Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company’s public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
We described an Italian adult case of congenital SCAR18 arising from the unreported association between a LoF variant and a deletion, with long-term follow-up and stable cerebellar atrophy since 14 years.

Funding
No funding.

Declaration of Competing Interest
The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data
Supplementary data to this article can be found online at https://doi.org/10.1016/j.jocn.2020.05.008.

https://doi.org/10.1016/j.jocn.2020.05.008

Intravenous Thrombolysis for Stroke in a COVID-19 Positive Filipino Patient, a Case Report

Christian Oliver C. Co a, Jeryl Ritzi T. Yu a, Lina C. Laxamana a, Deborah Ignacia A. David-Ona b

a Institute for Neurosciences, St. Luke’s Medical Center – Global City, 5th Ave, Taguig, 1634 Manila, Philippines
b Department of Internal Medicine, St. Luke’s Medical Center – Global City, 5th Ave, Taguig, 1634 Manila, Philippines

A R T I C L E   I N F O

Article history:
Received 26 March 2020
Accepted 1 May 2020

Keywords:
Coronavirus
COVID-19
SARS-CoV-2
Stroke
IV-RTPA

A B S T R A C T

The 2019 Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) which was first reported in Wuhan, China last December 2019, has been declared an emergency by the World Health Organization but eventually progressed to become a Pandemic. To date, Coronavirus Disease 2019 (COVID-19) has affected at least 100,000 individuals worldwide, reaching thousands of mortalities (Zhou et al., 2020; World Health Organization, 2020). In the Philippines, the number of COVID-19 confirmed positive cases is over 636 and is expected to rise (Department of Health, 2020). Respiratory infections alongside their comorbidities can induce acute myocardial infarction and acute ischemic stroke (Warren-Gash et al., 2018) [3]. These may further bring challenges in the management and administration of Intravenous (IV) Alteplase in eligible patients. Currently, there are no case reports in the administration IV Alteplase in ischemic stroke patients who are COVID-19 positive. We present a case of a 62-year old female who was admitted due to cough, colds and shortness of breath of 2 weeks duration and was tested to be COVID-19 positive. She suffered from an ischemic stroke while in the Medical Intensive Care Unit and was given Intravenous thrombolysis.

1. Introduction

IV Alteplase is administered in ischemic stroke patients who are eligible for thrombolysis [4]. There is no contraindication in the administration of IV Alteplase in patients with communicable diseases [4]. COVID-19 infected more than 100,000 individuals worldwide and its numbers are still increasing [1,8]. Administering IV Alteplase in COVID-19 positive patients poses a risk and challenge to the healthcare professionals. Respiratory infections can trigger acute coronary events and strokes along with the patient’s comorbidities [3,5]. A link between COVID-19 and stroke and its outcome when given Intravenous Alteplase has yet to be reported.

2. Case report

A 62-year old female, known hypertensive, prediabetic, dyslipidemic with a history of transient ischemic attack last 2019 presented to the emergency department with cough and colds of 2 weeks duration associated with shortness of breath. She was
initially managed as a case of Community Acquired Pneumonia, but was tagged as a Person Under Investigation (PUI) due to her occupation as a health provider. She was admitted in the Medical Intensive Care Unit, (converted to the hospital’s COVID Critical Unit) with necessary precautions undertaken. During the first hospital day, she developed sudden onset of severe dysarthria and right upper and lower extremity weakness, giving a National Institutes of Health Stroke Scale (NIHSS) of 4. Plain cranial CT scan showed a subtle hypodensity in the left centrum semiovale and corona radiata (Fig. 1a). CT-angiography showed significant stenosis in the left M1 segment of the Middle Cerebral Artery (Fig. 1b).

Intravenous thrombolysis (IV rTPA) was initiated at a dose of 0.9 mg/kg body weight 3.4 h post ictus with 10% bolus of the total dose given initially, followed by the remaining dose as an infusion over 1 h. Immediately after IV rTPA, the patient’s right leg weakness resolved with an NIHSS of 3. Repeat plain cranial CT scan 24 h post-IV rTPA showed absence of hemorrhage. Cautious hydration was made and Aspirin 100 mg was started. However, on day 3 post ictus, his right leg was seen to be moving side to side with a cumulative NIHSS of 6. There were fluctuations in motor strength thereafter for which adjustment in IV hydration was made. She was confirmed COVID-19 positive by reverse transcription polymerase chain reaction (rRT-PCR) along with the classic findings on High-resolution CT (HRCT) of the chest showing areas of ground glass densities with focal areas of consolidation predominantly in both peri hilar and peripheral regions of the lung (Fig. 2). The patient is being managed for the COVID-19 infection and is still admitted with mild dysarthria, right upper extremity falls before 10 s and right lower extremity drift (NIHSS of 4). Laboratory tests are as follows (please refer to Table 1.)

3. Discussion

On January 30, 2020, the WHO declared COVID-19 as a global emergency [2]. The most common symptoms are fever, cough and body malaise [6,7]. Sars-CoV-2 infects the respiratory tract by inducing release of inflammatory cytokines such as interleukin (IL)1β and IL-6 by binding to the Toll Like Receptor (TLR), triggering an inflammatory cascade and resulting in Acute Respiratory Distress Syndrome. Suppression of the inflammatory mediators have been shown to limit injury [10]. Increased inflammatory biomarkers (D-dimer, C-Reactive Protein and Fibrinogen) have been shown to increase stroke severity and disability within 30 days [11], while erythrocyte sedimentation rate has not been shown to predict the outcome of stroke [12]. Chest imaging of COVID-19 patients show consolidation, ground glass opacities and bilateral lung involvement, which were consistent with findings in our patient [1,6,7]. Diagnostic parameters of COVID-19 patients show elevated D-dimer, fibrinogen, erythrocyte sedimentation rate, lactate dehydrogenase and C-reactive protein which are seen in our patient (Table 1). These levels are directly proportional to the clinical outcome and mortality. Procalcitonin levels are normal unless there is a concomitant bacterial infection [1,6,7,11].

