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Bilateral pneumothorax as possible atypical presentation of coronavirus disease 2019 (COVID-19)

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1. Introduction

The novel coronavirus disease 2019 (COVID-19) has presented with a spectrum of symptoms and severity. Systematic reviews and meta-analyses demonstrate that the majority of presentations are mild with fever, cough, and shortness of breath. Typical radiographic findings of COVID-19 are bilateral ground-glass opacities on computed tomography (CT) scans. However, there have been instances of pneumothorax, giant bulla, and pneumomediastinum, mainly in elderly COVID-19 patients and predominately occurring at least one week after symptom onset. Here, we report a case where a healthy, young Hispanic man presented with three days of fever, cough, and dyspnea. On admission to the emergency department, he was found to have bilateral pneumothoraces, pneumomediastinum, and pneumopericardium requiring bilateral chest tubes. The patient had no predisposing risk factors for pneumothorax, such as a history of trauma, smoking, past intubations, asthma, high pressure oxygen delivery, or a history of prior pneumothorax. The only positive diagnostic test was a SARS-CoV-2 test by real-time reverse transcriptase–polymerase chain reaction assay. This case highlights the potential atypical presentation of a COVID-19 infection and is the first reported case, to our knowledge, that features bilateral spontaneous pneumothoraces, pneumomediastinum, and pneumopericardium as a probable rare presentation of COVID-19.

2. Case report

In April 2020, a 31-year-old Hispanic man with an unremarkable past medical history presented to the emergency department (ED) with three days of fever, cough, and worsening dyspnea. He denied any chest pain and reported no recent trauma. Additionally, the patient had no history of cardiopulmonary disease, intubations, mechanical ventilation, or drug use.

In the ED, he was found to be tachycardic (heart rate of 140 bpm) but normotensive (blood pressure of 130/88 mm Hg) and afebrile (37.2 °C). His peripheral oxygen saturation was 79% on room air which improved to 95% with the aid of a 15 L/min nonrebreather mask. Physical examination was significant for absent breath sounds on the left associated with crepitus extending bilaterally to the neck. A bedside ultrasound demonstrated pneumothorax and a portable anterior/posterior chest x-ray (CXR) confirmed a large left-sided tension pneumothorax as well as a small right-sided pneumothorax (Fig. 1). An emergent chest tube was placed on the left for the tension pneumothorax, and the patient was admitted to the medical intensive care unit.

A nasopharyngeal swab was performed with a detected result for SARS-CoV-2 on real-time reverse transcriptase–polymerase chain reaction assay. Admission bloodwork demonstrated no leukocytosis, lymphopenia, anemia, or electrolyte abnormalities. Troponin T and serum creatinine levels were within normal limits. Serum samples were significant for an elevated d-dimer assay of 3,248 ng/mL DDU (normal: < 500 ng/mL), ferritin of 787 ng/mL (normal: 24–336 ng/mL), C-reactive protein of 2.90 mg/dL (normal: <0.8 mg/dL), and a procalcitonin of 0.8 mg/dL. E-mail addresses: Amrit.Ahluwalia@downstate.edu (A.S. Ahluwalia), TQarni@northwell.edu (T. Qarni), NNarula@northwell.edu (N. Narula), WSadiq@northwell.edu (W. Sadiq), MChalhoub1@northwell.edu (M.N. Chalhoub).
0.09 ng/mL (normal: <0.1 ng/mL). Non-contrast chest CT was significant for extensive pneumomediastinum, pneumopericardium, and bilateral pneumothoraces, as well as bilateral confluent parenchymal consolidations, compatible with multilobar pneumonia (Fig. 2).

Over the following days, the patient’s supplemental oxygen requirements decreased, and he was transferred to the medical floor on hospital day (HD) three with serial CXRs demonstrating gradual resolution of his pneumothoraces (Fig. 3). He received a dose of tocilizumab on HD three, and he completed a five-day course of hydroxychloroquine. On HD six, the chest tube was removed. He was stable on room air and was discharged home on HD nine.

The following day, the patient returned to the ED with sudden-onset dyspnea. He was normotensive but tachycardic with a heart rate of 138 bpm, and his oxygen saturation was 84% on room air. CXR revealed recurrent new bilateral pneumothoraces with an approximate 7-cm airgap on the right and an approximate 4.5-cm airgap on the left (Fig. 4). Bilateral chest tubes were placed and remained for ten days. A CT chest with IV contrast was obtained and demonstrated worsening bilateral basilar loculated hydropneumothorax (Fig. 5). The patient underwent left-sided chemical pleurodesis on HD four and HD seven. Ultimately, the patient required CT-guided percutaneous placement of bilateral pigtail catheters which were placed on HD six and remained in place for seven days. By HD fifteen, all chest tubes were removed and repeat CXR noted resolved pneumothoraces (Fig. 6). The patient was subsequently confirmed to be stable on room air and was discharged home with close outpatient follow-up.

3. Discussion

To the best of our knowledge, this is the first reported case that

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**Abbreviations list**

COVID-19  Coronavirus Disease 2019  
CT  Computed Tomography  
CXR  Chest radiograph  
ED  Emergency Department  
HD  Hospital Day  
HFNC  High-flow nasal cannula  
SARS-CoV-2  Severe acute respiratory syndrome coronavirus 2
features bilateral spontaneous pneumothoraces, pneumomediastinum, and pneumopericardium as a probable rare presentation of COVID-19 as well as the first reported case which features pneumothoraces within a week of symptom onset. At the time of submission, only a handful of similar cases had been reported, and all cases had occurred after a reported symptom onset of over a week [2-5]. The first reported case was a 38-year-old man from Wuhan diagnosed with COVID-19 pneumonia who, while on high-flow nasal cannula (HFNC), developed mediastinal emphysema, giant bulla, and pneumothorax during the course of COVID-19 pneumonia, Korean J. Radiol. 21 (5) (2020) 541-544, https://doi.org/10.3348/kjr.2020.0180.

4. Conclusion

This case highlights the potential atypical presentation of COVID-19 requiring emergent intervention within a week of symptom onset in an otherwise healthy young adult. Individuals with as few as three days of symptoms may present with pneumomediastinum, bilateral pneumothorax, and subcutaneous emphysema related to COVID-19. The aim of this report is to educate physicians to consider this atypical and clinically severe presentation of COVID-19. Future case series and autopsy results are needed to elucidate a pathophysiological mechanism for how COVID-19 predisposes patients to pneumothoraces and whether there are any long-term sequelae of COVID-19-induced pneumothoraces.

Author contributions

All persons who meet authorship criteria are listed as authors. All authors certify that they have participated sufficiently in the work to take responsibility for the content. ASA and TQ made substantial contributions to conception and design of this case report. NN made substantial contributions acquisition of images. All authors made substantial contributions to the interpretation of data. ASA was involved in drafting the manuscript. TQ, NN, WS, and MNC revised the manuscript critically for important intellectual content. All authors read and approved the final manuscript for publication.

Declaration of competing interest

No authors have any conflicts of interest related to this report. The authors have no competing interest to declare.

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