


## Case report

## COVID-19-Related Spontaneous Pneumomediastinum: An Atypical Manifestation

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### Abstract

COVID-19 has been an emerging healthcare challenge during the last months. Herein we explain two cases with spontaneous pneumomediastinum as an atypical manifestation of COVID-19 disease; these two patients had confirmed COVID-19, leading to spontaneous pneumomediastinum as an atypical manifestation during the course of hospital stay, presenting by abrupt deterioration in O<sub>2</sub> saturation and symptoms. Spontaneous pneumomediastinum should be considered as a potential reason for the disease exacerbation in patients without previous history of mechanical ventilation.

**Keywords:** COVID-19, Coronavirus Pandemic, Pneumomediastinum, Spontaneous Pneumomediastinum

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### Introduction

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), originated in Wuhan, China, has spread all over the world. The usual clinical features of patients are dry cough, fever, diarrhea, vomiting, and myalgia (1, 2). Nevertheless, COVID-19 does not necessarily present in a similar pattern, and a long list of atypical presentations and complications have been described (3, 4). This wide range of presentations could not be limited just to clinical signs; instead, the diagnostic patterns demonstrate many diagnostic

diversities (1, 3). Many clinical studies have determined the most common expected radiological features of COVID-19 patients: multifocal ground-glass and/or consolidative opacities which are usually bilateral, peripheral, and basal in distribution. Though some reports are available, it seems that different radiologic patterns have not been mentioned enough, especially when considering the many organs systems potentially involved in COVID-19 (1, 4). Among the many unusual findings, some involve the pulmonary system; however, pneumomediastinum has rarely been reported (5-8). Herein we report two cases of

spontaneous pneumomediastinum associated with COVID-19 in a tertiary referral medical center in Tehran, Iran.

## Case Report

### The First Patient:

A 54-year-old nonsmoking man with a past medical history of hypertension and past surgical history of right kidney transplant was admitted to the emergency department of our hospital with seven days of dry cough, shortness of breath, nausea, vomiting, and decreased appetite. There were only bibasilar crackles at auscultation. The O<sub>2</sub> sat was normal on room air.

The first unenhanced chest CT scan after admission shows bilateral patchy ground-glass opacities and consolidations mainly peripherally dispersed in favor of COVID-19 (Figure 1-A). Complete blood count showed no elevated Leukocytes (5000 cells per  $\mu$ L) with 10% of lymphocytes. Other analyses revealed increased D-Dimer (1304 ng/ml); CRP and LDH elevation. The RT-PCR test was positive for COVID-19.

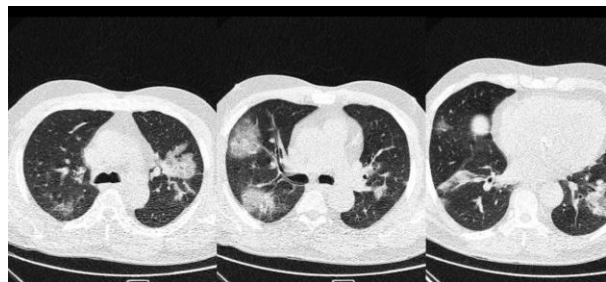
Treatment with antibiotics (ceftriaxone and metronidazole), antiviral (remdesivir), and corticosteroid (methylprednisolone) were administered.

On hospital day fourteen, the patient experienced pleuritic pain and a decrease in oxygen saturation (88%) with O<sub>2</sub> at 4L/min through a nasal cannula. A low-grade fever of 37.5°C was detected. Blood pressure was 140/77 mmHg and pulse rate was 95 per minute.

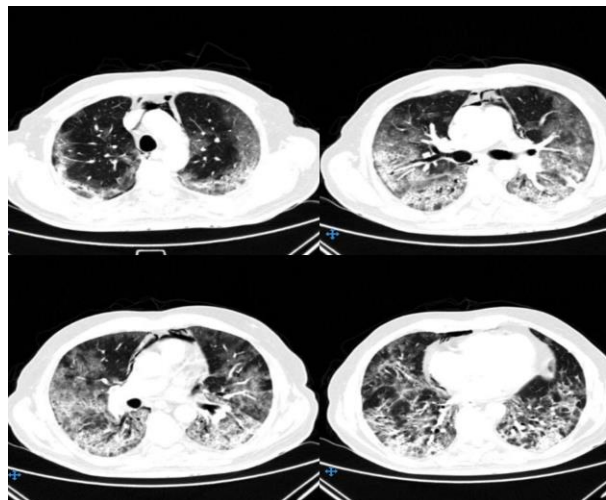
At this time, his respiratory rate was 34. The rest of the physical exam was normal. Crepitus around his neck and chest area was not noted. No leukocytosis was found (W.B.C: 5000 cells/ $\mu$ L).

