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

Natasha Ahuja[1*], Yaron Perry[2]

[1]*Department of Surgery, University at Buffalo Jacobs School of Medicine and Biomedical Sciences, Buffalo, New York, USA*

[2]*Department of Thoracic Surgery, Buffalo General Hospital, Buffalo, New York, USA*

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 pneumothorces 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 pneumothorces 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 medial 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). He was treated with steroids and prophylactic antibiotics. On HD #18, he was intubated. On HD #19, he developed worsening shortness of breath and crepitus was noticed along his neck. Chest x-ray documented bilateral pneumothoraces and we placed bilateral pigtail catheters, which resolved the

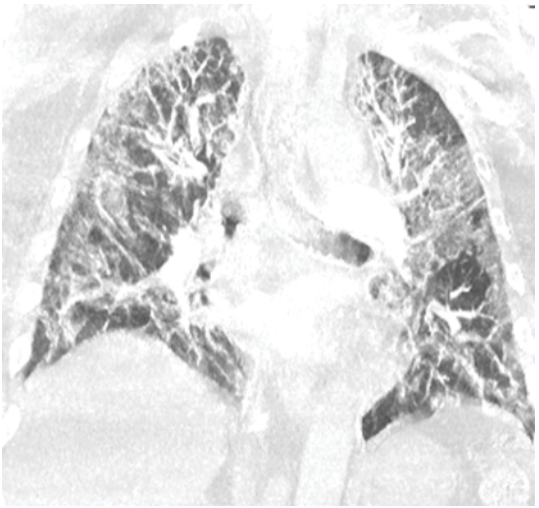

Figure 1a. CT scan on admission, coronal view.

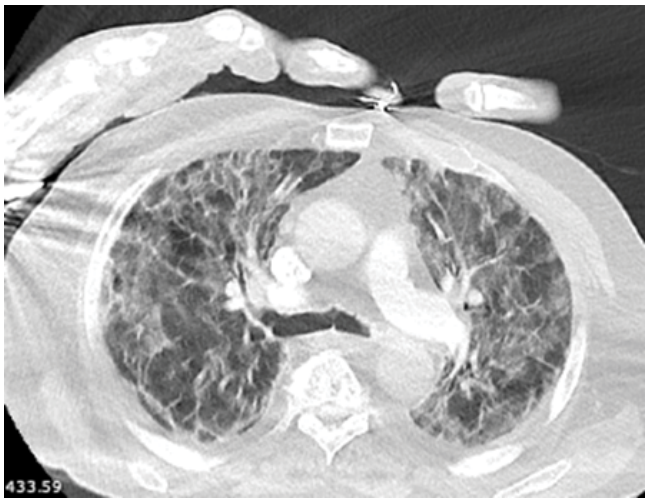

Figure 1b. CT scan on admission, axial view.

***Address for Correspondence:** Natasha Ahuja, Department of Surgery, University at Buffalo Jacobs School of Medicine and Biomedical Sciences, Buffalo, New York, USA, E-=mail: yperry@buffalo.edu*

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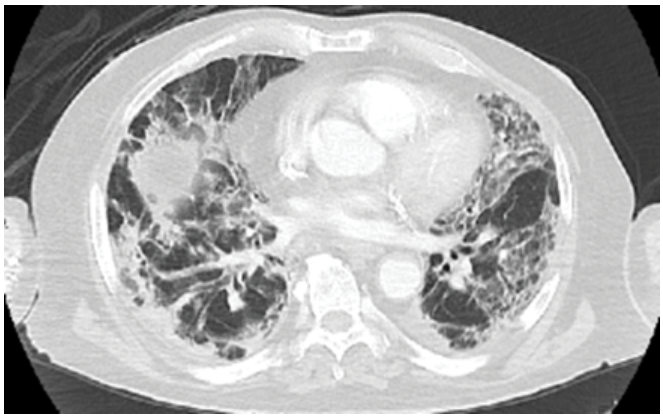

Figure 2a. Progression of emphysema.

