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Case Report

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Covid-19 Associated Subdural Hematoma: A Case Report Intracranial Hemorrhage in the Setting of Covid-19

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ABSTRACT

Coronavirus disease 2019 (COVID-19) is a pandemic that began in December 2019 as a result of the global spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). We frequently associate COVID-19 with symptoms of fever, shortness of breath, and pneumonia; however, we are slowly uncovering the fact that systems other than the respiratory are being affected. We present a 60-year-old female who presented with altered mental status and was found to have COVID-19 induced subdural hematoma. Although intracranial hemorrhages are extremely rare in the setting of COVID-19, it is known that the affinity of SARS-CoV-2 to the angiotensin-converting enzyme 2 receptors, in addition to the cytokine storm, predisposes infected individuals to intracranial hemorrhages. Thus, it is crucial to consider intracranial hemorrhage as a possible cause of altered mental status in patients infected with COVID-19 and weigh the potential risk versus benefits of utilizing anticoagulants when managing the thrombotic complications of this virus.

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Introduction

Coronavirus disease 2019 (COVID-19) is a pandemic that began in December 2019 as a result of the global spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This virus commonly presents with a cough (in 50%), fever (43%), myalgia (36%), headache (34%), dyspnea (29%), sore throat (20%), diarrhea (19%), nausea/vomiting (12%), and loss of smell or taste (<10%) [1]. Although mainly affecting the respiratory system, studies have concluded the possible neurotropic involvement of SARS-CoV-2 [2]. In fact, there have been several reported cases of COVID-19 related intracranial hemorrhage. However, these events are very scarce and diagnosed in less than 3% of mild-moderate COVID-19 infections and up to 6% in severe manifestations of this virus [3]. Thus, we present a rare case of COVID-19 related subdural hematoma, with an aim to discuss the possible inciting causes of COVID-19 induced intracerebral hemorrhage.

Case Report

We present to you a 60-year-old female who presented to the ED from a nursing home for evaluation of change in her mental status and fever. At baseline, the patient is oriented to person and place, is wheelchair-bound, and is able to express her needs verbally. Employees report the patient was moaning, shaking her head, normotensive, and febrile at 103°F.

The patient has an extensive past medical history, including stroke, hypertension, Alzheimer's dementia, coronary artery disease, diabetes, and chronic kidney disease stage III. She required hospitalization two months prior to this admission for encephalopathy, hypoxia, and COVID-19 infection, requiring IV steroids, convalescent plasma treatment, and ICU admission.

In the emergency department, the patient was noted to be febrile, tachycardic, tachypneic, and on 6L of oxygen via nasal cannula. Laboratory workup demonstrated urine analysis, complete blood count, and renal function tests within normal limits. Arterial blood gas revealed a pH of 7.41, an oxygen level of 54.4 mmHg, and a carbon dioxide level of 36 mmHg. The patient was COVID-19 positive, confirmed via RT-PCR of nasopharyngeal swab on this admission as well two months prior.

Several imaging tests were done. Chest X-ray revealed low lung volumes with findings of mild pulmonary vascular congestion.

Computed tomography (CT) scan of the abdomen and pelvis revealed bilateral mildly prominent pleural effusions with basal airspace disease, atelectatic changes, and likely associated inflammatory changes.

A CT scan of the head without contrast was ordered. As seen in Figure 1, it revealed acute on subacute/chronic large left subdural hematoma measuring 22mm in thickness causing diffuse effacement of the left cerebral hemisphere and midline shift to the right, approximately 16 mm causing subfalcine herniation as well as left uncal medical deviation.

