

Spontaneous Pneumothorax Complicating COVID-19 Pneumonia in a Patient Having Silicosis

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Abstract

Spontaneous pneumothorax is a very uncommon occurrence in patients having coronavirus disease 2019 (COVID-19) pneumonia. It is mostly seen due to barotrauma in patients receiving mechanical ventilation. Although it may occur at different courses of COVID pneumonia and in patients with no underlying lung disease, it has been seen in patients having underlying asthma, chronic obstructive pulmonary disease, and bronchiectasis. This report describes spontaneous pneumothorax in a silicosis patient during the course of COVID-19 pneumonia with successful outcomes. Possible mechanism of pneumothorax in COVID-19 pneumonia and contributing the role of silicosis is also mentioned with the importance of detecting such complications in time to reduce mortality in such patients.

Keywords: Coronavirus disease 2019 pneumonia, pneumothorax, silicosis

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus-2. Started in December 2019 from Wuhan, China, it spread globally and declared a pandemic by the World Health Organization in March 2020^[1] and still continues all over.

The disease mainly affects the lungs and presents with fever, myalgia, sore throat, cough, breathlessness, and gastrointestinal symptoms. It can complicate septic shock, metabolic acidosis, coagulopathy, and acute respiratory distress syndrome.^[2] Although very rare, pneumothorax has been noted to complicate COVID-19 pneumonia; however, the exact incidence, risk factors, and mechanisms are still unknown. This report describes a case of spontaneous pneumothorax complicating COVID-19 pneumonia in a young male patient having silicosis. Possible underlying mechanism and role of underlying disease are also discussed.

CASE REPORT

A 28-year-old male presented with chief complaints of high-grade fever with chills along with dry cough and increasing breathlessness for the past 5 days. He was a diagnosed case of simple silicosis 6 months ago based on

his occupational history of working in stone grinding factory for more than 10 years and suggestive chest radiographic picture showing bilateral nodular shadows [Figure 1a]. His earlier workup for tuberculosis was negative. He was a nonsmoker.

On examination, he was in respiratory distress with a respiratory rate of 28/min, with a temperature of 101°F. There was no cyanosis, but oxygen saturation was 86% on room air by digital pulse oximetry, and chest auscultation revealed bilateral coarse crackles on both sides. He was immediately hospitalized, and urgent X-ray of the chest revealed bilateral air space consolidation suggestive of bilateral pneumonia [Figure 1b]. His throat swab sample was sent for testing by the reverse transcription-polymerase chain reaction for COVID-19 disease. He was initially managed with oxygen by nasal cannula, intravenous broad-spectrum antibiotics, and nebulized bronchodilators along with supportive treatment.

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How to cite the article: Dixit R, Goyal M, Gupta A, Jalutharia J. Spontaneous pneumothorax complicating COVID-19 pneumonia in a patient having silicosis. *Indian J Respir Care* 2022;11:80-2.

Received: 20-11-2021

Revised: 07-12-2021

Accepted: 11-12-2021

Published: 04-01-2022

Access this article online

Quick Response Code:



Website:
www.ijrc.in

DOI:
10.4103/ijrc.ijrc_143_21

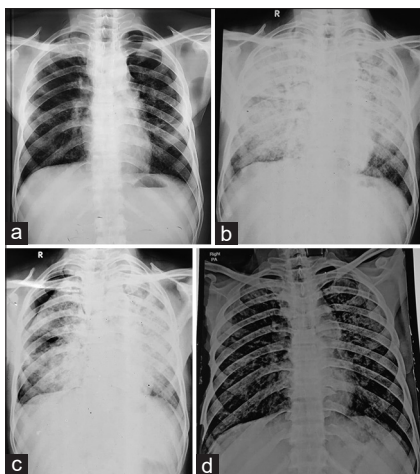


Figure 1: X-ray of the chest showing bilateral diffuse fine nodular shadows (a); bilateral consolidation (b); right-sided pneumothorax (c); and patchy fibrotic lesions (d)

On the next day, his throat swab report came positive for COVID-19. His blood investigation reports revealed hemoglobin 11 g%, total leukocyte counts 5830/mm³, lymphocytes 550 cells/ μ L, random blood sugar 128 mg/dL, D-dimer 5.81 mg/L, C-reactive protein 223.9 mg/L, lactate dehydrogenase 450 U/L, creatinine 1.04 mg/dL, prothrombin time 10.2 s, international normalized ratio 0.94, and activated partial thromboplastin time 19.4 s.

