



An abrupt fatal hemothorax in a stable COVID-19 patient: a case report with literature review

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Introduction and importance: COVID-19 has been widely spread in the last 2 years. Hemothorax is considered one of the rarest complications of COVID-19.

Case presentation: The authors herein report a case of a 52-year-old patient of COVID-19 that was complicated with abrupt massive hemothorax with hemodynamic instability. Emergent thoracostomy drained almost 4500 ml of blood within 48 h. Thoracoscopy was also performed draining an additional 2000 ml of blood and clots. No further bleeding occurred. Unfortunately, the patient died of septic shock and multiorgan dysfunction.

Clinical discussion: Hemothorax has been reported in seven patients with COVID-19 in the medical literature. Six patients had severe infection with veno-venous extra-corporeal membranous oxygenation (VV-ECMO), and the seventh patient had necrotizing pneumonia. To our knowledge, this represents the first patient of an abrupt massive hemothorax in a COVID-19 patient just before recovery.

Conclusion: Post-COVID-19 hemothorax should be suspected in severe cases with sudden clinical deterioration and evidence of pleural effusion.

Keywords: COVID-19, hemothorax, thoracostomy

Introduction

The world suffered from one of the vastest pandemics in the history for more than 2 years; COVID-19 reached very large numbers of confirmed infection with almost six million deaths worldwide. This infection has had a wide range of severities, presentations, and complications on various organ systems <https://covid19.who.int/>^[1,2].

Hemothorax is one of the rarest reported complications of COVID-19 in the medical literature; there are only few reports regarding this complication^[3–5]. Spontaneous hemothorax associated with COVID-19 patients is reported exclusively in association with severe infection and mostly with veno-venous

HIGHLIGHTS

- Hemothorax is an extremely rare life-threatening complication of COVID-19 infection that has only been reported seven times in the medical literature.
- Post-COVID hemothorax is more common in cases of severe infection with veno-venous extra-corporeal membranous oxygenation (VV-ECMO) and necrotizing pneumonia.
- Post-COVID hemothorax should be suspected in cases of severe infection with sudden deterioration and evidence of pleural effusion.

extra corporeal membrane oxygenation (VV-ECMO). To our knowledge, this is the first paper to report an abrupt massive hemothorax in a COVID-19 patient just before complete recovery.

Case presentation

A 52-year-old obese smoker male presented to our emergency department with signs and symptoms suggesting severe COVID-19 infection that started 5 days ago with progressive grade 4 dyspnea. The patient's past medical history was significant for hyperuricemia. Surgical, traumatic, pharmacological, family, and psychological history were unremarkable. Vital signs were stable with reduced SpO₂ of 82% that improved to 90% on high-dose oxygen administration. Inflammatory markers were elevated (LDH: +1000 U/l, Ferritin: +1000 mg/dl, C reactive protein (CRP): 76 mg/dl). Radiologic features were characteristic for severe COVID-19 infection with acute respiratory distress syndrome (ARDS). Polymerase chain reaction (PCR) swab test was

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392 mg/dl). Arterial blood gases revealed the presence of respiratory acidosis. Massive blood transfusion was administered with concomitant fresh frozen plasma and platelets transfusion.

In the next 24 h, the thoracostomy drained 1200 ml of blood and clots. Posterior thoracostomy was performed draining an additional 800 ml. No further blood was drained. On the 3rd day of intubation, thoracoscopy was performed to remove the remaining blood and clots from the pleural cavity and to achieve full lung expansion. Two liters of clots and blood were removed before the pleural washing with good lung expansion. However, the source of bleeding could not be defined as the patient was on mechanical ventilator. No further hemothorax developed.

On the following days, the patient experienced a severe decline in renal function (creatinine 7.1 mg/dl, urea 186 mg/dl, Na 146 mEq/l; and K 6.0 mEq/l). Arterial blood gases developed a severe mixed respiratory and metabolic acidosis. Unfortunately, on the 5th day of intubation, the patient developed a refractory shock and multiorgan dysfunction that was unresponsive to vasoconstrictors. At this stage, the patient was receiving inotropic support (norepinephrine and dopamine) as well as wide spectrum antibiotic agents. Unfortunately, he did not respond to therapy and the patient died on the 7th day of intubation.

