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Case report

Dual catastrophe of COVID-19: Massive pulmonary embolism and stroke in a previously healthy young patient: A case report

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A B S T R A C T
We are reporting a 45-year-old woman with COVID-19 who presented to the Emergency Department with a transient loss of consciousness and was found to have a massive pulmonary embolism and an acute stroke. To our knowledge, this is the first reported case that calls for attention to the importance of vigilance for such a catastrophic presentation of COVID-19.

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Introduction

The Severe Acute Respiratory Syndrome Corona Virus-2 (SARS-CoV-2) which is producing the current pandemic of COVID-19, is genetically homologous to SARS-CoV that caused the SARS outbreak in 2002. This current outbreak originated from Wuhan, China and has become a global pandemic with 215 countries involved, with a total of 10,259,381 million confirmed cases to date with 504,630 deaths [1].

Symptoms of COVID-19 are nonspecific, resembling influenza-like illnesses, which may include fever, cough, sore throat, arthralgia, myalgia, diarrhea, with or without the subsequent development of dyspnea. Fever (87.9%) and cough (67.7%) are the most common symptoms [2]. Severe cases of COVID-19 may present with acute respiratory distress, respiratory failure, septic shock, and multi-organ failure. Disease severity (including oxygen saturation, respiratory rate, blood leukocyte/lymphocyte count, and radiologic manifestations) predict poor clinical outcomes [3].

Saudi Arabia (population of 34,808,107) has performed 44,416 SARS-CoV-2 tests per 1 million population. The first reported case of COVID-19 was on 02 March 2020. In the 3 months since the first case, COVID-19 cases in Saudi Arabia reached 182,493 cases [4].

There is a tsunami of emerging COVID-19 research indicating that COVID-19 is a multi-organ systemic disease that can cause diverse pathologic changes, such as large vessel stroke, venous thromboembolism, micro thrombosis, myocardial injury, neurological sequelae, pulmonary disease, renal and hepatic dysfunction [5–13].

Case description

We report a 45-year-old Eritrean lady, with no chronic illness, who was last seen in normal state 3.5 h prior to presentation to the emergency department (ED). She experienced a dry cough and shortness of breath for the previous two weeks and a three-day history of palpitations. Her family brought her to the ED after a transient loss of consciousness. She was found to have right-sided weakness, left gaze deviation, aphasia, mouth deviation,
Fig. 1. Composite radiological images of our patient. Fig. 1-A, CT brain axial image showing diffuse edema and swelling in the right hemisphere. There is loss of grey-white matter differentiating in the left MCA territory suggestive of left MCA ischemic stroke. Fig. 1-B, CTA carotid showing patent ICA. Fig. 1-C, CTA carotid showing bifurcation of the carotid artery. Fig. 1-D, CTA carotid showing occluded bilateral ICA approximately one centimeter from the bifurcation. Fig. 1-E, Axial image lung window at the lung bases revealed peripheral subpleural ground-glass opacity. Fig. 1-F, Axial reformat CT chest image at the level of pulmonary trunk showing sided shape filling defect extending from the pulmonary trunk into right and left pulmonary arteries, typical for acute massive PEs. Fig. 1-G, Axial CT sections at the level of the kidney revealed poor left renal enhancement with heterogeneous hypodensities in the anterior segment due to infarction; the main left renal artery was patent (not shown on the image). Fig. 1-H. Axial CT sections at the level of the spleen revealed heterogeneous hypodensities due to infarction; the splenic artery was patent.
facial twitching, and abnormal jerky movement of her limbs. She was rapidly desaturating and hypotensive. The National Institute of Health Stroke Scale (NIHSS) score for her was 21. The history obtained from family members indicated no weight loss, fever, or previous recurrent miscarriages. Examination during her acute presentation revealed no skin changes, no cardiac murmurs, and no abdominal masses. Her chest X-ray showed no change in cardiac size, and the continuous cardiac monitoring did not reveal arrhythmia. The patient had more than two sets of blood cultures that showed no growth. Due to the acute presentation of the patient and her COVID-19 status, cardiac echocardiography, and blood tests for antiphospholipid syndrome were not carried out. Further clinical and laboratory parameters are shown in Table 1.

