Online version at http://www.minervamedica.it

Minerva Respiratory Medicine 2021 March;60(1):16-9
DOI: 10.23736/S2784-8477.20.01889-1

CASE REPORT

# Hemothorax: a rare presentation of COVID-19

Soheil EBRAHIMPOUR [1], Zeinab MOHSENI AFSHAR [2], Mahmoud SADEGHI-HADDAD-ZAVAREH [1], Masomeh BAYANI [1], Arefeh BABAZADEH [1] *

[1]Infectious Diseases and Tropical Medicine Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, Iran; [2]Clinical Research Development Center, Imam Reza Hospital, Kermanshah University of Medical Sciences, Kermanshah, Iran

*Corresponding author: Arefeh Babazadeh, Infectious Diseases and Tropical Medicine Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, Iran. E-mail: drbabazadeh.a@yahoo.com

## ABSTRACT

On December 31, 2019 novel Coronavirus (SARS-CoV-2) is the strain of Coronavirus that causes Coronavirus disease 2019 (COVID-19). It was initially reported from Wuhan, China. This novel virus causes atypical clinical presentations that differs from other viral pneumonias; in fact, some clinical aspects of infection are not cleared today. We present the case of a 69-year-old man with a 2-week history of dyspnea and hemoptysis. He was diagnosed with COVID-19 infection, confirmed by real-time reverse-transcriptase-polymerase chain reaction. On day 11 postadmission, the case's condition improved significantly, with his oxygen saturation rising and lymphopenia subsiding. His dyspnea gradually decreased in severity; furthermore, hemoptysis was controlled after treatment. This case indicates the complexity and variety of pneumonia complications caused by COVID-19 infection. We must have a high clinical suspicion in management of suspected cases especially in patients with novel clinical presentations such as our case in a pandemic. Thus, hemothorax due to viral lung parenchymal destruction can be a complication of COVID-19 pneumonia.

(*Cite this article as:* Ebrahimpour S, Mohseni Afshar Z, Sadeghi-Haddad-Zavareh M, Bayani M, Babazadeh A. Hemothorax: a rare presentation of COVID-19. Minerva Respir Med 2021;60:16-9. DOI: 10.23736/S2784-8477.20.01889-1)

KEY WORDS: COVID-19; Pneumonia; Hemothorax.

In late December 2019, for the first time a considerable number of pneumonia cases with unidentified causes have emerged in Wuhan, China. On January 7, officials from China's National Health Commission announced they had identified a new virus. The virus was called SARS-CoV-2 by the World Health Organization (WHO) and was identified as belonging to the Coronavirus family. By March 31, 2020, a total of 6,799,713 cases were confirmed and 397,388 cases died worldwide.[1] COVID-19 initially presents with respiratory signs and symptoms, as the most frequent of which are fever, dry cough, sore throat and shortness of breath, and also gastrointestinal symptoms such as nausea and diarrhea to a lesser extent.[2-4] Pneumonia appears to be the most common presentation of this infection that usually manifests as fever, dyspnea, cough, myalgia, and bilateral infiltrates on chest imaging.[5] However, there are some reports of unusual initial manifestation as hemoptysis, pneumothorax, hemothorax, and pneumomediastinum of this deadly infection.[6, 7] This issue may pose a significant challenge for diagnosis and control of the epidemic condition. Here, we report a unique case in its atypical initial presentation of COVID-19 infection.

## Case report

A 69-year-old man, in a rising period of COVID-19 outbreak in Babol, Iran presented to the Emergency Department with past medical history of hypertension, and a 2-week history of

