

# Simultaneous Bilateral Spontaneous Pneumothorax with COVID-19 Pneumonia

## COVID-19 Pnömonisi ile Birlikte Simultane Bilateral Spontan Pnömotoraks

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### Abstract

The declared COVID-19 pandemic has come to affect the entire world. Ever since the first cases were detected, pneumothorax has been considered a rare but possible complication, and may develop in patients under mechanical ventilation due to high pressure. We present here a case of simultaneous bilateral spontaneous pneumothorax with COVID-19 pneumonia with no history of chronic lung disease and no mechanical ventilation.

**Key words:** Bilateral, COVID-19, pneumothorax, videothoracoscopy.

### Özet

COVID-19, tüm dünyayı etkileyen bir salgın haline geldi. İlk olgular tespit edildiğinden beri, pnömotoraks nadir görülen bir olası komplikasyon olarak kabul edildi. Mekanik ventilasyon uygulanan hastalarda yüksek basınç nedeni ile pnömotoraks geliştiği bilinmektedir. Kronik akciğer hastalığı öyküsü olmayan ve mekanik ventilasyon uygulanmayan, COVID-19 pnömonisi ile birlikte simultane bilateral spontan pnömotoraks tespit ettiğimiz olgumuzu sunuyoruz.

**Anahtar Sözcükler:** Bilateral, COVID-19, pnömotoraks, videotorakoskopi.

## RESPIRATORY CASE REPORTS

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On March 11, 2020, the rapid increase in the number of patients worldwide led the World Health Organization (WHO) to declare COVID-19 a pandemic. COVID-19 infections can be asymptomatic or have mild symptoms, but can also cause severe symptoms, with fever, cough and shortness of breath being the most common (1,2). Studies of the infection caused by SARS-CoV-2 have concluded that 1–2% of patients develop pneumothorax, having been reported as a rare possible complication since the initial COVID-19 outbreak (3,4). In Chen et al. (3), of the 99 cases with a confirmed diagnosis of COVID-19, only one patient developed pneumothorax, while Yang et al (4). identified a case with the same diagnosis in an autopsy series involving 92 cadavers. Patients with COVID-19 infections and respiratory failure are often treated with positive pressure ventilation, and this can lead to the development of pneumothorax and worsen the progression of the existing condition. As massive pneumothorax is a life-threatening condition, it must be diagnosed and treated as a matter of urgency. Simultaneous bilateral spontaneous pneumothorax, while extremely rare, carries a high risk of mortality due to sudden lung collapse and tension pneumothorax, and so requires urgent treatment (5-7).

## CASE

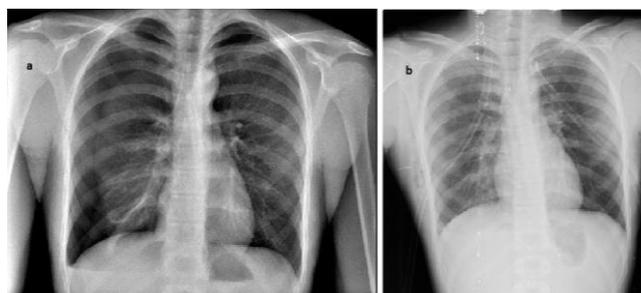
Simultaneous bilateral pneumothorax was detected on chest radiography of a 17-year-old male patient who was admitted to our emergency department with a complaint of chest pain. The patient had a history of smoking one pack per day for 7 years, while there was no comorbidity history. This was the patient's first pneumothorax attack. A tube thoracostomy with a wet suction-control closed-drainage system was applied to the right and left hemithorax (Figures 1a and b). A thoracic computed tomography (CT) taken the next day revealed bilateral ground-glass density that was more prominent on the right (Figure 2). The patient was referred to the department of infectious diseases and clinical microbiology with suspected COVID-19 pneumonia. A combined nose and throat swab test was taken from the patient, and prior to a positive result, 5-day azithromycin + hydroxychloroquine treatment was initiated due to the patient's high fever in the evening and CT findings compatible with COVID-19 pneumonia. A control combined nose and throat swab test was taken on the 13th day of hospitalization of the patient, whose first PCR test result was positive. Upon the receipt of a negative PCR test result on the 15th day of hospitalization, planned videothoracic surgery was

performed and subpleural blebs were detected in the right hemithorax resected with wedge resection and a pleural abrasion were performed. In a control examination two weeks after discharge, a left recurrent pneumothorax was detected and tube thoracostomy with a wet suction-control closed-drainage system was performed. A videothoroscopic wedge resection and apical pleural abrasion was performed to the left hemithorax on the third day of hospitalization. The tube thoracostomy was terminated on the postoperative third day, and the patient was discharged on the fifth postoperative day.

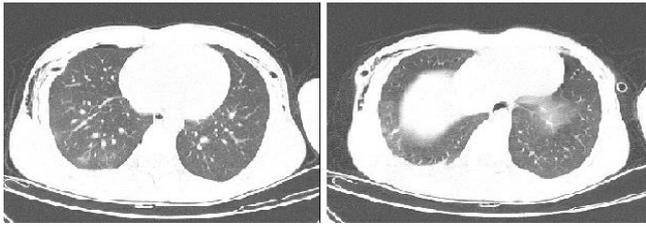
## DISCUSSION

Among the complications associated with severe coronavirus 2 (SARS-CoV-2), the most frequently mentioned are acute respiratory syndrome and respiratory failure. Pneumothorax, on the other hand, is a rare possible complication with a stated incidence of 1% in literature.

