

Spontaneous Pneumothorax in a Non-Mechanically Ventilated COVID-19 Patient

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Abstract

Background: The outbreak of Corona Virus Disease (COVID-19) was initially reported in Wuhan, China in December 2019. The disease was officially named COVID-19 by World Health Organization (WHO) on February 11, 2020. Most patients presented with symptoms of the upper respiratory tract, such as fever, dry cough, shortness of breath, and fatigue. However, other symptoms such as gastrointestinal disturbances, loss of smell and taste were also noted. Coronaviruses are enveloped positive-stranded Ribo Nucleic Acid (RNA) viruses.

Patients are diagnosed via real time Polymerase Chain Reaction (PCR) and imaging findings are characterized with ground glass opacities. Complications from the virus include but not limited to Acute Respiratory Distress Syndrome (ARDS), arrhythmias, acute cardiac injury, shock, cardiomyopathy, pulmonary embolism, acute stroke, encephalopathy, Guillain Barre, secondary infections, pneumomediastinum, and pneumothorax. We present a case of spontaneous pneumothorax in a non-smoker patient

who did not require any mechanical ventilation or have any prior pulmonary illnesses as a risk factor.

keywords: Ribo Nucleic Acid (RNA) viruses, COVID-19, Fever

Case Presentation

Our patient is a 75 years old man with a past medical history of hyperlipidemia and hypertension who presented to the emergency department with shortness of breath, cough, and a fever. He was diagnosed with COVID-19 three days prior to his admission with symptoms starting nine days prior to his diagnosis of COVID-19. His symptoms progressively worsened with muscle aches, generalized weakness, exertional dyspnea leading to his presentation to the hospital.

Initially, he was started on 4-liters supplemental oxygen to achieve saturation of peripheral oxygen (SpO₂) >92%. A Computer Tomography (CT) of his chest was obtained on the day of his admission which showed the extent of COVID-19 affecting his lungs. Six days into his admission, he required transitioning to High Flow Nasal Cannula (HFNC) for increased oxygenation demand and worsening infiltrates on chest x-ray. He was treated with five days of Remdesivir and ten days of Dexamethasone (Table 1).

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 8	DAY 9	DAY 10	DAY 11
Remdesivir	X	X	X	X	X						
Decadron	X	X	X	X	X	X	X	X	X	X	
Oxygen	NC	NC	NC	NC	NC	HFNC	HFNC	HFNC	HFNC	NC	NC
Chest Tube											
Pneumothorax											
	DAY 12	DAY 13	DAY 14	DAY 15	DAY 16	DAY 17	DAY 18	DAY 19	DAY 20	DAY 21	DAY 22

Remdesivir											
Decadron											
Oxygen	HFNC	HFNC	NC	NC	NC	NC	NC	NC	Room Air	Room Air	Room Air
Chest Tube	X	X	X	X	X	X	X	X	X	X	
Pneumothorax	X			X							

Table 1: Hospital Course

After five days of oxygenation *via* HFNC, he started to require less oxygen and was transitioned to nasal cannula. The following day, the patient had sudden hypoxia (SpO₂ ~70%) with a near syncopal episode. A stat chest x-ray showed a large left pneumothorax. He required oxygen *via* HFNC and placement of a chest tube which showed immediate improvement of oxygenation and re-expansion of his lungs. The next few days, he was finally off of any supplemental oxygen. His chest tube was managed by a few days of going back and forth between water seal and suction due to recurrence of the pneumothorax. Eventually, his chest tube was clamped and removed with no recurrence of the pneumothorax and the patient was discharged home (Figures 1-3).

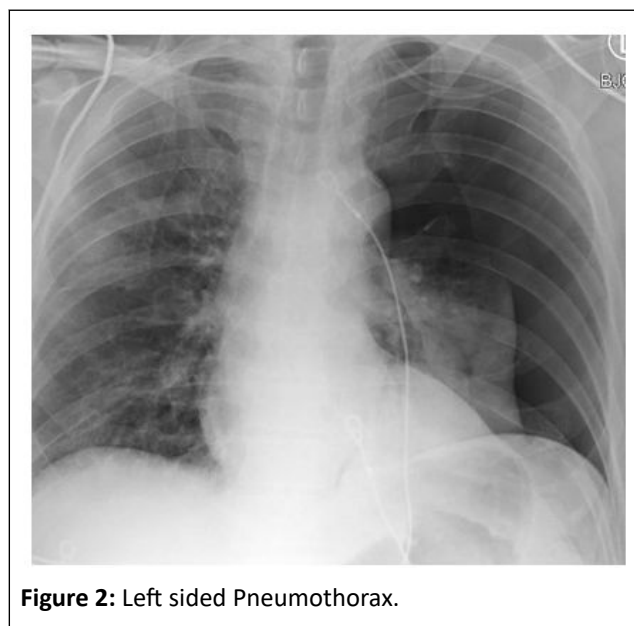


Figure 2: Left sided Pneumothorax.