dyspnea and hemoptysis. No other symptoms and signs such as fever, rhinorrhea, myalgia, diarrhea, nausea, sore throat, or confusional state were reported or detected. In clinical examination he was tachypneic (respiratory rate of 26 b/m) and his other vital signs were stable, also his blood oxygen saturation ($SpO_2$) was 83% on room air and his right lung had decreased sounds on auscultation. Because of patient's hypoxemia he was admitted in the Intensive Care Unit (ICU) and gave a duration of oxygen therapy with reservoir bag until his saturation rose. He mentioned a brief hospitalization 3 days earlier to current admission with the same complaints, and he had a mildly raised C-reactive protein (CRP) levels and lymphopenia, but with descending CRP titer. So, resolution of lymphopenia was discharged with diagnosis of suspected COVID-19. Moreover, the diagnosis of pulmonary thromboembolism (PTE) ruled out with normal computed tomography angiography (CTA). He received ceftriaxone (Jaber Ebne Hayyan Pharmaceutical Co., Tehran, Iran) and hydroxychloroquine (Iran Daru Co, Tehran, Iran) on that admission empirically based on suspecting COVID-19 that not confirmed due to negative result of reverse transcription polymerase chain reaction (RT-PCR). But after discharging his condition worsened in 2 weeks with approximately 100 cc blood loss with each expectoration. However, the hemoptysis was not persistent or decreased in severity in hospital readmission.

Biochemical markers as electrolytes, kidney, liver and thyroid function tests and coagulation tests because of lopinavir boosted ritonavir the mainstay of COVID-19 treatment may cause thyroid or liver or hematologic toxicity, on the first day of admission were normal. His full blood count was normal on admission except a moderate anemia, but he developed lymphopenia ($1.2\times10^9$/L) on day 5 of admission. C-reactive protein (CRP) was 80.3 mg/L (normal <5 mg/L) and the erythrocyte sedimentation rate (ESR) was 42 mm/h. Other laboratory data were as follows: lactate dehydrogenase (LDH), 370 U/L; ferritin: 295 µg/mL, platelet count: 155,000 /µL; INR: 1.2 and negative qualitative troponin (high sensitivity test). The initial chest radiograph, taken showed blunting of the right costophrenic angle, consolidation, and opacities in right lower lobe (RLL) (Figure 1). A high-resolution computed tomography (HRCT) scan of the chest showed a pleural effusion and loculated pleural space of the right lung, being more significant in the posterior segment of the right lower lobe and anterior basal segments of right middle and upper lobes, along with the passive collapse of the lung parenchyma and cardiac and mediastinal shift. A localized area of ground-glass opacity (GGO) and interlobular septal thickening with crazy paving pattern was found in the remaining parts of the right lower and middle lobes, which could be indicative of viral pneumonia or bacterial superinfection (Figure 2).

The sputum collected for acid-fast bacilli (AFB) smear with a suspicion of tuberculosis, which turned to be negative. Due to the outbreak

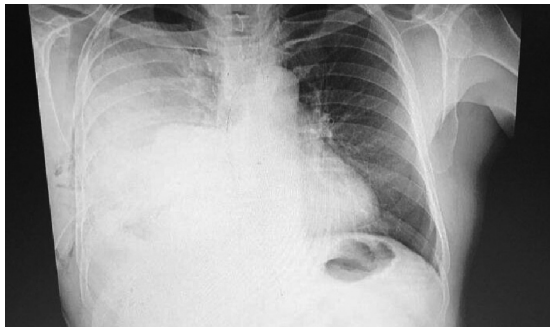

Figure 1.—Chest radiograph, blunting of the right costophrenic angle, consolidatio, and opacities in right lower lobe (RLL) in the right lung.

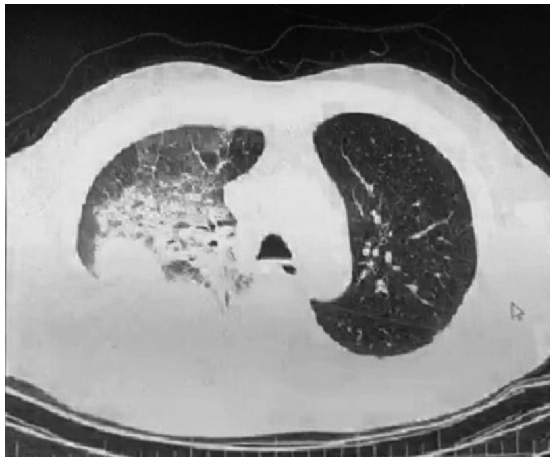

Figure 2.—CT scan performs GGOs in right lower and middle lobes.

of COVID-19 at the time, any patient with respiratory symptoms and signs should have been tested for Coronavirus infection, although up to the present time, hemoptysis as the initial manifestation of the viral diseases was exceedingly rare.

