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Spontaneous hemopneumothorax in a patient with COVID-19

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ABSTRACT

Coronavirus disease 2019 (COVID-19) is primarily a febrile respiratory illness that was first documented in China in December 2019 and shortly after declared a pandemic on March 11, 2020. The pathophysiology of the virus is still not completely understood and remains under investigation. Consequently, new symptomatic manifestations and complications of the disease continue to be discovered. Here we present the case of a spontaneous hemopneumothorax resulting in hemorrhagic shock in an adult male with PCR confirmed COVID-19.

1. Background

Coronavirus disease 2019 (COVID-19) is a febrile respiratory illness first documented in December 2019 in Wuhan, China, that was officially declared a pandemic by the World Health Organization (WHO) on March 11, 2020 [1]. Since COVID-19’s discovery, the virus has spread to 188 countries and regions, with over 7 million confirmed cases and greater than 400,000 deaths worldwide [2]. The most prevalent manifestations of COVID-19 are fever, cough, and dyspnea [3]. Spontaneous pneumothorax (SP) in COVID-19 infected patients is an uncommon occurrence and has been described in a few case reports [4,5] as well as a single retrospective review showing a 1% incidence [6]. Although SP is frequently accompanied by a small amount of hemorrhage, spontaneous hemopneumothorax (SHP) is a rare condition that can occur when more than 400 mL of blood accumulates in the pleural cavity in association with SP [8]. Here, we present a case of a large volume SHP causing hemorrhagic shock in a patient with PCR confirmed COVID-19.

1.1. Case

A 23-year-old male with no reported past medical history was brought via ambulance to the emergency department (ED) for acute onset of chest pain and shortness of breath 45 min prior to arrival. He denied any history of trauma, fever, or cough but did have a prior smoking history. Vital signs on arrival were notable for mild tachycardia to 110 beats per minute and tachypnea to 35 breaths per minute. He was afebrile and normotensive. Upon examination, he appeared in moderate distress with decreased breath sounds on the left. The remainder of his physical exam was unremarkable. Laboratory evaluation showed mild leukocytosis of 11.91000/uL and COVID-19 PCR was positive. Chest x-ray (CXR) showed a left hydropneumothorax with moderate to large pneumothorax component, moderate left-sided effusion, and mild associated right mediastinal shift (Fig. 1). Tube thoracostomy was performed, yielding 1200 mL of frank blood into the drainage chamber. The patient became pale and hypotensive to a systolic blood pressure (SBP) of 86 mmHg with a mean arterial pressure (MAP) of 59 mmHg. Massive transfusion protocol was activated and patient was transfused a total of 4 units of packed red blood cells (PRBCs) before achieving a normal MAP. Repeat CXR revealed expansion of the lung, improved left hydropneumothorax and chest tube in adequate position with the tip terminating at the apex. Cardiothoracic surgery was consulted and elected to obtain further diagnostic imaging since the chest tube output had slowed significantly and there was no reported history of trauma. CT angiogram of the chest was performed to localize the source of the bleeding, which showed active extravasation within the left apical pleural space and enlarged left hemopneumothorax with worsened rightward mediastinal shift (Fig. 2). Patient was subsequently taken to the operating room for thoracotomy and hemorrhage control. Upon entry into the thoracic cavity, 2 L of blood and 500 mL of clot were noted and evacuated. An apical bleb was noted and resected. Active arterial bleeding was noted in the area of the first intercostal space and repaired successfully. The patient was discharged from the hospital on hospital day 9.

2. Discussion

Spontaneous hemopneumothorax is a rare clinical disorder, with an incidence ranging from 2.0%–7.3% [7]. Affected patients are mostly male, between the ages of 15–39 [7]. Mechanisms of bleeding in SHP include
hemorrhage from a torn adhesion between parietal and visceral pleurae, rupture of vascularized bullae, and torn congenital aberrant vessels [7]. In this case, the patient’s spontaneous apical bulla rupture likely damaged the 1st intercostal artery, resulting in the large SHP and subsequent hemorrhagic shock. For hemodynamically stable patients, conservative treatment with tube thoracostomy alone is adequate in most cases [10,11] however for patients with persistent bleeding and hemodynamic instability, operative management with video-assisted thoracoscopic surgery (VATS) or thoracotomy may be required for hemorrhage control [9]. The relationship between the patient’s COVID-19 infection and the SHP remains unclear. COVID-19 has been frequently associated with thromboembolic events and rarely, disseminated intravascular coagulation [8], which this patient did not have. As research into this novel disease continues, it remains to be seen if further spontaneous hemorrhagic events will be associated with COVID-19.

3. Conclusion

This case, while uncommon, highlights a potentially lethal complication on top of the myriad of deleterious respiratory effects of COVID-19. Given that COVID-19 patients have had an increased association with thromboembolic events, choosing an anticoagulation strategy with a concomitant spontaneous hemorrhage presents a challenging dilemma. Further research into coagulopathy and COVID-19 infection will be helpful in this regard. When encountering a patient such as this in the emergency department, early recognition of shock and prompt resuscitation with blood products is critical. In patients with persistent hypovolemic shock and continuous bleeding, early surgical consultation and intervention should not be delayed.

Declarations of Competing Interest

The views expressed in this case report are those of the authors and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, or the United States Government. We are military service members. This work was prepared as part of our official duties. Title 17 U.S.C. 105 provides that “Copyright protection under this title is not available for any work of the United States Government.” Title 17 U.S.C. 101 defines a United States Government work as a work prepared by a military service member or employee of the United States Government as part of that person’s official duties.

Sources of support

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Prior presentations

None.

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Fig. 1. Chest X-ray illustrating hydropneumothorax on the left side.

Fig. 2. CT angiogram showing active extravasation within the left apical pleural space and enlarged left hemopneumothorax with worsened rightward mediastinal shift.