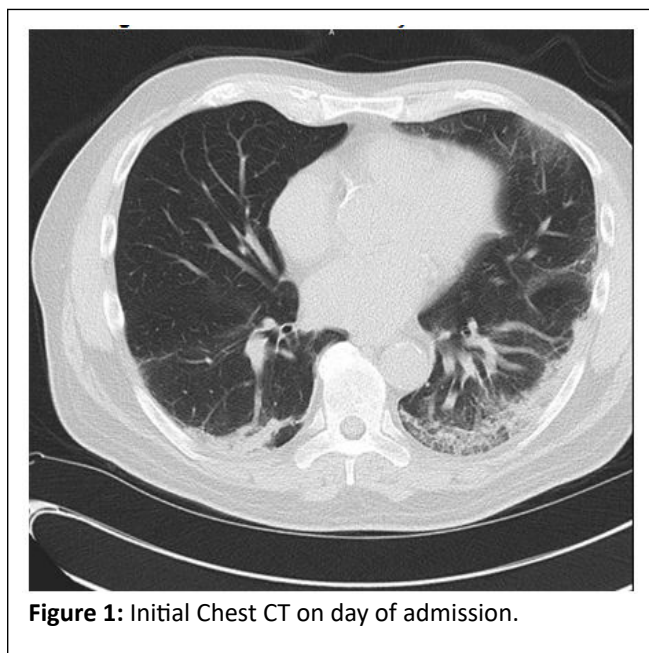


Figure 1: Initial Chest CT on day of admission.

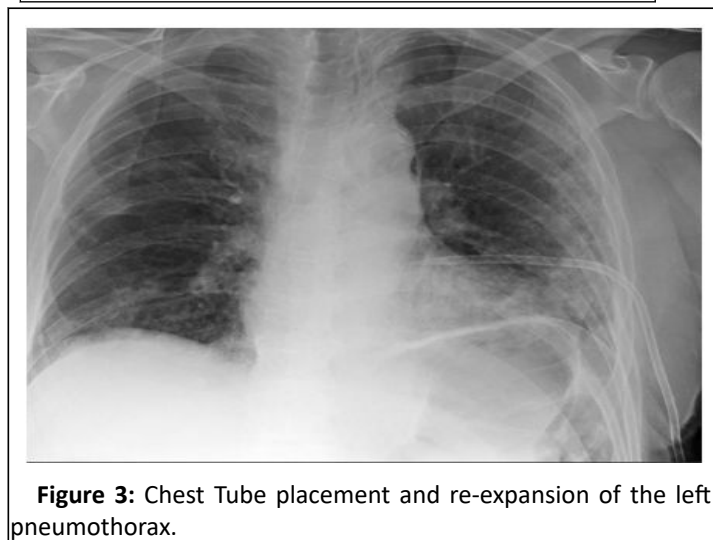


Figure 3: Chest Tube placement and re-expansion of the left pneumothorax.

Discussion

Pneumothorax occurs when the lung collapses secondary to air entering the pleural space. This can be further classified into spontaneous *vs.* traumatic. Spontaneous pneumothorax can be due to primary or secondary causes. The primary causes do not have any associations with an underlying lung disease. Whereas

secondary causes are due to underlying lung diseases such as Chronic Obstructive Pulmonary Disease (COPD), emphysema, cystic fibrosis, or lung malignancy. Traumatic pneumothorax, on the other hand, is due to a force causing penetration into the pleural cavity. This can be due to iatrogenic or non-iatrogenic causes. Iatrogenic causes include mechanical ventilation, thoracocentesis, Pacemaker insertion, tracheostomy. Non-iatrogenic causes are due to external force which results in a chest wall defect allowing external air to enter the pleural space.

Our patient had a spontaneous pneumothorax in the setting of a recent diagnosis of COVID-19 infection. He was a non-smoker, with no known past medical history of lung disease and no evidence of blebs or bullae on chest imaging. Additionally, his oxygenation demands were adequately supported with HFNC and did not require up titration to mechanical ventilation. Patient did not suffer any trauma with his near syncopal episode prior to his pneumothorax. The cause of his pneumothorax can only be associated with a recent COVID-19 diagnosis [1].

The largest series of pneumothoraces in nonventilated patients with COVID-19 were described in a multicentre retrospective case series by Martinell [2], which reported pneumothorax to be more prevalent in males, especially those who were affected with severe form of COVID-19. Additionally, pneumothorax has been associated with a poor prognostic marker previously. However, in the case series, the patients with pneumothorax had an overall survival of 63.1% which aligns with our patient's response to his pneumothorax & his survival from this complication.

According to a retrospective review of COVID-19 patients by Zantah which reviewed 902 COVID-19 positive patients, only six cases developed a spontaneous pneumothorax. Out of those, four required mechanical ventilation & all six cases required a chest tube placement. The incidence of mechanical ventilation causing pneumothorax is high secondary to the barotrauma and volutrauma causing overdistention of the alveoli. Our patient

not requiring any mechanical ventilation rules out barotrauma and volutrauma as a predisposing factor for his pneumothorax [3-6].

Conclusion

Spontaneous pneumothorax is a rare but serious complication of COVID-19. This case brings to surface a complication of COVID-19 which has been reported scarcely in literature. There have been very few cases of spontaneous pneumothorax in association with COVID-19 without any predisposing factors. It is essential that the medical community consider pneumothorax when presented with a sudden respiratory decompensation is observed in COVID-19 patients, even in the absence of mechanical ventilation.

References

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