



MULTIPLE LARGE-VESSELS STROKE AS A PRESENTING FEATURE IN THE MIDDLE AGED COVID-19 PATIENT: A CASE REPORT

Neurosurgery

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ABSTRACT

Acute ischemic stroke is one of most common emergency even during the COVID19 pandemic worldwide. Most of COVID19 patients manifested with clinical features ranging from asymptomatic, mild constitutional to respiratory symptoms. Some patients present with atypical symptoms including involvement of other systems, viz., gastrointestinal, cardiovascular, or neurological symptoms. The most common reported neurological symptoms are headache and dizziness followed by encephalopathy and delirium. The most common peripheral manifestation was hyposmia. The uncommon neurological complications noted are cerebrovascular accident (CVA), Guillian barre syndrome (GBS), acute transverse myelitis (ATM), and acute encephalitis. Few case reports of CVA in COVID19 were already published in literature, but the cases published were usually involvement small vessels or involvement of large vessels with partial occlusion. We report a case of 50 years' old gentleman without any known medical co morbidities, presenting with multiple vessels cerebral ischemic events with a COVID19 positive status.

KEYWORDS

COVID19, CVA, stroke, multiple large vessels.

INTRODUCTION-

Corona viruses are a group of related RNA viruses that cause diseases in mammals and birds. In humans, these viruses cause respiratory tract infections that can range from mild to lethal. Mild illnesses include some cases of the common cold (which is also caused by other viruses, predominantly rhinoviruses), while more lethal varieties can cause SARS (Severe acute respiratory syndrome), MERS (Middle East respiratory syndrome), and more recently, COVID-19 (corona virus disease 2019). In December 2019, the first reports of the COVID-19, an illness caused by the novel severe acute respiratory syndrome corona virus 2 (SARS-CoV-2), emerged from Wuhan, Hubei Province, China [1]. Initially all cases were clustered to the Huanan seafood wholesale market. World Health Organization (WHO) declared it a pandemic on 11 March 2020 [2]. Symptoms of SARS-Cov-2 infection range from asymptomatic disease to life-threatening acute respiratory distress syndrome (ARDS), severe pneumonia, acute kidney injury (AKI), myocarditis, eventual multi-organ failure, and death [3,4].

Case Report-



Figure1: Chest X ray showing bilateral prominent interstitial margins.

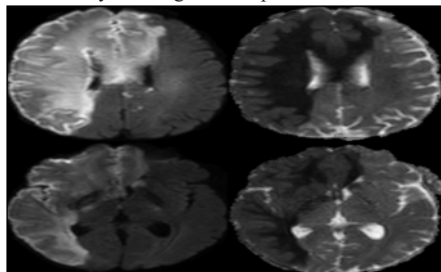


Figure2: MRI Brain Showing Right Internal Carotid Artery Territory Infarct With Left Anterior Cerebral Artery Territory Infarct.

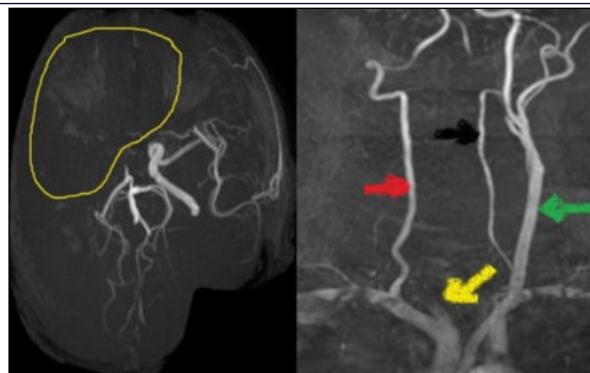


Figure 3: MR Angiography Of Neck And Brain Vessels Demonstrating Non-visualization of Right Internal Carotid Artery And Left Anterior Cerebral Artery Territory (yellow Circle).there Is Non-Visualization Of Right Common Carotid Artery At Its Origin From brachiocephalic Trunk (yellow Arrow) And Appreciable Visualization Of Right Vertebral artery (red Arrow), Left Vertebral Artery (black Arrow) And Left Common Carotid Artery (green Arrow).