Pneumothorax related to COVID-19 infection is thought to be caused by degeneration in the lung parenchyma, resulting from long-term inflammatory damage and the resulting air leaks. The process would appear to resemble the formation of pneumothoraxes in SARS caused by another virus in the Coronaviridae family. The alveolar damage caused by SARS-CoV-2 can lead to the rupture of the alveoli, and thus air leakage into the pleural space. In addition to alveolar damage, the presence of enlarged pneumocytes, as multinucleated syncytial cells in the alveolar spaces, has also been demonstrated, and it has been reported that pneumocyte desquamation and hyaline membrane may also be seen. The mechanism is thought to involve the rupture of the alveolar wall due to the increased pressure difference between the alveoli and pulmonary interstitium as a result of the diffuse alveolar damage caused by SARS-CoV-2, although this has not been fully clarified (7,8).



**Figure 1a and b:** Simultaneous bilateral pneumothorax detected in chest radiography of a 17-year-old male patient. Tube thoracostomy with a wet suction control closed-drainage system was applied to the right and left hemithorax, respectively



**Figure 2:** In the thoracic computed tomography (CT) taken the next day, a bilateral ground-glass density was detected that was more prominent on the right

The lung diseases that cause pneumothorax include cystic fibrosis, emphysema, necrotizing pneumonia, idiopathic pulmonary fibrosis, eosinophilic granulomatous disease, sarcoidosis, tuberculosis and lung cancer, although pneumothorax may also develop in patients who are mechanically ventilated due to the damage resulting from high pressure on the lung parenchyma (9). In some COVID-19 patients with pneumothorax, the presence of such underlying risk factors as chronic obstructive pulmonary disease (COPD) or the use of mechanical ventilation may raise doubts about the source of the complication – pneumothorax being a known complication of intubation-related mechanical ventilation (6,10), but it seems that even without barotrauma, pneumothorax can coexist with COVID-19 (10,11).

The case presented here was not treated with mechanical ventilation, and while there was a history of smoking, there was no COPD or other lung disease. We thus concluded that an alternative explanation should be sought for the development of pneumothorax in COVID-19 pneumonia. Tension pneumothorax is a possible complication, but most cases are reported as spontaneous pneumothorax (12,13). Although tube thoracostomy provides satisfactory results in these patients, operative treatment should be considered as an option as long-term hospitalization may be required. The surgical approach to pneumothorax in COVID-19 patients has been determined as thoracoscopic bullectomy/blebectomy and pleurodesis (14).

It should be kept in mind that in patients with suspected COVID-19, pneumothorax may worsen the prognosis by causing acute respiratory decompensation. COVID-19 patients treated with mechanical ventilation are at risk of pneumothorax associated with ventilation, and so should be kept under constant observation (15). The management of pneumothoraxes in COVID-19 patients is vital for the prevention of life-threatening tension pneumothoraxes. Simultaneous bilateral primary spontaneous pneumothorax is rare, occurring in less than 2% of all pneumotho-

raxes, and given the high risk of mortality, it should be treated as a matter of urgency (16,17).

Chronic obstructive pulmonary diseases (COPDs) are reported to be the most common pathological factor in the development of concurrent bilateral secondary pneumothorax, and simultaneous bilateral pneumothorax can be seen after cystic fibrosis, malignancy metastasis, tuberculosis, trauma or interventions. The absence of any of these conditions in the case presented here raises the suspicion that COVID-19 was a factor in the development of simultaneous bilateral spontaneous pneumothorax. (7,16,17).

## CONCLUSION

Simultaneous bilateral spontaneous pneumothorax is an extremely rare but life-threatening condition that requires immediate diagnosis and treatment. Pneumothorax is a possible complication of COVID-19 pneumonia and should be considered in the differential diagnosis of COVID-19 patients who experience sudden respiratory decompensation.

## CONFLICTS OF INTEREST

None declared.

## AUTHOR CONTRIBUTIONS

Concept - P.E., M.A., S.B., O.K., S.E., V.B.; Planning and Design - P.E., M.A., S.B., O.K., S.E., V.B.; Supervision - P.E., M.A., S.B., O.K., S.E., V.B.; Funding - R.P.E., V.B., S.E.; Materials - V.B., S.E.; Data Collection and/or Processing - P.E., O.K., S.B.; Analysis and/or Interpretation - P.E., M.A.; Literature Review - P.E., O.K.; Writing - P.E., O.K., M.A.; Critical Review - V.B., S.E., S.B.

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Fikir - P.E., M.A., S.B., O.K., S.E., V.B.; Tasarım ve Dizayn - P.E., M.A., S.B., O.K., S.E., V.B.; Denetleme - P.E., M.A., S.B., O.K., S.E., V.B.; Kaynaklar - P.E., V.B., S.E.; Malzemeler - V.B., S.E.; Veri Toplama ve/veya İşleme - P.E., O.K., S.B.; Analiz ve/veya Yorum - P.E., M.A.; Literatür Taraması - P.E., O.K.; Yazıyı Yazan - P.E., O.K., M.A.; Eleştirel İnceleme - V.B., S.E., S.B.

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