Crit Care Shock (2020) 23:196-200

Acute ischemic stroke - an extrapulmonary COVID-19 presentation

Beena Yousuf, Abdalaziz H. Alsarraf, Huda Alfoudri,

Abstract

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that causes coronavirus disease 2019 (COVID-19) has emerged as a high contagious and deadly virus, with an endless capacity to surprise clinicians with new presentations and complications. Although COVID-19 typically presents as respiratory infection but it can present with thromboembolic event. Our hospital, one of the main tertiary care hospitals in Kuwait, experiencing sudden surge of stroke cases in last few weeks of COVID-19 pandemic. Stroke is a medical emergency which needs early recognition and management for better neurological outcome. In the COVID-19 pandemic, when seeing patients with neurological manifestations, clinicians should consider COVID-19 as a differential diagnosis and should take full protective measures until proven to be negative. Based on our experience, we want to highlight that COVID-19 patients can present with extrapulmonary manifestation like stroke. Emergency physicians, stroke team and intensivist should be wary of this fact. Triaging and COVID-19 screening is the key to minimize the virus spread and to ensure staff and other patients safety.

Key words: Extrapulmonary manifestation, thromboembolic, stroke, COVID-19, pandemic.

Introduction

The SARS-CoV-2 virus that causes COVID-19 has emerged as a high contagious and deadly virus, with an endless capacity to surprise clinicians with new presentations and complications. (1) Although COVID-19 typically presents as respiratory infection but it can present with thromboembolic event. Our hospital, one of the main tertiary care hospitals in Kuwait, experiencing sudden surge of stroke cases in last few weeks of COVID-19 pandemic. We report a case of a young healthy patient who presented with an acute cerebral infarction, which could possibly be a rare extrapulmonary manifestation of COVID-19.

From Department of Anesthesia, Critical Care and Pain Management, Al Adan Hospital, Ministry of Health Kuwait (Beena Yousuf, Abdalaziz HRH Gh S. Alsarraf, Huda Alfoudri).

Address for correspondence:
Beena Yousuf, MBBS, FCPS
Department of Anesthesia, Critical Care and Pain Management, Al Adan Hospital, Ministry of Health Kuwait
Email: beena_yousuf@hotmail.com

Case history

A 40-year-old male with no past medical history, presented to emergency department with sudden onset of dizziness and right sided weakness with no other symptoms. Initial vital signs were normal with a temperature of 36.9 °C, heart rate (HR) of 80 bpm, blood pressure (BP) of 120/86 mmHg, and oxygen saturation (SpO2) of 100% on room air. He was conscious, alert, oriented with a Glasgow coma scale (GCS) of 15/15 and National Institutes of Health Stroke Scale (NIHSS) score 5, neurological examination revealed right sided weakness. Computed tomography (CT) of brain showed faint hypodensity of the left thalamic region consistent with an evolving acute ischemic stroke involving left middle cerebral artery (**Figure 1**). He was out of the window for thrombolytic therapy. Significant laboratory findings were: high white blood cell count (WBC) of 1800/mm^3 with mild lymphopenia, C-reactive protein of 188 mg/l, and a D-dimer of 576 ng/l, which markedly increased to 4769 ng/l on the second day of admission. Rest of the blood work, electrocardiogram, and chest radi-

ography were normal. The patient was admitted to the medical ward, however, later on during the same day his neurological status deteriorated with dropping GCS to less than 8/15 and NIHSS score increasing to 23. He was immediately intubated and mechanically ventilated for airway protection. An urgent CT brain was done which showed a progressive and extensive multiple bilateral cerebellar, left temporal and left thalamic infarctions with brain edema (**Figure 2**). Patient was not suitable for any active surgical intervention due to extensive bilateral infarctions and poor neurological status, so he was continued on supportive care in the intensive care unit. Due to unusual progression of his stroke, echocardiography, an ultrasound carotid arteries were done with normal findings and COVID-19 polymerase chain reaction (PCR) was requested which came positive. On day 3 of his admission, CT brain was repeated, which showed further worsening of his infarction with severe brain edema (**Figure 3**). Unfortunately, brain stem testing done showed severe brain stem dysfunction and he passed away on fifth day of his admission.