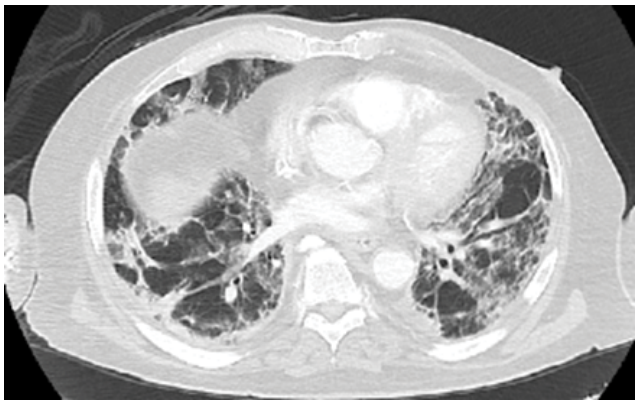

Figure 2b. No evidence of pneumoperitoneum on hospital day 18.

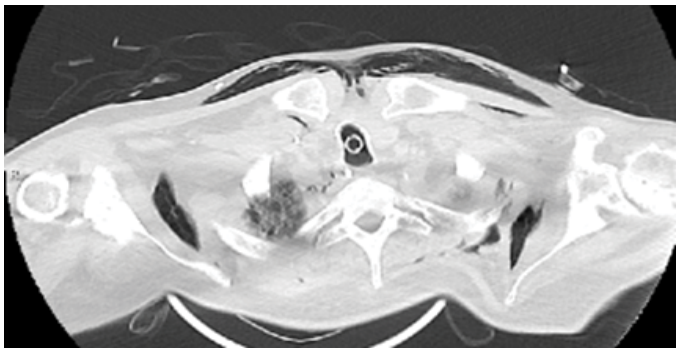

Figure 3a. Hospital day 21, document subcutaneous emphysema.

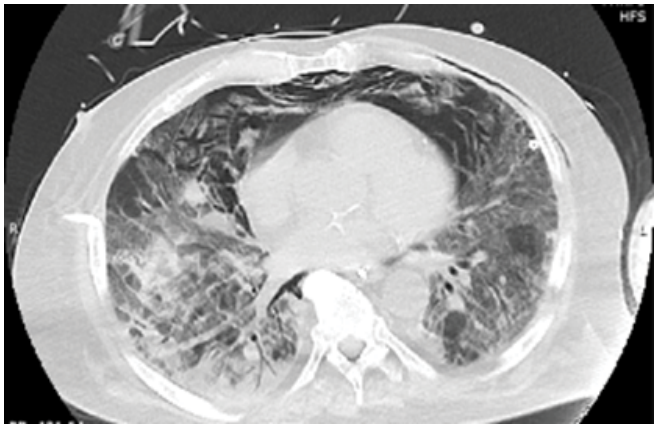

Figure 3b. Lower chest.

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,

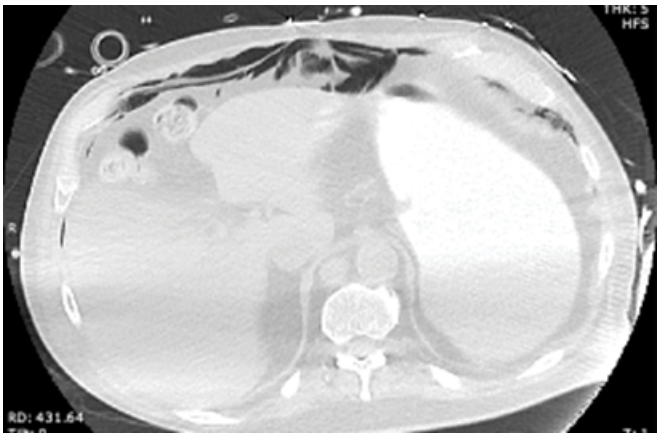

Figure 3c. Document pre-peritoneal air.

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 arrythmias. 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 pneumothoraxes. 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.

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