

Spontaneous Pneumomediastinum, Mediastinitis and Subcutaneous Emphysema Occurring in the Post Sars-Cov-2 Infection: An Uncommon Presentation

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Abstract

Background: Coronavirus disease 2019 (COVID-19) is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), declared as a pandemic by World Health Organization. Computed Tomography provides an imaging perspective towards many parenchymal and rare extra-parenchymal abnormalities of the COVID-19 pneumonia like spontaneous pneumothorax, pneumomediastinum and subcutaneous emphysema helping further in diagnosis and surveillance. **Case Report:** A 53-year-old male was admitted with RT-PCR positive report of COVID19 pneumonia presented with hypoxemia and was started on non-invasive ventilation with lung protective ventilation and other symptomatic management. He developed sudden onset shortness of breath and chest pain on Day 14 of admission with a SpO₂ of 90 % on NIV ventilation, after testing negative on RT-PCR on day 12. A HRCT (high resolution CT) chest was obtained that showed extensive consolidations ground glass opacities and “crazy paving appearance” in bilateral lung fields. A calcified nodule with positive “halo sign” was seen. Presence of air was seen along the perivascular sheath, peribronchial sheaths (“Double bronchial wall sign” positive) and into the subcutaneous neck space on both sides and anterior chest wall, which was suggestive of pneumomediastinum with subcutaneous emphysema. Contrast enhanced computed tomography images showed multiple thin septations showing minimal enhancement surrounding the mediastinal fat that was suggestive of mediastinitis. He was managed conservatively and gradually improved. **Conclusion:** Spontaneous pneumomediastinum and subcutaneous emphysema are quite a rare complication in the immediate post COVID19 pneumonia period and can result in remarkable morbidity for the patient. Keeping a high index of suspicion and early identification of the same is possible using CT Chest which aides in identification and management of such patients.

Keywords: Spontaneous pneumomediastinum, mediastinitis, subcutaneous emphysema, COVID19, SARSCOV2

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Introduction

Coronavirus disease 2019 (COVID-19) is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), declared as a pandemic by World Health Organization (WHO) in January 2020.^[1] In Radiology, CT provides an imaging perspective towards many parenchymal and extra-parenchymal abnormalities of the COVID-19 pneumonia helping further in diagnosis and surveillance. However, with progression and severity, the CT presentation due to the novel coronavirus SARS-COV-2 varies. The common imaging findings consist of multiple patchy bilateral ground-glass opacity (GGO) with or without consolidation and interlobular septal thickening with a peripheral or posterior distribution, predominantly involving the lower lobes, depending upon the stage of disease.^[2]

We present a case of a patient presenting with uncommon complication of pneumomediastinum, mediastinitis and subcutaneous emphysema apart from the typical pulmonary findings of COVID19 pneumonia on CT chest as a complication even after being declared negative on repeat RTPCR testing.

Case Report

A 53-year-old, male adult was admitted to our hospital, for the management of SARS-COV-2 pneumonia after he tested positive on a RT-PCR analysis. He presented with non-productive cough, shortness of breath and fever. His oxygen saturation was 87% on room air at the time of admission and 94% on 6L O₂. He was a known hypertensive for 5 years. Biochemical parameters showed a total leucocyte count of 12000 (4000–10000 cells/ μ L) with 75% neutrophils,

12 % lymphocytes. His C-reactive protein was 36.1mg/L (normal < 5 mg/L), D- Dimer 0.6ug/ml (normal <5 μ g/ml), Lactate dehydrogenase 300 μ /L (normal<247 μ /L) and Serum ferritin 300ng/ml (21.81-274.66), the unit i.e ng/mL. He was started on empirical broad-spectrum antibiotics based on local antibiogram, Injection dexamethasone, Injection Remdesivir, Injection Low molecular weight heparin along with other symptomatic management.

Chest X-ray Antero Posterior view obtained in supine position, using mobile CXR unit, revealed confluent and bilateral alveolar opacities with air bronchogram and ground glass opacities without any pleural effusion [Figure 1A]. Repeat Chest-radiograph obtained on day 8 of admission showed further worsening with development of right sided white out lung with further increase and diffuse distribution of left sided alveolar opacities [Figure 1B]. In view of worsening chest findings and not maintaining his oxygen saturation despite high flow oxygen, patient was started on Non-invasive ventilation (NIV) with FiO₂ of 80%, positive end expiratory pressure of 5cm H₂O, pressure support of 8 cm H₂O and a respiratory rate of 18/min maintaining protocols of lung protective ventilation with tidal volume monitored at 5-6 mL/kg of predicted body weight.