Discussion

COVID-19 has been one of the most pervasive pandemics affecting the worldwide population <https://covid19.who.int/>. The severity of infection correlates directly with mortality rates. Overall mortality rate in the general population without neoplasms or immunosuppression is 1.6%. However, it is estimated that the overall in-patient mortality was 13.2%, and increased to 17.2% in cases with respiratory failure while the highest mortality is reported in patients requiring mechanical ventilations which exceeded 50% in mortality rate. Noteworthy, mortality was significantly higher in patients with previous cardiovascular or renal diseases^[6,7].

COVID-19 has been associated with several complications on various systems. Complications related to the pleural cavity such as hemothorax and pneumothorax are very uncommon. Hemothorax is one of the rarest severe forms of hemorrhagic complications associated conclusively with severe cases. Only few reports have been published regarding COVID-19 associated hemothorax; all of the cases were associated with severe infections, and most of the patients were even on VV-ECMO^[3-5,8,9].

Densos *et al.* reported the occurrence of hemothorax in 4 out of 62 patients who required VV-ECMO. All four patients had severe forms of the disease and only one of them survived while it was fatal for the other three cases. Noteworthy, all of these patients had peripheral artery branches aneurysms on chest CT scan, and one of them also had renal and diaphragmatic artery aneurism^[3].

Guyen *et al.* included 75 patients of confirmed severe COVID-19 infection that were admitted to ICU. One patient out of the total population had sudden hemothorax that was treated promptly and the patient had a favorable outcome^[4]. Another case was reported by Jung *et al.* about a 63-year-old man with a diagnosis of COVID-19 who had a severe necrotizing pneumonia, which led to a respiratory failure and the patient was put on VV-ECMO. Later on, the patient had an abrupt massive hemothorax and developed signs of shock. Prompt management

of the patient led to an uneventful recovery and the patient was discharged eventually^[5]. A similar case of a 68-year-old patient with severe necrotizing pneumonia on VV-ECMO had sudden left hemothorax that led to a fatal refractory shock and multiple organ systems failure^[9].

Although the etiology of bleeding in our patient could not be conclusively determined, some factors could have played a contributive role. In the absence of clear guidelines for anticoagulation at the time our patient was infected, our patient infection was considered severe in a high-risk patient. Thus, anticoagulation was initiated with further down titration to prophylactic dose of 40 mg enoxaparin per day. However, full coagulation profile at the time of bleeding (including bleeding time, clotting time, prothrombin time and INR, partial thromboplastin time, and fibrinogen) was normal. Furthermore, the presence of heavy clots on thoracoscopy and the absence of any other source of bleeding make the anticoagulation etiology of bleeding less probable. Another etiology could be pulmonary artery aneurysm rupture. However, computerized tomography for pulmonary arteries could not be performed. Additionally, small foci of necrosis were observed on computerized tomography scan which could have contributed as a predisposing factor for bleeding in our patient.

As elaborated above, most patients who had COVID-19 associated hemothorax had a similar sequencing of events; first of all, the initial presentation followed by a deterioration and severe form of infection, which required VV-ECMO to compensate for the respiratory insufficiency, and finally, sudden hemothorax with variable degrees ensued while the patient is in the ICU setting mostly. Surprisingly, the patient in our case had a totally different sequencing of events. To our knowledge, this is the first report of an opposing clinical scenario; the patient went into a relatively long period of uneventful recovery, and just before his discharge, he had sudden hemodynamic collapse and respiratory failure caused by sudden massive hemothorax.

Conclusion

This case should raise profound awareness among clinicians about the misleading abrupt turning of events in COVID-19 patients; therefore, we advise every clinician to keep close monitoring of each COVID-19 patient even close to complete recovery.

Ethical approval

Not applicable.

Consent for publication

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 by the Editor-in-Chief of this journal on request.

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Author contribution

G.M.: conceptualization, data curation, investigation, writing – original draft, and writing – review and editing; S.B.: conceptualization, data curation, investigation, and writing – original draft; H.Y. and A.A.Y.: investigation and writing – review and editing; S.A.: conceptualization, data curation, investigation, supervision, and writing – review and editing.

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All authors declare that they have no conflict of interest for this article.

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