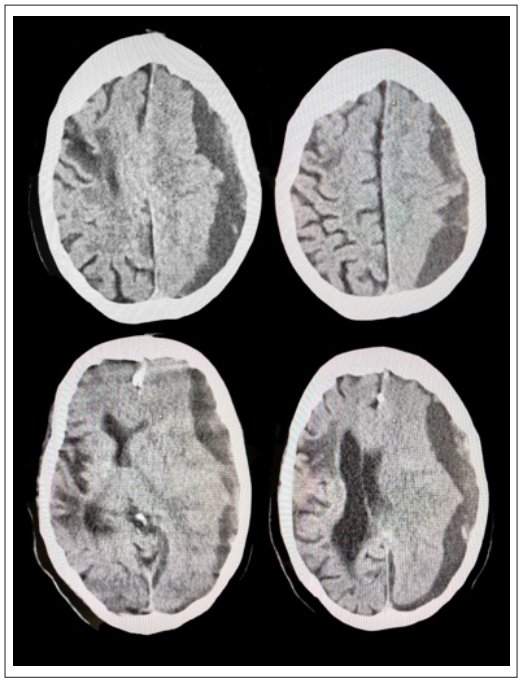

Figure 1: CT scan of the head without contrast revealed acute on subacute/chronic large left subdural hematoma measuring 22mm in thickness causing diffuse effacement of the left cerebral hemisphere and midline shift to the right, approximately 16 mm causing subfalcine herniation as well as left uncal medical deviation.

Neurosurgery and trauma were consulted daily on the patient. Due to the patient's grave prognosis and following discussion with the patient's power of attorney, the patient was placed on comfort care only/ hospice care.

Discussion

Fever, shortness of breath, and pneumonia seem to be the cardinal associations concerning COVID-19. However, we are continuously finding that more organ systems than initially thought are being affected. The manifestations of COVID-19-induced intracranial hemorrhage are multifactorial, and the pathogenesis of hemorrhage in the setting of COVID-19 has not been fully uncovered.

Interestingly, the affinity of the SARS-CoV-2 for angiotensin-converting enzyme 2 receptors may allow the virus to attack intracranial arteries [4]. In fact, the angiotensin 2 receptors are expressed in cerebrovascular endothelial cells and the circumventricular organs. They play a significant role in the regulation of several functions in the brain: regulation of blood pressure, sympathoadrenal system, hormone formation, water and sodium intake, cerebral blood flow, and vascular autoregulation.5 Thus, the coronavirus–ACE 2 binding is directly responsible for the blood-brain barrier (BBB) damage and the possible elevation of blood pressure. This may ultimately predispose the affected individual to the occurrence of a cerebral hemorrhage.

Additionally, it is possible that the cytokine storm that accompanies this disorder could be the cause of intracranial hemorrhages. Regarding COVID-19, multiple cytokines, including IL-1B, IFN-γ, IP-10, and MCP-1, have been found to be elevated, particularly in patients with severe disease and high rates of mortality [4]. However, this is an area that still needs to be further investigated.

It is now established through various cases that COVID-19 induces a significant prothrombotic state. In fact, there is an adaptive hemostatic response that occurs as a defense to COVID-19 infection: activation of the coagulation cascade increased inflammatory markers such as fibrinogen, increased cytokine production, neutrophil extracellular traps, and damage-associated molecular patterns (DAMPs). Therefore, treating the prothrombotic state with anticoagulants comes with the high-risk complication of hemorrhage, and its risk-to-benefit ratio is a point for further investigation [6].

Although rare, it is crucial to identify the possible hemorrhagic presentations with which COVID-19 may manifest. It is crucial for physicians to consider intracranial hemorrhage as a probable cause of altered mental status in patients infected with COVID-19 and weigh the possible risk versus benefits of utilizing therapeutic anticoagulants when managing the thrombotic complications of this virus.

References

1. Stokes EK, Zambrano LD, Anderson KN, Marder EP, Raz KM, et al. (2020) Coronavirus Disease 2019 Case Surveillance - United States. MMWR Morb Mortal Wkly Rep. 69: 759-765.
2. Brouwer MC, Ascione T, Pagliano P. (2020) Neurologic aspects of covid-19: a concise review. Infez Med. 28: 42-45.
3. Zhou Z, Kang H, Li S, Zhao X. (2020) Understanding the neurotropic characteristics of SARS-CoV-2: from neurological manifestations of COVID-19 to potential neurotropic mechanisms. J Neurol. 267: 2179-2184.
4. Spence J D, de Freitas G R, Pettigrew L C, Ay H, Liebeskind D S, et al. (2020) Mechanisms of Stroke in COVID-19 [published online ahead of print, 2020 Jul 20]. Cerebrovasc Dis. 1-8.
5. Saavedra JM (2005) Brain Angiotensin II: New Developments, Unanswered Questions and Therapeutic Opportunities. Cell Mol Neurobiol. 25: 485–512.
6. Iba T, Levy JH, Levi M, Connors JM, Thachil J et al. (2020) Coagulopathy of Coronavirus Disease 2019. Crit Care Med. 48: 1358-1364.