

Spontaneous Pneumomediastinum and Pneumopericardium in a Young Adult with COVID-19: A Case Report

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Abstract

Extrapulmonary air extravasation has been reported as a complication of the coronavirus disease 2019 (COVID-19), although largely in patients on mechanical ventilation who experience pulmonary barotrauma. Simultaneous pneumomediastinum and pneumopericardium have seldom been reported, especially in patients without predisposing risk factors. We present the case of a previously healthy, 21-year-old male hospitalized for a COVID-19 infection who was found to have spontaneous pneumomediastinum and pneumopericardium on imaging. He required oxygen via face mask and had elevated inflammatory markers with significant pulmonary involvement but made a successful recovery. Pneumomediastinum and pneumopericardium have the potential to cause adverse outcomes such as cardiac tamponade and their impact in COVID-19 is not yet known, although preliminary research indicates it may predispose to worse outcomes. Awareness of this novel disease process could help elucidate its true prognostic value and inform a need for intervention. Overall, this case report adds to the growing body of evidence regarding COVID-19 and its extrapulmonary manifestations.

Keywords: COVID-19; Spontaneous; Pneumomediastinum; Pneumopericardium

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Introduction

Some case reports present occurrences of extra-pulmonary air extravasation as a complication of the coronavirus disease 2019 (COVID-19), most commonly in patients on mechanical ventilation. Few reports depict these findings in non-ventilated patients, and even fewer identify concurrent pneumomediastinum and pneumopericardium. We present the case of a 21-year-old male with no significant comorbidities and an uncomplicated course of COVID-19 developing spontaneous pneumomediastinum and pneumopericardium.

Case Report

A 21-year-old male presented to the emergency department with 2 weeks of progressively worsening cough, shortness of breath, fever, pharyngitis, nausea and vomiting. He had tested positive for COVID-19 1 week prior. On admission, his temperature was 39.8°C, heart rate 125 beats per minute, blood pressure 136/82 mmHg, respiration rate 36 breaths per minute, oxygen saturation

of 88% on room air. Initial labs in **Table 1** showed markedly elevated inflammatory markers. Computed tomography of the chest showed bilateral, patchy ground glass opacities and concurrent pneumomediastinum and pneumopericardium (**Figure 1**). He required 4 liters of oxygen via face mask to attain oxygen saturations of 96% but had stable respiratory and cardiac symptoms. Consultation with thoracic surgery recommended no intervention unless respiratory symptoms worsened.

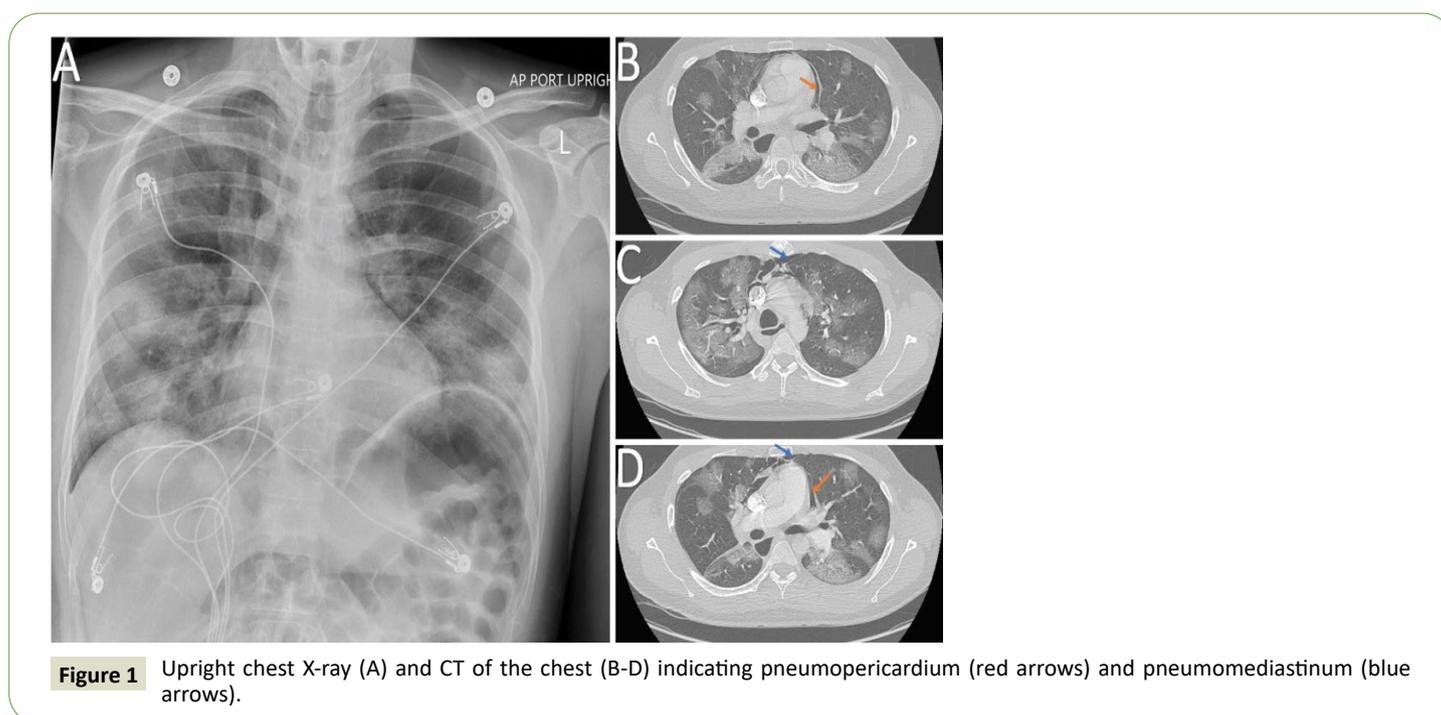
The patient was treated with Remdesivir 200 mg three times between hospital day 2 to discharge on day 4 with improving inflammatory markers and an oxygen saturation of 94% on room air. A repeat chest X-ray was found to be stable and he was discharged with home oxygen and guaifenesin 600 mg as needed for cough.