A 50 years' gentleman with no known co-morbidities presented to our hospital, with history of sudden onset of left sided weakness since early morning of the day of admission. It was followed by few episodes of vomiting and altered sensorium. He was brought to our institute after 12 hours of onset of symptoms with GCS-E1V2M5, left sided hemiplegia, pupils-3mm, bilaterally reacting, and temperature-102°F. Patient had poor respiratory efforts. In view of low GCS and poor respiratory efforts, he was intubated orally and put on ventilator support. He had no history of any respiratory symptoms, fever, or any known definite COVID19 contact. Necessary blood investigations, X ray Chest, MRI Brain with stroke protocol and COVID19 test was done. His X-ray chest revealed bilateral prominent interstitial margins (Figure -1). MRI Brain revealed right internal carotid artery territory infarct, left anterior cerebral artery territory infarct (Figure -2). MR angiography of neck and brain vessels revealed, non-visualization of right common carotid at its origin from brachiocephalic trunk and non-visualization of left anterior cerebral artery (Figure -3). His COVID19 PCR test was positive. He underwent decompressive craniectomy with lax duraplasty as an emergency procedure. Intra-operatively brain was non pulsatile. Post-operatively he was managed with all supportive measures, but unfortunately he succumbed to death. His lipid profile, homocysteine level, blood sugar was normal. His 2D echo cardiography was within normal limits and didn't reveal any clots.

DISCUSSION-

There is not enough experimental data available for COVID-19, but it

is considered a mutation of Severe Acute Respiratory Syndrome Virus and Middle East Respiratory syndrome Virus [5]. Therefore, it is expected that it will behave in a similar manner like that of SARS and MERS virus [6]. Corona viruses have their primary target as respiratory epithelium resulting in primarily respiratory symptoms; they are not primarily a neurotropic virus. The target receptor for attachment to the cell and their subsequent internalization is mediated by the angiotensin converting enzyme-2 receptor (ACE 2)[7]. Neurological damage by COVID19 is likely by two mechanisms- hypoxic brain injury and an immune mediated damage. Systemic hypoxia due to severe pneumonia leading to brain damage, viz. neuronal swelling and brain edema which ultimately results in neurological manifestations. Cytokine storms with increased levels of inflammatory cytokines and activation of T lymphocytes, macrophages, and endothelial cells are the factors for immune mediated brain damage by activation of complement and coagulation cascades [8-10]. In the study of Mao et.al, 5.7% of patients developed cerebrovascular disease later in the course of illness in patients with severe infection [11]. In another study by Li Y et.al, the incidence of stroke in COVID-19 patients was about 5% with a median age of 71.6 years [12]. A study was conducted by Oxley T.J. et. al consisting of total 5 patients, who presented with large vessel stroke in COVID19 patients. In their study consisting of 5 patients, 3 patients presented with MCA territory infarct, 1 patient with PCA territory infarct and 1 patient with partial infarction of the right middle cerebral artery with a partially occlusive thrombus in the right carotid artery at the cervical bifurcation [13].

In another study was conducted by Avula A et al, consisting of 4 COVID19 patients presenting acute stroke. Among the 4 patients, 2 patients presented with partial MCA occlusion, 1 patient presented with MCA territory infarct and 1 patient presented with MCA territory stroke with ICA occlusion [14]. The exact pathophysiology behind the cerebrovascular accidents is yet to be determined. Autopsy and pathology findings are scarcely available, but recent autopsy findings suggest thrombotic microangiopathy in multiple organs especially in the lungs [15]. Few autopsy reports of brain are available in electronics media, but no autopsy reports of the brain are published till the time of this writing. With this evidence, the most acceptable mechanism of early cerebrovascular accidents could be hypercoagulability leading to macro and micro thrombi formation in the vessels. Other pathophysiology could be directly related to the infection or hypoxia as already discussed earlier.