Discussion

The COVID-19 outbreak is an unprecedented global public health challenge. In December 2019, the outbreak occurred in Wuhan, China, since then the disease has spread exponentially and has been declared a global pandemic by World Health Organization. As of May 20, 2020, more than 5,076,996 confirmed cases from more than 210 countries and more than 329,053 deaths have been documented worldwide. (2)

The clinical spectrum of COVID-19 appears to be wide, encompassing asymptomatic infection, mild to severe respiratory infection, multiorgan dysfunction syndrome (MODS), and death. (3) However, clinicians worldwide facing this pandemic with daily new challenges. Recent data demonstrates strong association between elevated D-dimer levels and poor prognosis, concerns have risen about thrombotic complications in patients with COVID-19. (4) It's also suggested that respiratory failure is not due to ARDS alone, but that thrombotic process may play a role as well. (4,5) COVID-19 may predispose to both venous and arterial thromboembolic disease due to excessive inflammation, hypoxia, immobilization, and diffuse intravascular coagulation. (6)

Acute cerebral infarction could possibly be a rare extrapulmonary manifestation of COVID-19. Initial reports confirm that cerebrovascular diseases are very frequent in COVID-19 patients and their prevalence increase in severe cases. A retrospective data from Wuhan, China, showed 5% incidence of stroke among hospitalized COVID-19 patients. (7) Another report from China also reported that 36% of COVID-19 positive patients had some form of neurological manifestations. (8) Recent case series of 4 patients from one of the hospitals of New York, USA, showed neurological symptoms in elderly high risk patients as COVID-19 presentation. (9) The underlying mechanism of COVID-19-associated cerebral vascular accident (CVA) is still not clear but it has been speculated that due to severe systemic inflammatory response, COVID-19 may disrupt the integrity of vascular endothelium and upset the balance between coagulation and anticoagulation, which causes hypercoagulation and thrombosis. (10)

Our hospital, one of the main tertiary care hospitals in Kuwait, experienced a sudden surge of stroke cases in the non-COVID intensive care unit (ICU) since early May 2020. Most of them were young and some of them didn't have any traditional risk factors for stroke with the only common finding being high D-dimer levels. The possibility of COVID-19 was raised in these patients due to recently reported high incidence of thrombotic complication in COVID-19 and the result surprisingly came positive for most of them. Due to this rare and life threatening presentation of COVID-19, we report a case of a young previously healthy gentleman who presented with acute cerebral infarction and a positive PCR for COVID-19 disease (extrapulmonary COVID-19 manifestation) with no prior typical COVID-19 constitutional or respiratory symptoms. Our observation with the above reported case and the other cases suggest that stroke accompanying the pandemic virus appears to be more severe due to hypercoagulability and the pro-thrombotic state. It also highlights the importance of testing all patients presenting to the non-COVID ICUs with signs and symptoms of acute ischemic stroke in addition to taking the full protective measures in order to ensure the staff safety and prevent the spread of the infection until the COVID-19 status is clear. More research is needed to identify the neurological implications of COVID-19 disease.