The second CT scan was performed which showed a significant amount of pneumomediastinum with no cervico-mediastinal emphysema and pneumothorax (Figure 1-B).

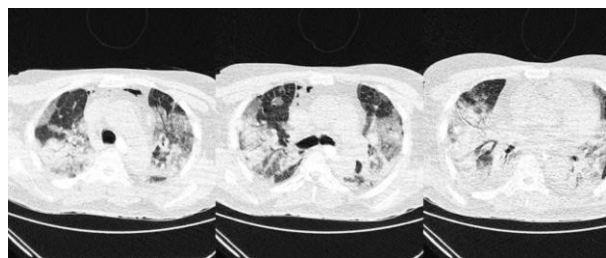
The third CT scan was performed 6 days later and revealed resolving pneumomediastinum with conservative management (Figure 1-C).



A



B



C

**Figure 1-A.** the first unenhanced chest CT scan after admission with mainly peripheral bilateral patchy ground-glass opacities and consolidations

**Figure 1-B.** the second unenhanced CT- scan with deteriorated consolidations in addition to pneumomediastinum.

**Figure 1-C.** the third CT Scan shows bilateral progressing consolidations and resolving Pneumomediastinum.

### The Second Patient:

A 71-year-old man with a past medical history of hypothyroidism complained of 3 days of fever (37.7°C, axillary route), dry cough, headache, sore throat. He

denied using tobacco and alcohol. Physical examination showed wheezing sounds at auscultation. Oxygen saturation was normal (96% without O<sub>2</sub>). First Chest CT-scan demonstrates peripheral ground-glass opacities predominantly in lower lobes in both lungs in favor of COVID-19 (Figure 2-A). Laboratory tests demonstrated leukocytosis (14,800 cells per  $\mu\text{L}$ ) with the presence of lymphopenia (8%) and elevated C-reactive protein (4+). COVID-19 PCR analysis was positive. The treatment with ceftriaxone and levofloxacin was started.

On the thirteenth day of the hospital stay, the patient stated discomfort while breathing at rest with minimal exertion. The oxygen saturation was low (87% without O<sub>2</sub>). No fever was detected. Blood pressure was 120/83 mmHg and pulse rate was 92 per minute. His respiratory rate was 38. The rest of the physical exam was normal. Crepitus around his neck and chest area was not noted. White blood counts were decreased and within the normal range (8900 cells/ $\mu\text{L}$ ).

