JCS Journal of Chest Surgery
https://doi.org/10.5090/jcs.20.149
pISSN: 2765-1606 eISSN: 2765-1614
J Chest Surg. Published online February 15, 2021

Case Report

Hemopneumothorax as an Unusual and Delayed Complication of Coronavirus Disease 2019 Pneumonia

Muhammet Sayan, M.D., Merve Satir Turk, M.D., Dilvin Ozkan, M.D., Aykut Kankoc, M.D., Ismail Tombul, M.D., Ali Celik, M.D.

Department of Thoracic Surgery, Gazi University, Ankara, Turkey

ARTICLE INFO
Received December 11, 2020
Revised December 31, 2020
Accepted January 13, 2021

Corresponding author
Muhammet Sayan
Tel 90-5071927600
Fax 90-5071927600
E-mail muhammets@gazi.edu.tr
ORCID
https://orcid.org/0000-0002-5402-9031

The increasing number of studies published on coronavirus disease 2019 (COVID-19) pneumonia has improved our knowledge of the disease itself and its complications. Despite a considerable number of publications on COVID-19 pneumonia-associated pneumothorax, no article on spontaneous hemopneumothorax has been found in the English-language literature. According to published case reports, pneumothorax generally occurs in hospitalized patients during treatment, whereas cases that arise in the late period after discharge are exceptional. Herein, we present a case of spontaneous hemopneumothorax occurring as a late complication of COVID-19 pneumonia on day 17 after discharge.

Keywords: COVID-19, Pneumothorax, Pneumomediastinum, Hemothorax

Case report

Knowledge of coronavirus disease 2019 (COVID-19) pneumonia, which emerged in December 2019 and has since affected the entire world, and its resulting complications is increasing day by day. In COVID-19 pneumonia, pneumothorax (PT) is seen in roughly 1% of hospitalizations and 2% of intensive care unit admissions [1]. In these patients, PT can occur by itself or accompany pneumomediastinum (PM); moreover, it may occur spontaneously or in response to the barotraumatic effect of a mechanical ventilator. The pathophysiology of PM and PT involve alveoli rupture and the occurrence of free air as intrathoracic pressure increases in response to cough or positive airway pressure. If free air moves toward the mediastinum through the perivascular-peribronchial sheaths, PM occurs, whereas PT is formed when the free air moves to the periphery into the subpleural area and visceral pleural rupture takes place. Sometimes, both PM and PT can be observed together [2]. In COVID-19 pneumonia with PM and/or PT as a complication, the clinical presentation is usually seen when the patient is hospitalized, especially under invasive mechanical ventilation. Herein, we present a case report of a patient who developed spontaneous hemopneumothorax after receiving COVID-19 pneumonia treatment and being discharged.

A 30-year-old male white-collar patient was admitted to the emergency department with complaints of shortness of breath and left-sided chest pain. His medical history included hospitalization for 7 days for COVID-19 pneumonia and medical therapy with oxygen, hydroxychloroquine, favipavir, enoxoparin, moxifloxacin, and steroids. His complaints occurred suddenly 17 days after discharge. He had no history of smoking, surgical intervention, mechanical ventilation, or trauma. His vital signs upon admission to the emergency department were as follows: an oxygen saturation of 90% (with 10 L/min of oxygen), a pulse of 128 beats per minute, and arterial blood pressure (systolic/diastolic) of 80/50 mm Hg. A large left-sided PT and contralateral shifting of the trachea and mediastinum were detected on a chest X-ray (Fig. 1A).

Considering the presence of tension PT, decompression with thoracentesis under local anesthesia followed by tube thoracostomy and underseal drainage was performed. A massive air leak and 400 mL of hemorrhagic drainage resulted from chest tube placement (Fig. 1B). After tube thoracostomy, the patient's condition stabilized, and thoracic computed tomography (CT) was performed. Thoracic CT showed improvement in mediastinal shift, bilateral patchy infiltrations, left PT, and high-density pleural effusion (Fig.

Copyright © The Korean Society for Thoracic and Cardiovascular Surgery. 2021. All right reserved.
This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (http://creativecommons.org/licenses/by-nc/4.0) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

https://doi.org/10.5090/jcs.20.149

2A, B). The ratio of pleural fluid hematocrit to serum was greater than 0.5, and no microorganisms were detected on Gram staining and fluid culture. The patient was admitted for inpatient treatment at Department of Thoracic Surgery, Gazi University, and medical therapy, including 2 L/min nasal oxygen therapy, antibiotic prophylaxis, paracetamol, and tramadol, was administered. The air leak from the chest tube stopped after 7 days of tube thoracostomy. When no PT was seen on chest radiography, the chest tube was removed, and then the patient was discharged. Neither PT nor pleural effusion was seen on chest radiography taken 10 days after discharge (Fig. 3). The follow-up of the patient has continued without any problems. The patient provided written informed consent for the publication of his clinical details and images.