Conclusion

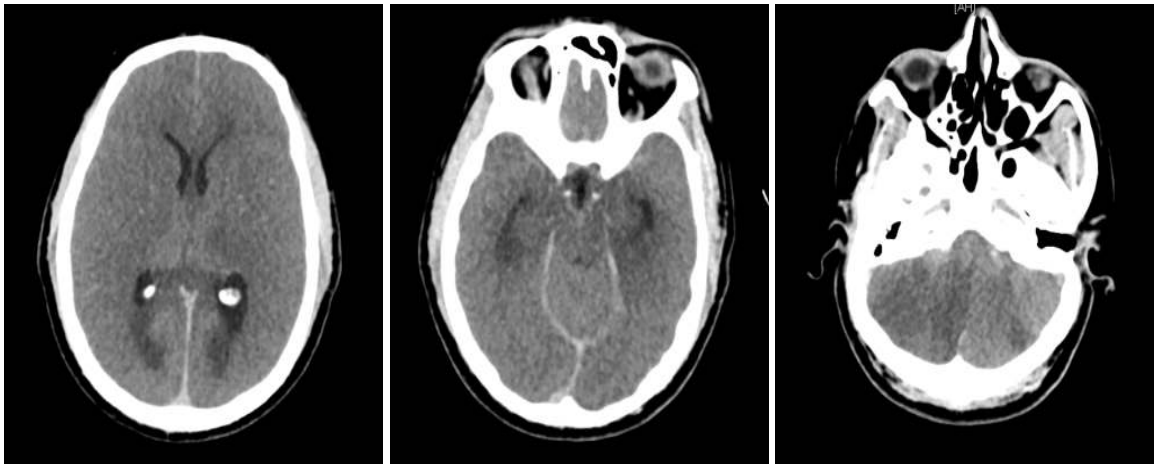
Stroke is a medical emergency which needs early recognition and management for better neurological outcome. In the COVID-19 pandemic, when seeing patients with neurological manifestations, clinicians should consider COVID-19 as a differential diagnosis and should take full protective measures until proven to be negative. Based on our

experience, we want to highlight that COVID-19 patients can present with extrapulmonary manifestation like stroke. Emergency physicians, stroke team, and intensivists should be wary of this fact. Triaging and COVID-19 screening is the key to minimize the virus spread and to ensure staff and other patients safety.

Figure 1. CT brain on arrival evolving left thalamic infarction

Figure 2. CT brain showing extension and progression of the left thalamic and bilateral cerebellar infarctions with brain edema

Figure 3. CT brain with findings suggestive of severe brain edema with transtentorial herniation and closing of the foramen magnum



References

1. Pan L, Wang L, Huang X. How to face the novel coronavirus infection during the 2019–2020 epidemic: the experience of Sichuan Provincial People's Hospital. Intensive Care Med 2020;46:573-5.
2. COVID-19 Coronavirus Pandemic [Internet] 2020 [cited 2020 May 25]. Available from: https://www.worldometers.info/coronavirus/
3. Sun X, Wang T, Cai D, Hu Z, Chen J, Liao H, et al. Cytokine storm intervention in the early stages of COVID-19 pneumonia. Cytokine Growth Factor Rev 2020;S1359-6101(20)30048-4.
4. Yuki K, Fujiogi M, Koutsogiannaki S. COVID-19 pathophysiology: A review. Clin Immunol 2020;215:108427.
5. Tan CW, Low JGH, Wong WH, Chua YY, Goh SL, Ng HJ. Critically ill COVID -19 infected patients exhibit increased clot waveform analysis parameters consistent with hypercoagulability. Am J Hematol 2020;Online ahead of print.
6. Klok FA, Kruip MJHA, van der Meer NJM, Arbous MS, Gommers D, Kant KM, et al. Confirmation of the high cumulative incidence of thrombotic complications in critically ill ICU patients with COVID-19: An updated analysis. Thromb Res 2020;191:148-50.
7. Li Y, Wang M, Zhou Y, Chang J, Xian Y, Mao L, et al. Acute Cerebrovascular Disease Following COVID-19: A Single Center, Retrospective, Observational Study. SSRN Electronic Journal 2020.
8. Mao L, Jin H, Wang M, Hu Y, Chen S, He Q, et al. Neurologic Manifestations of Hospitalized Patients With Coronavirus Disease 2019 in Wuhan, China. JAMA Neurol 2020; e201127.
9. Avula A, Nalleballe K, Narula N, Sapozhnikov S, Dandu V, Toom S, et al. COVID-19 presenting as stroke. Brain Behav Immun 2020; S0889-1591(20)30685-1.
10. Oxley TJ, Mocco J, Majidi S, Kellner CP, Shoirah H, Singh IP, et al. Large-Vessel Stroke as a Presenting Feature of Covid-19 in the Young. N Engl J Med 2020;382:e60.