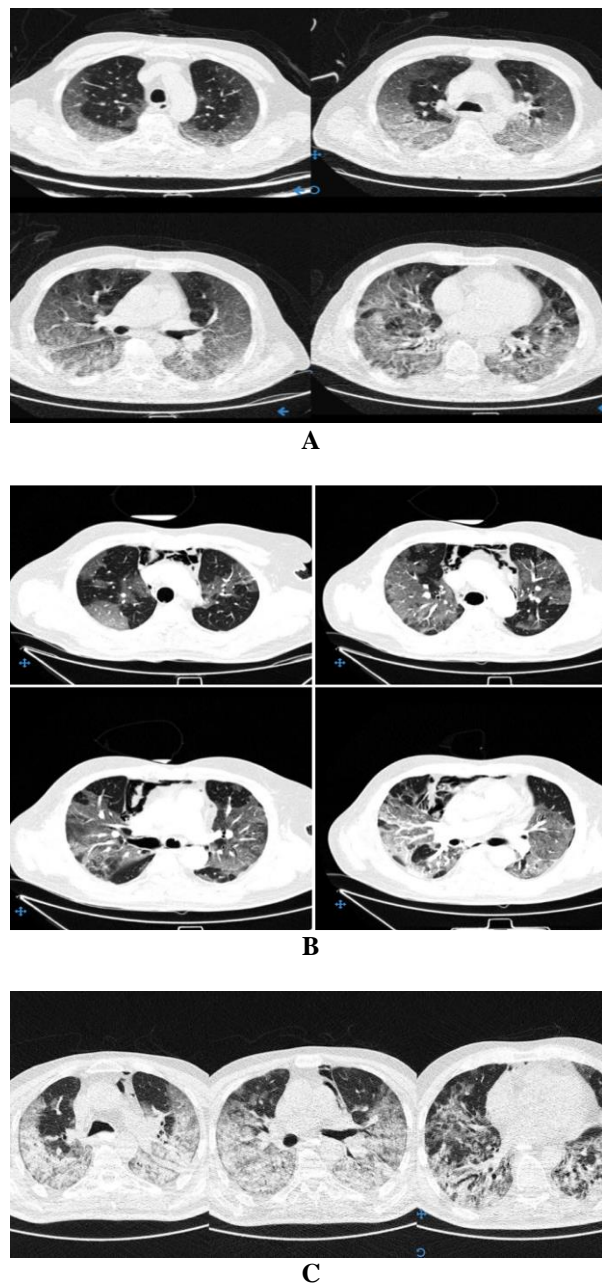
On suspicion of pulmonary emboli and to rule out other causes a pulmonary CT angiography was done, which was negative for pulmonary emboli but revealed pneumomediastinum in addition to existing ground-glass opacities (Figure 2-B), with no pneumothorax and no evidence for tracheal or esophageal perforation. Follow up CT scan 5 days later showed a decrease in the amount of pneumomediastinum (Figure 2-C).

For these patients, no intervention was required. We continued the same treatment and followed the clinical status and radiological findings. The respiratory status of both of them was maintained stably without increased oxygen requirements.

Their respiratory status became better and the supplemental oxygen requirements decreased gradually. They were discharged from the hospital in stable condition, having never required mechanical ventilation.

## Discussion

Pneumomediastinum refers to a situation where air occupies some parts of the mediastinum. Many methods can be used to verify such a situation, such as a chest X-ray and CT scanning of the thorax.



**Figure 2-A.** the first Chest CT-scan demonstrates peripheral ground-glass opacities in both lungs

**Figure 2-B.** the second Chest CT scan shows pneumomediastinum in addition to ground glass opacities

**Figure 2-C.** Chest CT-scan demonstrates resolving pneumomediastinum and progressing opacities

Nonetheless, severe central chest pain is considered the main symptom. Another major symptom is subcutaneous emphysema, which specifically affects the face, neck, and chest. Spontaneous pneumomediastinum is a rare symptom, which is

commonly caused by various medical conditions such as infections, thoracic surgery/pericardial fluid drainage, traumas, respiratory disorders like asthma, and chronic lung disease, and positive pressure ventilation (4-6). Although most cases receive treatment conservatively, this situation should be carefully monitored to avoid life-threatening conditions.

The new pandemic of COVID-19 is the new worldwide challenge of healthcare systems; particularly due to its wide and different range of clinical and Paraclinical features. In severe reported cases (1-3), pneumomediastinum was observed as an uncommon respiratory syndrome. Although the exact mechanism is not fully understood, this might be related to diffuse alveolar injury and rise in alveolar pressure leading to vulnerable alveoli and therefore ruptured alveoli. Some of these severe reported cases have been complicated by pneumothorax (3-5). Despite very rare reports of the coexistence of pneumopericardium, pneumomediastinum, and subcutaneous emphysema, these can be simultaneously appearing in young people with a history of blunt trauma or asthma (6-8).

However, none of these risk factors were reported in the history of our patients. Therefore, the pneumomediastinum should be associated with COVID-19 pneumonia. Notably, sepsis evidence and signs such as subcutaneous emphysema were not found in our patients.

## Conclusion

Although pneumomediastinum could be starting in a self-limiting manner, it requires careful investigation to avoid exacerbating conditions in COVID-19. Besides, spontaneous pneumomediastinum should be considered as a potential reason for the disease exacerbation in patients without previous history of mechanical ventilation.

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## Conflicts of Interest

The authors declare that there are no conflicts of interest.

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