Discussion

While pneumomediastinum and pneumopericardium in the setting of COVID-19 are prevalent among mechanically ventilated

Table 1 Demographic information and initial laboratory findings.

Demographic Information	
Age (years)	21
Sex	Male
Ethnicity	Hispanic
Body Mass Index (kg/m,)	25.06
Medical History	None
Symptoms on Presentation	Fever and Cough
Treatment	Levofloxacin, Guaifenesin, Methylprednisone, Remdesivir, Enoxanarin
Initial Laboratory Findings	
White-cell cot. (× leuL)	11.6
Hemoglobin (g/dL)	13.7
Hematocrit (%)	39.9
Platelets (× 10 ³ /uL)	334
C-Reactive Protein (mg/dL)	18.2
D-dimer (ug/ml FEU)	2.04
Albumin (g/dL)	3.4
ALT (U/L)	56
AST (U/L)	117
ALKP (U/L)	42
Fenitin (ng/mL)	2615
LDH (U/L)	890
BNP (pg/mL)	168
PT (seconds)	12.5
INR	1
Serum Sodium (mEq/L)	124
Serum Potassium (mEq/L)	4.4
Serum Chloride (mEq/L)	90
CO2 (mEq/L)	22
Blood Urea Nitrogren (mg/dL)	7
Creatinine (mg/dL)	0.71
Glucose (mWdL)	110



patients, few cases have been noted in non-ventilated patients without pulmonary barotrauma. Furthermore, this simultaneous presentation is unusual [1]. A recent literature review by Quincho-Lopez and colleagues identified 5 cases of pneumomediastinum in non-ventilated COVID-19 patients, with an unfavorable disease progression in 50% of cases. Spontaneous pneumomediastinum typically resolves on its own; however, it can cause cardiac tamponade, and has been associated with poor outcomes with COVID-19 [2,3]. This highlights the importance of elucidating its prevalence and its relationship with disease course.

Although the mechanism is not fully understood, Lei (2020) proposes that peribronchial abscess formation from COVID-19 infection causes pulmonary emphysema followed by air tracking along bronchovascularity resulting in spontaneous pneumomediastinum [4]. We hypothesize a similar mechanism for the progression of air into the pericardium. With the 2002 Severe Acute Respiratory Syndrome coronavirus, pneumomediastinum most often occurred when ground glass opacities began to resolve and among males, which was consistent with our patient [5].

Conclusion

In summary, although the etiology and clinical impact of spontaneous pneumomediastinum and pneumopericardium in COVID-19 has yet to be elucidated, clinicians should be aware of its potential for worsening disease. Notably, recent case studies suggest that spontaneous air extravasation in patients on mechanical ventilation following COVID-19 infection have poorer prognoses and worse outcomes. On their own, both pneumomediastinum and pneumopericardium have the potential

to cause adverse outcomes, and their impact in COVID-19 is not yet known. This unique case adds to the growing body of evidence regarding COVID-19 and its extrapulmonary manifestations.

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None.

Conflicts of Interest/Competing Interests

The authors declare that they have no competing interests.

Ethics Approval

Not applicable. No participants were enrolled in this case report.

Consent to Participate

Not applicable. There is no identifiable information in this case report.

Consent for Publication

Not applicable. There is no identifiable information in this case report.

Authors' Contributions

TE and NS wrote the majority of the manuscript. NS created manuscript figures and TE performed background research. MK cared for this patient and contributed with ongoing editing and manuscript improvements. All authors read and approved the final manuscript.

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