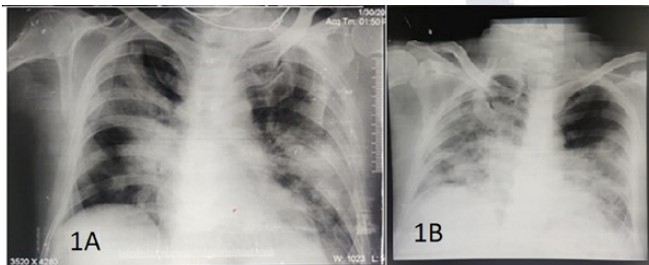


Figure 1: (A) Chest Xray AP view showing confluent and bilateral alveolar opacities with air bronchogram and ground glass opacities without pleural effusion. (B) Repeat Chest Xray AP view obtained on day 8 of admission showing further worsening with development of right sided white out lung and diffuse and further increase in left sided alveolar opacities.

Repeat RTPCR report came to be negative for COVID-19 on Day 12th. However, the patient developed sudden onset shortness of breath associated with diffuse chest pain on day 14th of admission associated with crepitus on chest and neck with O₂ saturation being 90% on NIV support on FiO₂ 70%. Repeat biochemical parameters showed total leucocyte count of 12500 (4000–10000 cells/ μ L) with neutrophils 78%, lymphocytes 15%, C-reactive protein concentration of 436mg/L (normal < 5 mg/L), D-Dimer 1.96ug/ml (normal<5 μ g/ml), Lactate dehydrogenase 342 μ /L (normal<247 μ /L), Ferritin > 2000ng/ml (21.81-274.66). A

HRCT (high resolution CT) chest using thin sections (1.5mm) was obtained that showed extensive consolidations and ground glass opacities involving both parenchymal and peripheral aspects of bilateral lung fields with the right fields being more involved than the left. Inter/intralobular septal thickening was seen within the ground glass opacity at places giving “crazy paving appearance” with pleural thickening, involving the costal and mediastinal pleura posteriorly. A calcified nodule measuring 5x6 mm is seen in superior segment of right lower lobe with surrounding ground glass halo thus showing a positive “halo sign” [Figure 2A, 2B].

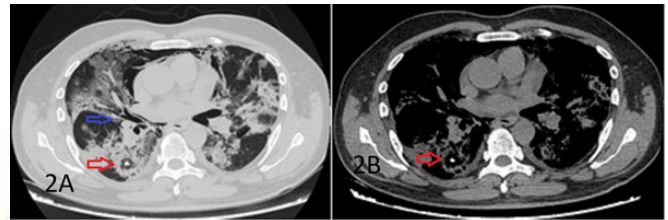


Figure 2: (A) Axial HRCT chest section (lung window) showing Halo sign (red arrow) and Double bronchial wall sign (blue arrow) (B) Axial HRCT chest (mediastinal window) showing presence of Halo sign (red arrow).

Presence of air was seen lateral to the pericardium extending superiorly along the perivascular sheath, peribronchial sheaths giving “double bronchial wall sign” positive [Figure 2A] and into the subcutaneous neck space on right side, which was suggestive of pneumomediastinum. with subcutaneous emphysema [Figure 3A, 3B]. Contrast enhanced computed tomography images showed multiple thin septations showing minimal enhancement surrounding the mediastinal fat that was suggestive of mediastinitis [Figure 4A,4B]. Pericardial effusion with maximum thickness of 13 mm seen along left ventricle. Pericardium is also slightly compressing upon the right ventricular appendages. However, 2D ECHO cardiography was done that showed normal cardiac parameters with no evidence of constrictive pericarditis.

The patient was subsequently started on higher antibiotics, capsule Nintedanib in view of post COVID fibrosis and NIV parameters were changed to a 0 PEEP in view of pneumomediastinum and subcutaneous emphysema. The patient gradually improved and was subsequently shifted on to nonbreathing mask. He was then sent for home isolation on minimal oxygen support. The patient was advised to follow up after 7 days with a repeat HRCT chest to look for resolution of pneumomediastinum.