In his second admission, as a rule in our hospital for all patients admitted with suspected COVID-19 pneumonia, a nasopharyngeal specimen taken on admission and tested by RT-PCR was positive for novel Coronavirus disease 2019 or SARS-CoV-2, which confirmed the diagnosis of COVID-19 infection.

Because of his massive pleural effusion and due to patients persistent fever on broad spectrum antibiotics empyma was suspected and thoracic surgical consult was requested, which recommended a chest tube insertion. The drained fluid was completely bloody (Figure 3). No affirmative results were found in the drainage of the pleural effusion, the pleural fluid smear and culture was negative and, thus, empyema ruled out. On his admission, his therapy started with lopinavir/ritonavir (Bakhtar bioshimi Co, Iran) (400/100 mg tablet, orally twice a day), hydroxychloroquine sulfate (Iran daru Co, Tehran, Iran) (400 mg per day for 5 days), and oseltamivir (Tamiflu, F. Hoffmann-La Roche Ltd, Basel, Switzerland), (75 mg, twice daily). Also, due to his hypoxemia and $SpO_2$ below 93% in air room that not raised with nasal oxygen therapy, he went under oxygen therapy with reservoir bag (oxygen flows of 10-15 L·min) and his arterial $SpO_2$ raised with this modality; thus, bilevel positive airway pressure (BiPAP) or mechanical ventilation not needed. Also, due to the patient's worsening condition, he went on broad spectrum antimicrobial agents, ribavirin (Bakhtar Bioshimi, Kermanshah, Iran) (600 mg, orally twice a day), intravenous immunoglobulin (IVIG) (Green Cross Corporation, Korea) (20-25mg, daily), interferon beta-1b (Zist Daru Danesh, Iran) 250 mcg every other day for 5 doses, and beta-1a (Zist Daru Danesh, Iran) 44 mcg subcutaneous (SC) injection every other day for 5 doses were added to the prior regimen.

Figure 3.—The drained fluid is completely bloody in chest tube insertion.

On day 11, fever completely subsided and the patient's condition improved significantly, with his oxygen saturation rising and reaching 98% without supplemental oxygen and lymphopenia subsided. Lymphocyte count reaches above 2000/μL and CRP titer decreased bellow mg/L. His dyspnea gradually decreased in severity and also hemoptysis was controlled after antiviral treatment.

## Discussion

Early diagnosis of Coronavirus infections as COVID-19 remains an enormous challenge due to its varied presentations. The most common manifestations of COVID-19 infection at onset of illness have been reported to be fever, a dry cough, fatigue and dyspnea.[8]

Hemoptysis and pleural effusion have been rarely reported as the first signs of the illness.[9] In functional and structural assessments angiotensin converting enzyme 2 (ACE2) was identified as a possible functional receptor for SARS-CoV-2 like SARS-CoV.[10] ACE2 was highly expressed on pulmonary epithelial cells. Because of ACE2 is highly expressed on the apical side of this epithelial cells in the alveolar space, the SARS-CoV-2 virus can enter and destroy them. This matches with the fact that the early pulmonary injury was often seen in the distal airway and this destruction can progress and involve the whole lungs, causing progressive hypoxemia. On the other hand, this destructive situation can cause alveolar hemorrhage. Moreover, hemorrhagic destruction of lung parenchyma in COVID-19 peripheral pneumonitis can access to pleural space, causing hemothorax. But this presentation is a rare manifestation of COVID-19; thus,

patients with this presentation may be missed as other diagnoses. Hemoptysis was the main clinical symptom in this patient during the first days of the disease course, accompanied by the typical characteristic patterns of COVID-19 imaging findings, including ground glass opacification (GGO), crazy-paving pattern and consolidation of the peripheral or subpleural lung regions.

Hence, the diagnosis of COVID-19 infection especially without obvious typical manifestations makes detection difficult. Typical CT findings of COVID-19 infection include GGO, mixed GGO, or crazy-paving patterns, and consolidation of the peripheral or subpleural segments with bilateral lower lung involvements.[5] However, our patient's pulmonary involvement was unilateral, which is not consistent with COVID-19. Therefore, diagnosis of COVID-19 infections from GGO with a unilateral involvement and hemothorax, with the initial manifestation of hemoptysis, could have been quite challenging.

