

Self-Expanded Spontaneous Pneumothorax and Subcutaneous Emphysema in a Sri Lankan Patient with COVID Pneumonia

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Abstract

Corona Virus Disease – 2019 (COVID-19) is the global health concern and associated with multiple pulmonary and extra-pulmonary complications. Pneumothorax is reported but in small numbers and possibly associated with adverse morbidity and mortality. In addition to secondary pneumothorax occurring due to positive airway pressure ventilation, spontaneous pneumothorax can also happen in severe COVID-19 pneumonia and in some cases associated with pneumomediastinum. Here we present a case of spontaneous pneumothorax in a Sri Lankan patient with severe COVID-19 pneumonia.

Keywords: Spontaneous Pneumothorax, Subcutaneous Emphysema

Case Report

A 59 year old retired clerk with end stage renal failure (ESRF) presented with worsening shortness of breath and low grade fever, while awaiting his routine dialysis. As tested positive for COVID- 19, he was transferred to COVID intensive care unit (ICU) due to the desaturation requiring ventilator support. His hypoxic respiratory failure was managed with high flow nasal oxygen (HFNO) with 40 l/min flow rate and 60% oxygen percentage. The chest X-ray showed characteristic findings of COVID pneumonia with peripherally located bilateral consolidations, in addition to the dialysis catheter inserted 10 days prior to this presentation (figure 1). His routine haemodialysis was carried out every third day. He had clinical improvement with reduced oxygen requirement since first day.

His investigations revealed leukocytosis ($13 \times 10^3/\mu\text{l}$) with lymphopenia (4 %), haemoglobin of 8.9 g/dl, normal serum electrolyte levels, elevated troponin I (0.45 ng/ml), elevated D-dimer (1.2 $\mu\text{g/ml}$) and high serum ferritin levels (1200 ng/ml). Serum creatinine of 6 and 7 mg/dl, C-reactive protein (CRP) of 66 mg/l and 84 mg/l and procalcitonin levels of 0.22 $\mu\text{g/l}$ and 0.34 $\mu\text{g/l}$ were noted respectively on 1st and 5th day. Intravenous meropenem (1 g twice a day), oral clarithromycin (500 mg twice a day), intravenous dexamethasone (6 mg daily) and subcutaneous enoxaparin (40 mg daily) (renal adjusted therapeutic dose) were commenced at the time of admission and continued according to the standard protocol along with calcium, iron, zinc supplementation and his usual medications including premixed insulin.

Significant clinical improvement was achieved at the end of the 3rd day leading to face mask O₂ with 40% O₂. Right sided chest pain was complained on 5th day without change of clinical parameters, and postero-anterior chest X-ray was taken. Mild right sided pneumothorax which measured around 2 cm at the hilar level and subcutaneous emphysema was observed (figure 2).

Re-questioning and reevaluation was not revealed previous similar events, any underlying diseases or family history leading to pneumothorax. Collective decision was taken to manage the pneumothorax in conservatively, while closely monitoring in the ICU. As the patient is in an immune suppressive stage due to ESRF, other investigations were carried out to rule out possible other aetiologies for pneumothorax. Sputum for acid fast bacilli and Xpert/MTB RIF did not detect *Mycobacterium tuberculosis*, serology was negative for cytomegalo virus and silver stain from the sputum did not detect *Pneumocystis jiroveci*. High Resolution Computed Tomography (HRCT) was not carried out urgently and decided to perform later.

Follow-up chest X-ray after 24 hours, revealed the complete resolution of pneumothorax and subcutaneous emphysema. Chest X-ray was completely resolved on 10th day parallel with clinical and biochemical

improvement. Immunoglobulin G for COVID-19 was became positive on 21st day along with complete resolution of respiratory symptoms and discharged from inward facility.

