Pneumothorax, Pneumomediastinum and Pneumoperitoneum in a COVID Positive Patient - A Case Report

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Abstract

The COVID-19 pandemic has left our world in a state of disarray as patients have been suffering from recurrent pneumothoraces, acute liver failure, increase clotting risk, and conditions we are still learning about. We treated a patient who developed bilateral pneumothoraces that ultimately worsened and lead to pneumomediastinum, subcutaneous emphysema, and pre-peritoneal free air. The best management of such cases remains unknown. Now more than 5 million COVID-19 cases globally, we should continue to report on the associated morbidity and potential treatment.

Keywords: COVID-19 • Pneumothorax • Pneumomediastinum

Introduction

The COVID-19 pandemic has left our world in a state of disarray especially as there have been many surprising compilations associated with the virus. Patients have been suffering from recurrent pneumothoraces, acute liver failure, increase clotting risk, and conditions we are still learning about. We treated a patient who developed bilateral pneumothoraces that ultimately worsened and lead to pneumomediastinum, subcutaneous emphysema, and pre-peritoneal free air.

Case Report

This is a 67-year-old male brought from his nursing facility to the emergency room (ER) with complaints of shortness of breath for a week and a nonproductive cough. His past medical history included bladder cancer, which was treated with bilateral nephrostomy tubes and was currently undergoing chemotherapy. He also suffered from stage III chronic kidney disease and was a former smoker. Upon his arrival to the ER, he was hemodynamically stable but placed on a non-rebreather due to low oxygen saturation. Chest Computed Tomography with Angiography (CTA) demonstrated bilateral pulmonary emboli disease and extensive bilateral interstitial lung process (Figures 1a and 1b). He was tested positive for COVID and transferred to the MICU for high flow nasal cannula (HFNC) - 10L/m to maintain his saturations. He was given steroids and also started on a heparin drip for the bilateral pulmonary emboli. During his first couple of days in the medical ICU (MICU), he was weaned to nasal cannula, and transferred to the floor.

However, on hospital day (HD) 17, he had increasing oxygen requirement and was transferred back to the MICU for higher level of care. Repeat Chest CT scan demonstrated worsening of his lung process (Figures 2a and 2b).

Keywords: COVID-19 • Pneumothorax • Pneumomediastinum

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pneumothoraces and improved his respiratory status. On HD #21, he started to have increased in pressors requirements. He underwent a CT scan which demonstrated worsening subcutaneous emphysema, pneumomediastinum, and concern for pneumoperitoneum (Figures 3a-3c). The free air was later read as preperitoneal, demonstrating the air spreading through the different skin levels. Shortly after the scan, his hemodynamics worsened, and he developed arrhythmias. Discussion was held with the family about his poor prognosis and he was ultimately made comfort care. He passed away later that evening.

**Discussion**

Pneumothorax is a result of rupture of visceral or parietal pleural membrane which allows for air to enter into the pleural space. It can either be spontaneous, iatrogenic, or traumatic and typically resolved with tube thoracostomy [1]. Spontaneous pneumothoraces are slowly starting to become a common finding in COVID positive patients. Only about 1% of COVID-19 patients have developed a pneumothorax [2]. This patient had spontaneous pneumothorax, pneumomediastinum, and subcutaneous emphysema at the same time. Spontaneous pneumomediastinum, usually a rare condition, refers to alveolar rupture due to an increase in intrathoracic pressure, followed by air dissection through the bronchovascular sheath into the mediastinum [3]. Subcutaneous emphysema occurs when air gets into tissues under the skin, with pneumothorax often being the cause [4]. It is felt to be due to weakened pleura secondary to infection and inflammation. This infection leads to consolidated airspaces, which then leads to peripheral ballooning.

At our hospital, we have started to notice multiple COVID patients with bilateral pneumothoraces. Once we have placed a pigtail catheter, we have kept the chest tube to suction to help re-inflate the lungs but also to decrease the risk of transmission of disease, especially while these patients remain intubated. Because these patients typically develop acute respiratory distress syndrome (ARDS), they are treated with high PEEP. However, this also causes high baropressure on the lungs and leads to development of bullae. With the increased airway pressure, it ultimately ruptures and develop into a pneumothorax. The damage here is typically worsened by any associated pulmonary pathology (i.e., pneumonia, history of emphysema or COPD) and severity of ARDS and increasing the risk of barotrauma [2].

**Conclusion**

We have also noted that increase in patients’ age is typically relates to increase in comorbidities and ultimately, increase risk of acquiring COVID. This is highlighted in our patient as he had history of bladder cancer, actively treated with immunosuppressive chemotherapy and he resides in a nursing home facility. This case is documentation that acute deterioration with rapid oxygen desaturation in a COVID-19 patient could indicate pneumothorax, pneumomediastinum or associated pneumoperitoneum. The best management of such cases remains unknown. Now more than 29 million COVID-19 cases globally, we should continue to report on the associated morbidity and potential treatment.
References


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