The first considerations in the differential diagnosis of hemoptysis were alveolar hemorrhage, pulmonary thromboembolism and tuberculosis, which were rolled out by CT angiography and acid-fast bacilli staining of sputum. The reason for hemothorax in COVID-19 pneumonia may be its angioinvasion and endothelial and lung parenchymal destruction. Unfortunately, there are no reliable pathological data of this virus' effect on different organs; thus, we cannot define it clearly.

## Conclusions

The current case indicates the complexity and variety of pneumonia complication caused by COVID-19 infection. We must have a high clinical suspicion in management of suspected cases, especially in patients with novel clinical presentations such as our case in a pandemic. Moreover, we can remember that in COVID-19 pneumonia patient with pleural effusion and persistent fever due to virus replication or immunologic mediators may be ongoing; thus, we should keep in mind the probability of hemothorax. Moreover, the imaging findings of COVID-19 overlap with other viral pneumonia, which sometimes it is not fully compatible with the disease condition; therefore, RT-PCR test are recommended for timely diagnosis and treatment.

## References

**1.** Coronavirus disease. 2019 (COVID-19): situation report – 139. WHO; 2020 [Internet]. Available from: https://www.who.int/docs/default-source/Coronaviruse/situation-reports/20200607-covid-19-sitrep-139.pdf?sfvrsn=79dc6d08_2 [cited 2020, Nov 11].

**2.** Thevarajan I, Nguyen TH, Koutsakos M, Druce J, Caly L, van de Sandt CE, *et al.* Breadth of concomitant immune responses prior to patient recovery: a case report of non-severe COVID-19. Nat Med 2020;26:453–5.

**3.** Sohrabi C, Alsafi Z, O'Neill N, Khan M, Kerwan A, Al-Jabir A, *et al.* World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). Int J Surg 2020;76:71–6.

**4.** Mohseni Afshar Z, Ebrahimpour S, Javanian M, Vasigala VR, Masrour-Roudsari J, Babazadeh A. Vital role of chest CT in diagnosis of coronavirus disease 2019 (COVID-19). Caspian J Intern Med 2020;11:244–9.

**5.** Yoon SH, Lee KH, Kim JY, Lee YK, Ko H, Kim KH, *et al.* Chest radiographic and CT findings of the 2019 novel Coronavirus disease (COVID-19): analysis of nine patients treated in Korea. Korean J Radiol 2020;21:494–500.

**6.** Salehi S, Abedi A, Balakrishnan S, Gholamrezanezhad A. Coronavirus Disease 2019 (COVID-19): A Systematic Review of Imaging Findings in 919 Patients. AJR Am J Roentgenol 2020;215:87–93.

**7.** Shi F, Yu Q, Huang W, Tan C. 2019 Novel Coronavirus (COVID-19) Pneumonia with Hemoptysis as the Initial Symptom: CT and Clinical Features. Korean J Radiol 2020;21:537–40.

**8.** Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, *et al.* Clinical characteristics of 138 hospitalized patients with 2019 novel Coronavirus–infected pneumonia in Wuhan, China. JAMA 2020;323:1061–9.

**9.** Joshi S, Bhatia A, Tayal N, Nair D. Hemoptysis as an Initial Presentation of COVID-19 - An Observation. J Assoc Physicians India 2020;68:68.

**10.** Shang J, Ye G, Shi K, Wan Y, Luo C, Aihara H, *et al.* Structural basis of receptor recognition by SARS-CoV-2. Nature 2020;581:221–4.

*Conflicts of interest*.—The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

*Authors' contributions*.—Soheil Ebrahimpour, Arefeh Babazadeh have given substantial contributions to manuscript conception and design, Mahmoud Sadeghi-Haddad-Zavareh, Masomeh Bayani and Arefeh Babazadeh to data acquisition, analysis and interpretation. Soheil Ebrahimpour, Zeinab Mohseni Afshar, Mahmoud Sadeghi-Haddad-Zavareh, Masomeh Bayani and Arefeh Babazadeh to manuscript writing, Zeinab Mohseni Afshar to manuscript revision. All authors read and approved the final version of the manuscript.

*History*.—Manuscript accepted: September 1, 2020. - Manuscript received: August 11, 2020.