Discussion

In the present study, we present a case of spontaneous hemopneumothorax as an unusually late complication of COVID-19 pneumonia. While cases of spontaneous PT associated with COVID-19 pneumonia have been reported in the English literature, spontaneous hemopneumothorax case has not yet been encountered. In these publications, it has been observed that patients are generally of advanced age and have comorbidities. In a multi-center study including 60 cases, it was reported that the patients were predominantly older than 60 years, and that most of them had respiratory and non-respiratory comorbidities [1]. In another series including 40 patients, the median age was 66 years, and 95% of the patients had comorbidities [3]. In contrast, Ozdemir et al. [4] reported that the effect of age and comorbidities on PT was not significant in their study conducted in intubated COVID-19 patients. Our case was 31 years old and had no comorbidities before COVID-19 pneumonia.

An examination of COVID-19-associated PT cases demonstrated that the degree of pneumonia is generally severe [2,5,6]. Our patient also had moderate-to-severe pneumonia, consistent with the literature, and his thoracic CT showed bilateral diffuse patchy infiltration in both lungs. COVID-19 pneumonia-associated PT cases are usually detected in patients who are hospitalized and under treatment. There are only 2 case reports in the English-lan-

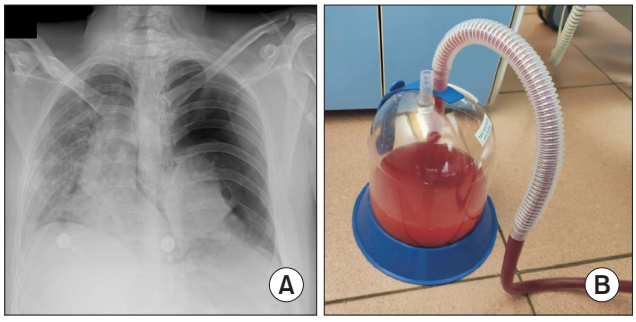


Fig. 1. (A) Chest X-ray showing left sided pneumothorax and contralateral mediastinal shift. (B) Hemorrhagic drainage from the chest tube.

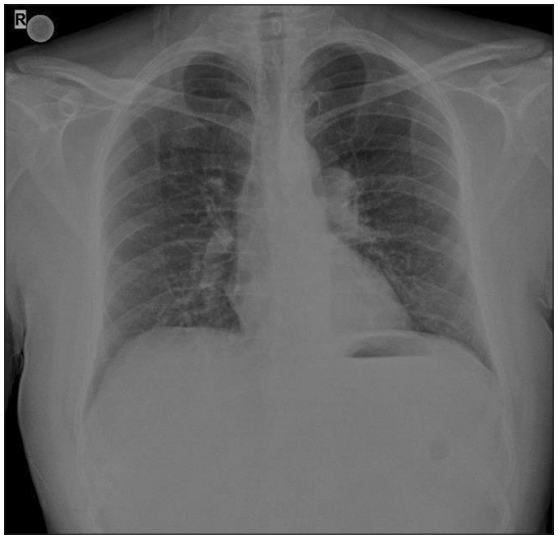


Fig. 3. There is no pneumothorax or pleural effusion on a follow-up chest X-ray after discharge.

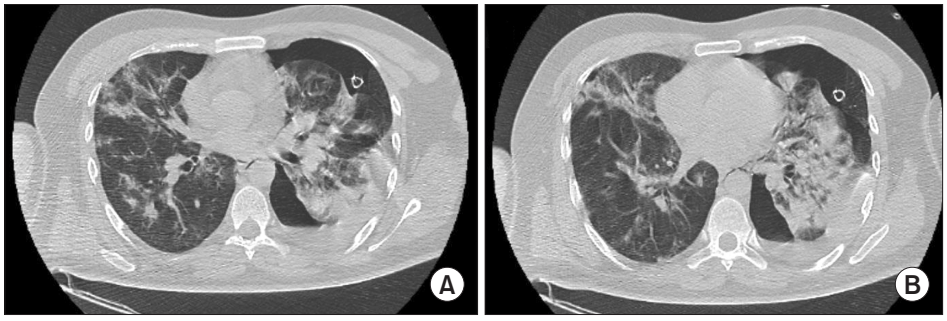


Fig. 2. (A, B) Thoracic computed tomography shows bilateral, diffuse patchy infiltration and left pneumothorax.