His treatment was revised with intravenous remdesivir, low-molecular-weight-heparin, and methyl prednisolone. He required 8–10 l of oxygen to maintain SpO₂ above 95%. With this treatment, his condition remained stable over 2 days, and then his SpO₂ was maintained at 4–5 l oxygen. On the 6th day of admission, he complained of right-sided chest pain and increasing breathlessness with fall in SpO₂ – 88% with 4 l of oxygen. On auscultation, there was reduced pneumophonation and electrocardiogram showed sinus tachycardia. An urgent X-ray of the chest revealed pneumothorax on the right side [Figure 1c]. An intercostal chest drain was immediately inserted that resulting in clinical improvement and reduced oxygen demand. He continued to show improvement with the resolution of pneumonitis, and the chest drain was removed after 10 days. On the 15th day of admission, he was discharged and was maintaining SpO₂ of 96% on room air. A repeat chest X-ray at 6 weeks showed no recurrence of pneumothorax but patchy fibrotic shadows [Figure 1d]. The patient was then advised rehabilitation including exercises and nutritional support with supportive and symptomatic treatment.

DISCUSSION

Radiology plays an important role in the management of COVID-19 pneumonia. The common radiographic abnormalities include ground-glass haziness, particularly at the periphery, posteriorly, and at lower lobes, apart from dense consolidation and fibrotic changes in late stage. The uncommon findings are pleural effusion, pericardial effusion, lymphadenopathy,

cavitation, various computed tomography signs (halo sign, melted sugar, cotton candy, etc.), and pneumothorax.^[3]

Pneumothorax, although very uncommon in COVID-19 pneumonia, has been reported both in intubated and nonintubated patients and on either side or bilaterally and with or without associated pneumomediastinum. This may be seen in acute form at the time of presentation, during the hospitalization period, in patients receiving invasive ventilator support and in post-COVID phase as well. It has been observed in smokers as well as nonsmokers and in those with no underlying lung disease.^[4,5]

The occurrence of pneumothorax cannot be considered rare as coincidence in COVID-19 pneumonia as there are several published series on this across various centers.^[4] There are several possible mechanisms to explain this complication that includes (a) pneumatoceles or cyst formations in COVID-19 pneumonia even without ventilator support with their subsequent rupture, (b) persistent coughing leading to an increase in intrathoracic pressure in the presence of underlying pleural abnormalities, (c) alveolar damage from COVID-19 pneumonitis inflammation or ischemic parenchymal damage, (d) pulmonary embolism associated infarction with subsequent parenchymal cavitation and then pleural rupture, and (e) rupture of alveoli by barotrauma resulting from mechanical ventilation.^[5,6] Among patients having underlying lung diseases, pneumothorax has been reported in COVID-19 pneumonia patients having asthma, chronic obstructive pulmonary disease, and bronchiectasis.^[4] In our case, the underlying lung disease in patient having COVID-19 pneumonia was silicosis and the pneumothorax developed subsequently. Silicosis is known to cause pneumothorax by several mechanisms with or without pneumomediastinum. Bullae and emphysema in silicosis are known to occur in the absence of smoking and are known to cause pneumothorax. In interstitial lung diseases, local inflammation along with increased elastic recoil (as seen on fibrosis) and a collapse of the adjacent region makes the lung vulnerable for segmental hyperdistension and subsequent development of pressure gradient to cause alveolar rupture.^[7,8] The above facts make silicosis patients more vulnerable to complicate into pneumothorax once they get COVID-19 pneumonia due to the other added risk factors inherent to viral pneumonia. Therefore, persons caring for such patients must be more vigilant in this direction.

It is utmost important to recognize pneumothorax as it is an emergency situation, particularly in COVID-19 pneumonia patients when they deteriorate suddenly and do not maintain saturation. Although initially, pneumothorax was considered a poor prognostic factor in COVID-19 pneumonia, the subsequent reports observed favorable outcomes when managed promptly.^[4] It is important to recognize pneumothorax as a complication in COVID-19 pneumonia patients especially when they deteriorate rapidly with desaturation. A simple auscultation finding of decreased breath sounds and subsequent radiologic/sonologic confirmation with

immediate intervention may reduce fatality in patients having underlying lung disease.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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