A computed tomography (CT) of the brain confirmed an acute left middle cerebral artery (MCA) stroke with diffuse brain edema causing a midline shift (Fig. 1-A), CT angiography (CTA) showed abrupt cut-off of the contrast opacification in the bilateral internal carotid arteries at the level of the bifurcation and bilateral vertebral arteries (Fig. 1-B, -C, -D).

She was later intubated due to status epilepticus and a drop in oxygen saturation, which dropped to 76%. The chest X-ray was unremarkable. A CT pulmonary angiogram (CTPA) then confirmed the presence of a massive acute saddle-shaped Pulmonary Embolism (PE) with right ventricular strain and peripheral subpleural ground-glass opacity at the lung base (Fig. 1-E, F), the CT scan also showed hypodensities in the left kidney and spleen that likely represented infarcts (Fig. 1-G, H).

She was admitted to the intensive care unit (ICU) on inotropic support and an intravenous heparin infusion was started. A multidisciplinary pulmonary embolism response team meeting was conducted and concluded that the patient was not a candidate for systemic or catheter-directed thrombolysis for PE due to the perceived risk for higher intracranial hemorrhage and poor neurological outcome. Four days after admission to the ICU, the patient unfortunately died. The Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) PCR test came back positive after the death of the patient.

Discussion

Our patient had severe fatal COVID-19 pneumonia with multi-organ failure, massive PE, MCA stroke, spleen, and kidney infarcts. This drastic case presentation concurs with linking other published cases linking stroke, large vessel occlusion, and PE with COVID-19 [5,6,10,11]. Another prospective cohort study with autopsy findings of venous thromboembolism in patients with COVID-19 showed that deep venous thrombosis was present in 7 of 12 patients (58%) in whom venous thromboembolism (VTE) was not suspected before death, and PE was the direct cause of death in four patients [7]. Fatal PE secondary to COVID-19 was reported earlier by Creel-Bulos, et al. where 3 out of 5 patients died secondary to acute cor pulmonale causing obstructive shock [8]. In a study by Tang et al., elevated D-dimer at admission and markedly increasing D-dimer levels (3- to 4-fold) over time were associated with high mortality, likely reflecting coagulation activation from infection/sepsis, cytokine storm, and impending organ failure [9]. Similar to cytokine storm syndrome, severe COVID-19 sepsis is associated with heightened inflammatory markers, elevated ferritin, and augmented activation of the pulmonary vascular endothelium; we believe that our patient fits this clinical picture [10]. Research suggests that the presence of antiphospholipid antibodies can increase the risk of thrombosis in COVID-19 patients [10]. However, we do not know whether the rise in antiphospholipid antibodies is secondary to COVID-19 or a pre-existing condition that exacerbated the risk of thrombosis. The possible explanation of the arterial and venous thrombosis in COVID-19 patients has been shown in previous reports as a vasculitis-like presentation, with features similar to atypical Kawasaki disease, which is a systemic vasculitis syndrome affecting medium-size vessels [13]. We could not perform an echocardiogram, nor a Doppler ultrasound for our patient, neither could we test for antiphospholipid antibodies, as our patient’s condition rapidly deteriorated.

Conclusion

To our knowledge, this is the first reported case of COVID-19 associated with large-vessel stroke, PE, renal and splenic infarctions, in a relatively young patient. We concur with previous research that due to the social curfew at that time and patient’s reluctance to present to the hospital may have contributed to the grave outcome. As COVID-19 is a great mimicker of multiple diseases, we suggest that, during this pandemic, any young patient presenting with unprovoked arterial and venous thrombosis should be tested for COVID-19.

Author contribution

All authors contributed equally to the writing of the manuscript.
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Competing of interest

None declared.

Ethical approval

Informed consent for publication was taken from the family and IRB exemption was taken from King Fahad Medical City’s Institutional Review Board.

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