guage literature describing patients who presented to a PT clinic after discharge. In these cases, PT onset time was 19 and 21 days after discharge [7,8]. Similarly, this period was 17 days in our case. Furthermore, while the mortality of COVID-19 pneumonia complicated by PT is reported to be high in the literature, the effect of PT on mortality in cases like ours remains unclear. The fact that PT is generally seen in patients with severe pneumonia increases the controversy. Martinelli et al. [1] reported that the 28-day mortality rate was 78.3% in their series including 60 patients. In another study conducted by Zantah et al. [5] including 6 cases, 4 patients died. In another case series, the mortality rate was found to be 50% [4]. In contrast, Hameed et al. [9] reported that in their series including 3 cases, all patients survived. Our patient was discharged 7 days after tube thoracostomy when his PT treatment was successfully completed.

In our case, there was no specific cause of hemothorax, and the patient had no history of anticoagulant use, trauma, or invasive intervention. An article published by Yang and Jung [10] provides some insights into the physiopathology of spontaneous hemopneumothorax. In this article, the mechanism of bleb formation, the occurrence of PT and PM, and how angiogenesis is evoked in the parietal pleura are described in detail. In addition, it has been reported that during bleb rupture, the force of detachment may injure the surrounding vascular structures, and spontaneous hemopneumothorax may occur [10]. The pathophysiology of spontaneous hemopneumothorax in our case was not clear. It may be similar to the mechanism described by Yang and Jung [10], or it may have occurred as a result of microvascular pathologies in COVID-19 pneumonia.

In conclusion, knowledge about COVID-19 pneumonia and its complications is increasing day by day, and in this case report, a case of hemopneumothorax is presented as an unusually late complication.

Conflict of interest

No potential conflict of interest relevant to this article was reported.

ORCID

Muhammet Sayan: https://orcid.org/0000-0002-5402-9031
Merve Satir Turk: https://orcid.org/0000-0003-4873-3281
Dilvin Ozkan: https://orcid.org/0000-0002-7149-5982
Aykut Kankoc: https://orcid.org/0000-0001-5048-6115
Ismail Tombul: https://orcid.org/0000-0002-7224-6961
Ali Celik: https://orcid.org/0000-0001-5385-6492

References

1. Martinelli AW, Ingle T, Newman J, et al. *COVID-19 and pneumothorax: a multicentre retrospective case series*. Eur Respir J 2020;56:2002697.
2. Zayet S, Klopfenstein T, Mezher C, Gendrin V, Conrozier T, Ben Abdallah Y. *Coronavirus disease 2019 with spontaneous pneumothorax, pneumomediastinum and subcutaneous emphysema, France*. New Microbes New Infect 2020;38:100785.
3. Miro O, Llorens P, Jimenez S, et al. *Frequency, risk factors, clinical characteristics, and outcomes of spontaneous pneumothorax in patients with coronavirus disease 2019: a case-control, emergency medicine-based multicenter study*. Chest 2020 Nov 20 [Epub]. https://doi.org/10.1016/j.chest.2020.11.013.
4. Ozdemir S, Bilgi DO, Kose S, Oya G. *Pneumothorax in patients with coronavirus disease 2019 pneumonia with invasive mechanical ventilation*. Interact Cardiovasc Thorac Surg 2020 Nov 19 [Epub]. https://doi/org/10.1093/icvts/ivaa287.
5. Zantah M, Dominguez Castillo E, Townsend R, Dikengil F, Criner GJ. *Pneumothorax in COVID-19 disease: incidence and clinical characteristics*. Respir Res 2020;21:236.
6. Oye M, Ali A, Kandah F, Chowdhury N. *Two cases of spontaneous pneumomediastinum with pneumothorax in patients with COVID-19 associated pneumonia*. Respir Med Case Rep 2020;31:101308.
7. Abushahin A, Degliuomini J, Aronow WS, Newman T. *A case of spontaneous pneumothorax 21 days after diagnosis of coronavirus disease 2019 (COVID-19) pneumonia*. Am J Case Rep 2020;21:e925787.
8. Ferreira JG, Rapparini C, Gomes BM, Pinto LA, Freire MS. *Pneumothorax as a late complication of COVID-19*. Rev Inst Med Trop Sao Paulo 2020;62:e61.
9. Hameed M, Jamal W, Yousaf M, et al. *Pneumothorax in COVID-19 pneumonia: a case series*. Respir Med Case Rep 2020;31:101265.
10. Yang HC, Jung S. *Bullae formation hypothesis in primary spontaneous pneumothorax*. J Thorac Dis 2020;12:2833-7.