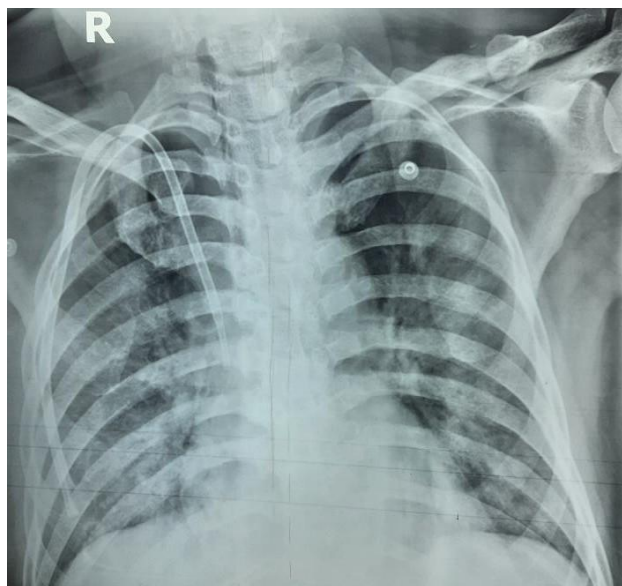


Figure 1

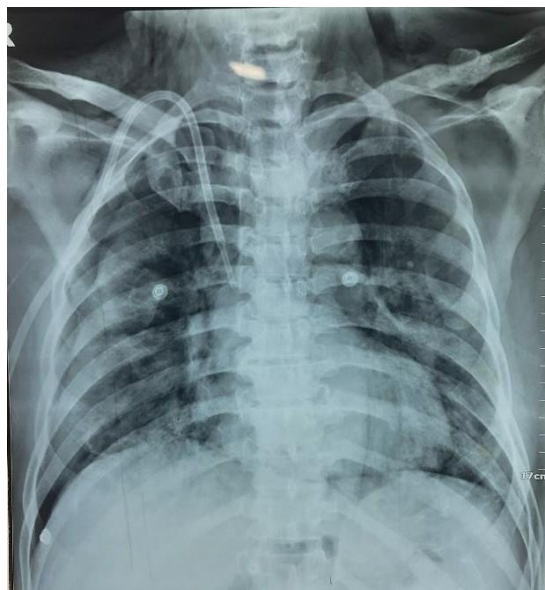


Figure 2

Discussion

Current global crisis of COVID-19 is the most dynamic interest in world medical community. Whole world is unaware of exact clinical spectrum of the pandemic. Different phenotypes and clinical behavior are to be learnt. According to the reported information, it has numerous pulmonary and extra-pulmonary complications due to many pathophysiological consequences [1,2].

The true incidence of pneumothorax in COVID-19 is not yet well established and considered as an uncommon event [1]. It can be associated with pneumomediastinum and even rarely can be bilateral [1,2]. However, the occurrence of pneumothorax has not been considered as an independent poor prognostic maker according to the case series published up to date [2]. It has more preponderance in male gender and patient who was intubated and ventilated [2]. Patients who had developed spontaneous pneumothorax were noted to have pleuritic chest pain, dyspnea, higher white cell count, tachycardia and hypoxia [3]. Elevated levels of CRP, D-Dimer, ferritin, IL-6 and lactate dehydrogenase were also associated with development of spontaneous pneumothorax in COVID-19 [1].

In addition to the secondary pneumothorax due to barotrauma secondary to assisted ventilation, either invasive or non-invasive, COVID-19 pneumonia itself a risk for developing spontaneous pneumothorax. The typical appearance of COVID-19 pneumonia with peripheral consolidation and ground glass, similar to that of our patient is the commonest pattern for development of pneumothorax in COVID-19 [2,4]. The pathophysiology may be linked to the formation of bullae and cysts in the areas of consolidation and subsequent rupture during the course of illness leading to pleural and mediastinal air leak [2-6]. The dysregulated immune system, microangiopathy and the thrombosis may also contributory to these complications [4]. Therefore, the patients are more liable to get pneumothorax even without assisted ventilation and barotrauma.

Even though some reports noted the necessity of surgical management in COVID-19 pneumothorax, large

scale surgical series suggested most of them settle with chest drainage without requiring further surgical interventions [2]. Persistent air leak and resistant pneumothorax may be managed according to the practical guidelines, which may require pleurodesis, bulectomy and other procedures. The details on self-expanded pneumothorax similar to our patient are sparse in the literature.

Conclusion

Therefore, the occurrence of a spontaneous pneumothorax would be considered in a background of clinical deterioration of COVID-19 pneumonia. Appropriate investigations and treatment would be supplementary to standard management. We would like to hypothesize that increased markers of inflammatory response like CRP, D-Dimer, ferritin and IL-6 indirectly proportionate with severe inflammatory effect of COVID-19 which can lead to interstitial oedema and poor functional performance. As a result of this effect normal lung tissue can be over inflated with increasing pressure leading to rupture.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review with the corresponding author.

Authors' contributions:

HB drafted the manuscript. DM supervised and involves the management and manuscript; SD and PW involve the management.

Author's information

HB is senior registrars in respiratory medicine. DM (MD, FRCP) is a senior consultant respiratory physician. PW and SD Resident respiratory physician,

Conflicts of interest:

All the authors have declared that they have no conflicts of interest.

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