 pneumonia: Report of 6 cases. *Radiology Case Reports*. 2021;16(3):687-92.
4. Macklin cc. Transport of air along sheaths of pulmonic blood vessels from alveoli to mediastinum: clinical implications. *Archives of internal medicine*. 1939;64(5):913-26.

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