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Delayed recurrent spontaneous pneumothorax in a patient recovering from COVID-19 pneumonia

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- Letter to the Editor -

While spontaneous pneumothorax in COVID-19 pneumonia is now a well-known complication, recurrent delayed pneumothorax has not been reported. We report such an instance in a patient nine weeks after presenting with COVID-19 pneumonia when she was deemed to have recovered well. A 66-year-old female presented to emergency department with fever, non-productive cough and increasing breathlessness for 12 days. She was normally fit, never smoked, and had a history of well-controlled asthma, thyroidectomy and parathyroidectomy. Twelve hours later, she required intubation and mechanical ventilation for worsening respiratory failure. COVID-19 infection was confirmed from the tracheal sample. She subsequently developed critical illness neuropathy leading to significant quadriplegia and slow wean. Percutaneous tracheostomy was done and her ventilatory support had reduced to pressure support 8 cm H₂O, PEEP 5 cm H₂O and FIO₂ 0.35. Computed tomography (CT) scan of chest on Day 19 of hospital admission showed extensive bilateral patchy ground glass opacification, significant bronchial distortion and traction bronchiectasis. There were no pneumatoceles. She received pulsed intravenous methylprednisolone for three days. X-ray chest on Day 27 showed two pneumatoceles about 3 to 4 cm in diameter in the right lung. Next day, she spontaneously developed a large pneumothorax and broncho-pleural fistula on contralateral side requiring a chest drain. CT scan on Day 31 showed new onset pneumomediastinum, persistence of pneumothorax on left side, and appearance of additional pneumatoceles in right upper zone. There was no evidence of pulmonary embolism. Application of low-pressure suction led to complete re-expansion of the left lung and the broncho-pleural fistula.
resolved over the next week. Repeat bronchial samples were negative for COVID-19.

On Day 37 and Day 41, sputum culture grew *Serratia Marscesens* and blood culture grew *Klebsiella Aerogenes* respectively; both responded to a course of antibiotics. She came off ventilatory support by Day 54. Repeat CT scan showed resolution of the pneumomediastinum, reduction in size of right lung pneumatoceles and appearance of new pneumatoceles in the left lung. Trachea was decannulated on Day 59 and she was transferred to the medical ward three days later. On Day 68, she spontaneously developed tension pneumothorax on the left side requiring emergency decompression and chest drain (Figure 1). She did not require any additional ventilatory support except supplemental oxygen and the chest drain was removed a week later. She required another three weeks to recover well enough to be discharged home. The total duration of hospital stay was three months. SpO2 of around 90% on room air was deemed acceptable and arrangements were put in place for follow up and home oxygen supplementation if required.

Pneumothorax in COVID-19 pneumonia can be a presenting feature or develop in the acute phase [1,2]. Hollingshead and Hanrahan [3] reported a patient who presented with loculated pneumothorax in the fourth week of illness. There have been no reports of recurrent delayed spontaneous pneumothorax occurring several weeks later. Our report suggests that pneumatoceles could be the precursor of development of pneumothorax in COVID-19. In an autopsy series of 38 patients, Carsana et al. [4] found that loss of pneumocytes was present in 100% of cases with a multifocal distribution comprising the majority. The mean duration of hospital stay of patients in this series was only 7 days with a range up to 23 days. It is possible the process of lung destruction continues with longer duration of illness.

Although the first pneumothorax was expected on the same side as that of pneumatoceles, it developed on the contralateral side in this patient. The fast rate at which the pneumatoceles developed was interesting. In previous case reports, the pneumomediastinum and pneumothorax...
resolved with time [5,6]. While pneumomediastinum did resolve in our patient, the pneumatoceles not only persisted but new ones continued to appear much later in clinical course, despite the repeat sample for active COVID-19 infection testing negative. *Klebsiella* pneumonia has been associated with formation of pneumothorax and empyema [7]. In all such cases, the bacterium is grown in the sputum or pus. In our patient, *Klebsiella* was grown once from blood culture and was not grown in any of the sputum samples. Pleural drain fluid was not purulent. Hence it is unlikely that the pneumothorax was caused by the *Klebsiella* infection.

This report highlights the need for a high index of suspicion for pneumothorax in patients with severe COVID-19 pneumonia when they deteriorate acutely after appearing to stabilise. Considering that this can happen in very late stages of disease when there is no sign of active infection, close monitoring is required in the presence of radiological evidence of pneumatoceles. This report is published with the written consent of the patient’s legal guardian.
References


Figure 1

Chest X-Ray on Day 68 showing the pneumothorax on left side with compression of the lung (solid black arrow). The hub of cannula used to decompress the tension pneumothorax is still in situ (solid white arrow). Trachea had been decannulated by this time.