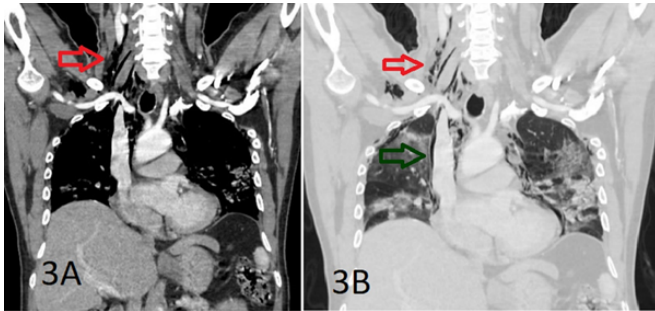


Figure 3: (A) Coronal section CECT Chest (mediastinal window) showing subcutaneous emphysema. (B) Coronal section CECT chest (lung window) showing subcutaneous emphysema (red arrow) and Pneumomediastinum (green arrow).

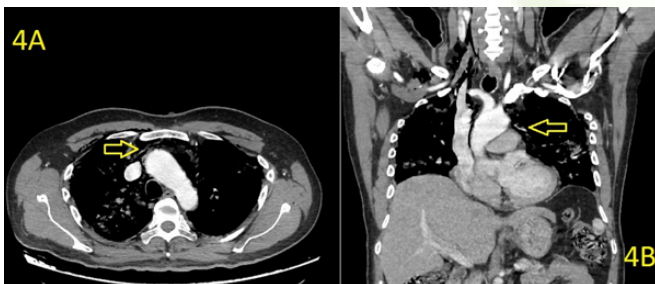


Figure 4: (A) Axial section and (B) Coronal section CECT chest (mediastinal window) showing multiple thin enhancing septations within the mediastinal fat suggestive of mediastinitis (yellow arrow).

Discussion

Corona virus (SARS-CoV2) is responsible for the global menace of COVID19 disease. Although it is a newer disease and all manifestations are still to be unearthed, it most commonly presents as fever, cough, myalgia, fatigue, diarrhea, nausea, headache and hemoptysis.^[3] Majority of the patients remain asymptomatic, however those in whom the severity is profound, may manifest with features of acute respiratory distress syndrome and even multiorgan dysfunction syndrome. CT plays a vital role in the identifying the magnitude of pulmonary damage and identifying rarer complications like subcutaneous emphysema and spontaneous pneumomediastinum.

Spontaneous pneumomediastinum is usually seen in young patients and presents with chest pain, sudden onset shortness of breath, cough or dysphagia. It is characterized by presence of air in mediastinum without any apparent causes including traumatic, surgery, iatrogenic, hollow viscus perforation, or infection by gas producing organisms. The occur-

rence of this pathology can be attributed to the existence of a pressure gradient between alveoli and the interstitium resulting in alveolar rupture and further spread along the venous sheaths to the mediastinum. This pressure gradient can be due to increased intra-alveolar pressure or decreased pressure in perialveolar interstitial space.^[4] SARS-CoV2 has a predisposition for Angiotensin converting enzyme 2 receptors which are abundant in the type II pneumocytes and may be responsible for the damage to the alveolar membrane and subsequent rupture that may lead to spontaneous pneumomediastinum and subcutaneous emphysema.^[5] In our case, the patient presented with typical symptoms of COVID19 pneumonia and was managed conservatively. However, the patient deteriorated further on 14th day of admission (2 days after coming negative on repeat COVID19-RTPCR). HRCT Chest revealed the presence of pneumomediastinum and subcutaneous emphysema. There was no history of any chronic respiratory illness, tobacco use, and the non-invasive ventilation was instituted using lung protective ventilation making barotrauma unlikely. This indicates a possibility of COVID19 pneumonia related alveolar damage leading to spontaneous pneumothorax and subcutaneous emphysema. Spontaneous pneumomediastinum is managed conservatively and is usually self-limiting unless severe. Only a few case reports have been published regarding the occurrence of this complication,^[4-8] which highlight a similar occurrence of events and in a similar duration in the course of illness. However, none of the cases have occurred in patients after being negative on a repeat RTPCR which emphasizes on the fact that a physician should keep a high degree of suspicion in patients presenting with such symptoms even if they are declared negative for COVID19. Early identification of the pathology in our patient turned an asset and timely and appropriate intervention were given which led to an early recovery for the patient.

Conclusion

Spontaneous pneumomediastinum is a rare complication occurring in the patients with COVID19 pneumonia and can lead to significant clinical deterioration of the patient's condition. So, awareness of this possibility and early identification using computed tomography can save the patient from significant morbidity and possible mortality.

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