CONCLUSION-

Till date, as per extensive search of various publications, no case report or case series revealed such extensive occlusion of multiple large vessels of the brain as the initial manifestation in COVID19 patients. Basically COVID19 is a disease concerning pulmonologists, internists and intensivists, but the neurologists, neurosurgeons and all practicing physicians should be well aware of its neurological complications. Management of COVID 19 and its emergencies is a team work. More research and studies should be conducted to have a clear knowledge of neurological manifestations in COVID19 patients.

REFERENCES-

1. Li X., Zai J., Zhao Q: Evolutionary history, potential intermediate animal host, and cross-species analyses of SARS-CoV-2. *J Med Virol.* 2020. 10.1002/jmv.25731
2. WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020. (2020). Accessed: 11 March 2020: <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-....>
3. Huang C., Wang Y., Li X: Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet.* 2020, 395:497-506. 10.1016/S0140-6736(20)30183-5
4. Inciardi RM, Lupi L, Zacccone G, et al.: Cardiac Involvement in a Patient With Coronavirus Disease 2019 (COVID-19). *JAMA Cardiol.* 2020, 10.1001/jamacardio.2020.1096
5. Wu Yeshun, Xu Xiaolin, Chen Zijun, et al.: Nervous system involvement after infection with COVID-19 and other coronaviruses. *Brain Behav Immun.* 2020, 10.1016/j.bbi.2020.03.031
6. Li Yan-Chao, Bai Wan-Zhu, Hashikawa Tsutomu: The neuroinvasive potential of SARS-CoV2 may play a role in the respiratory failure of COVID-19 patients. *J Med Virol.* 2020, 92:552-5. 10.1002/jmv.25728
7. Baig AM, Khaleeq A, Ali U, et al.: Evidence of the COVID-19 virus targeting the CNS: tissue distribution, host virus interaction, and proposed neurotropic mechanisms. *ACS Chem Neurosci.* 2020, 11(7):995-8. 10.1021/acscchemneuro.0c00122
8. Tu H, Tu S, Gao S, et al.: The epidemiological and clinical features of COVID-19 and lessons from this global infectious public health event. *J Infect.* 2020, 81(1):1-9. 10.1016/j.jinf.2020.04.011
9. Mehta P, McAuley DF, Brown M, et al.: COVID- 19: consider cytokine storm syndromes and immunosuppression. *Lancet.* 2020, 395:1033-4. 10.1016/S0140-6736(20)30628-0
10. Tveit K: Cytokine storms in COVID-19 cases? *Tidsskr Nor Lægeforen.* 2020, 140. 10.4045/tidsskr.20.0239
11. Mao L, Jin H, Wang M, et al.: Neurologic Manifestations of Hospitalized Patients With

- Coronavirus Disease 2019 in Wuhan, China. *JAMA Neurol.* 2020, 77(6):683-690. 10.1001/jamaneurol.2020.1127
12. Li Y, Wang M, Zhou Y, et al.: Acute Cerebrovascular Disease Following COVID- 19: A Single Center, Retrospective, Observational Study.. *Stroke Vasc Neurol.* 2020, 5(3):279-284. 10.1136/svn-2020-000431
 13. Oxley TJ, Mocco J, Majidi S, et al.: Large-Vessel Stroke as a Presenting Feature of Covid-19 in the Young. *N Engl J Med.* 2020, 382(20):e60. 10.1056/NEJMc2009787
 14. Avula A, Nalleballe K, Narula N, et al.: COVID-19 presenting as stroke. *Brain Behav Immun.* 2020, 87:115-119. 10.1016/j.bbi.2020.04.077
 15. Fox SE, Akmatbekov A, Harbert JL, et al.: Pulmonary and Cardiac Pathology in Covid-19: The First Autopsy Series from New Orleans. *Lancet Respir Med.* 2020, 8(7):681-686. 10.1016/S2213-2600(20)30243-5