Currently, there are no reports elucidating the direct relationship of COVID-19 and its influence on stroke outcome. Possible mechanisms that may explain acute ischemic events in COVID-19 patients include cardiovascular compromise in the setting of infection, reduced oxygenation in the setting of acute respiratory distress syndrome, and systemic inflammation causing thrombosis.
The management of COVID-19 patients who suffer from stroke poses a challenge to healthcare professionals. There are no specific clinical guidelines established in handling COVID-19 positive patients who are eligible for thrombolysis. Management of hemodynamic status must always balance the risk and benefits of such treatment in COVID positive cases. There is no direct causal relationship of stroke with COVID-19 as of yet but given the fact that COVID-19 patients are predisposed to developing neurologic complications such as acute vascular events, monitoring these complications in the setting of COVID-19 infection is highly warranted. We therefore propose the following:

1. Development of an Acute Stroke Unit capable of managing COVID-19 patients and
2. Establishment of a clinical pathway and guidelines for the management of these complications in COVID-19 patients.

Acknowledgements

This material would not be possible without the support of the Brain Attack Team in St. Lukes Medical Center – Global City. We would also like to thank and commend our stroke nurses: Alyssa Mae C. Domingo, Evita C. Trias, Joana Lyn M. Racpan-Cauntay, Karen Carzina S. Ilano and Maria Joanne D. Francisco for their contributions in this case.

References

[1] Zhou Fei, Yu Ting, Du Ronghui, Fan Guohui, Liu Ying, Liu Zhibo, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. Lancet. 2020. https://doi.org/10.1016/S0140-6736(20)30569-3

[2] World Health Organization. A report about coronavirus disease 2019 (COVID-19) Retrieved from, 2020. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200313-sitrep-53-covid-19.pdf?sfvrsn=adb3772_2.

[3] Warren-Gash C, Blackburn R, Whitaker H, et al. Laboratory-confirmed respiratory infections as triggers for acute myocardial infarction and stroke: a self-controlled case series analysis of national linked datasets from Scotland. Eur Respir J 2018;51:1701794. https://doi.org/10.1183/13993003.01794-2017

[4] De Keyser Jacques, Gdovinova Zuzana, Uyttenboogaart Maarten, Vroomen Patrick C, Luijckx Gert Jan. Intravenous alteplase for stroke beyond the 4.5 hours treatment window: a self-controlled case series analysis of national linked datasets from Scotland. Lancet. 2016. https://doi.org/10.1016/j.laneuro.2016.01.036

[5] World Health Organization. Guidelines and in particular clinical situations. Stroke AHA 2007;38:2612–8.

[6] Russell MG, Gorelick MB, Khoury P, et al. Risk factors for 30-day mortality after acute ischemic stroke treated with thrombolysis. J Neurol Res North Am 2016. Available at: https://www.neurores.org/index.php/neurores/article/view/362/346 [Date accessed: 23 Mar. 2020]

[7] De Keyser Jacques, Gdovinova Zuzana, Uyttenboogaart Maarten, Vroomen Patrick C, Luijckx Gert Jan. Intravenous alteplase for stroke beyond the 4.5 hours treatment window: a self-controlled case series analysis of national linked datasets from Scotland. Lancet. 2016. https://doi.org/10.1016/j.laneuro.2016.01.036

[8] Department of Health, Updates on novel coronavirus disease 2019-COVID-19 research (LANCOVID-19). Travel Med Infect Dis 2020. https://doi.org/10.1016/j.tmaid.2020.101606.

[9] de la Iglesia García-Pérez, Vázquez Ferreiro, de la Iglesia García-Pérez, Vázquez Ferreiro. C-Reactive protein and interleukin-6 as biomarkers of acute ischemic stroke. J Neurol Res North Am 2016. Available at: https://www.neurores.org/index.php/neurores/article/view/362/346 [Date accessed: 23 Mar. 2020].

[10] Cunningham Sherry, Carregoni Gonzaga, de la Iglesia García-Pérez, Vázquez Ferreiro. C-Reactive protein and interleukin-6 as biomarkers of acute ischemic stroke. J Neurol Res North Am 2016. Available at: https://www.neurores.org/index.php/neurores/article/view/362/346 [Date accessed: 23 Mar. 2020].

[11] Pinto AM, de la Iglesia García-Pérez, Vázquez Ferreiro, de la Iglesia García-Pérez, Vázquez Ferreiro. C-Reactive protein and interleukin-6 as biomarkers of acute ischemic stroke. J Neurol Res North Am 2016. Available at: https://www.neurores.org/index.php/neurores/article/view/362/346 [Date accessed: 23 Mar. 2020].

[12] de la Iglesia García-Pérez, Vázquez Ferreiro, de la Iglesia García-Pérez, Vázquez Ferreiro. C-Reactive protein and interleukin-6 as biomarkers of acute ischemic stroke. J Neurol Res North Am 2016. Available at: https://www.neurores.org/index.php/neurores/article/view/362/346 [Date accessed: 23 Mar. 2020].

[13] Chen L, Deng H, Cui H, et al. Inflammatory responses and inflammation-associated diseases in organs. Oncotarget 2017;8(6):7204–18. https://doi.org/10.18632/oncotarget.23208.