COVID-19 Related Stroke in Patients on Anticoagulants

Hewa Sattar Salih, Ph.D*

ABSTRACT

Objectives: We aim to highlight the relationship between COVID-19 and stroke even after anticoagulants administration to our reported patients.

Methods: Retrospective data were obtained from the Bahrain Defense Force (BDF) hospital medical records. This paper presents six male patients who were diagnosed with COVID-19 cases based on the polymerase chain reaction (PCR) nasopharyngeal swab test. They were admitted into the field intensive care unit of BDF Hospital. Those patients received therapeutic doses of anticoagulants during their hospitalizations. They developed new onset of neurological deficits. Radiological imaging was done to confirm the diagnosis of stroke. Patient information was kept private.

Results: Based on the clinical presentation followed by radiological examination, five patients were diagnosed with acute ischemic stroke and one with intracerebral hemorrhage despite the administration of therapeutic doses of anticoagulants which indicated the significant relationship between COVID-19 and stroke.

Conclusion: There is a significant relationship between COVID-19 and stroke which is highlighted in this study. COVID-19 is considered a risk factor of stroke regardless the use of therapeutic dose of anticoagulants. In addition, the study shows that the risk of COVID-19 related stroke increases in male patients with comorbidities.

Keywords: COVID-19, Polymerase chain reaction, Anticoagulants, Ischemic stroke

INTRODUCTION

Since the beginning of the corona virus disease 2019 (COVID-19) pandemic, many questions have been raised about the origins of this disease and the possible complications, which appear to bemainly respiratory. By the end of March 2021, global statistics of COVID-19 reported more than 129 million active cases and more than 2.8 million deaths[1]. COVID-19 mainly affects the lungs causing serious acute respiratory distress syndrome (ARDS) mostly in male elderly patients with comorbidities[2]. However, while this disease continues to be investigated, it was reported that it is associated with neurological complications[3]. In the literature, it was found that patients with COVID-19 may develop new onset of cerebrovascular disease[4]. In this paper, we aim to highlight the relationship between COVID-19 and stroke even after anticoagulants administration.

METHODS

We report a case series of six patients who were diagnosed with COVID-19-related stroke based on clinical and radiological findings. Retrospective data were obtained from the Bahrain Defense Force (BDF) hospital medical records. Those cases were admitted in the field intensive care unit of the Bahrain defense force hospital. All cases were confirmed to be infected by COVID-19 by using polymerase chain reaction (PCR) nasopharyngeal swab. All patients received therapeutic doses of anticoagulants along with antivirals and antibioticsstarting on the first day of admission. None of them received the COVID-19 vaccine.

CASE PRESENTATIONS

CASE 1

A 70-year-old male was diagnosed with COVID-19, which was confirmed via the PCR test. He was admitted to the field intensive care unit (ICU) because of increased oxygen requirements and worsening respiratory symptoms. He was a known case of type two diabetes mellitus (T2DM). The patient was receiving antiviral medication and anticoagulants and had an uneventful hospital stay. He was discharged in stable condition with no active complaints. After a total of 23 days of diagnosis, he came to the outpatient clinic with history of sudden left-sided hemiplegia. Neurological examination showed left upper limb weakness grade 4/5 and left lower limb weakness grade 4/5. Magnetic resonance imaging (MRI) of the brain was performed and revealed a right basal ganglia hemorrhage (Figure 1). Follow-up visits in the outpatient clinic and post-stroke rehabilitation were instructed for the patient.

CASE 2

An 80-year-old male, who was a known case of T2DM, hypertension, dyslipidemia, and ischemic heart disease, was admitted to the field ICU with COVID-19 associated pneumonia. The patient required a high amount of oxygen on admission and oxygen saturation was maintainedvia a high flow nasal cannula. Thepatient was noted to have high d-dimer and leukocytosis. He was kept on therapeutic doses of anticoagulant and antiviral medications. Suddenly, he developed dysarthria after seven days afterhis COVID-19 diagnosis. Physical

* Radiology Department
Bahrain Defense Force Hospital, Royal medical services
Kingdom of Bahrain
E-mail: Abdulla3likhaled@gmail.com
** Chief Resident in Neurology Department
*** Chief Resident in Radiology Department

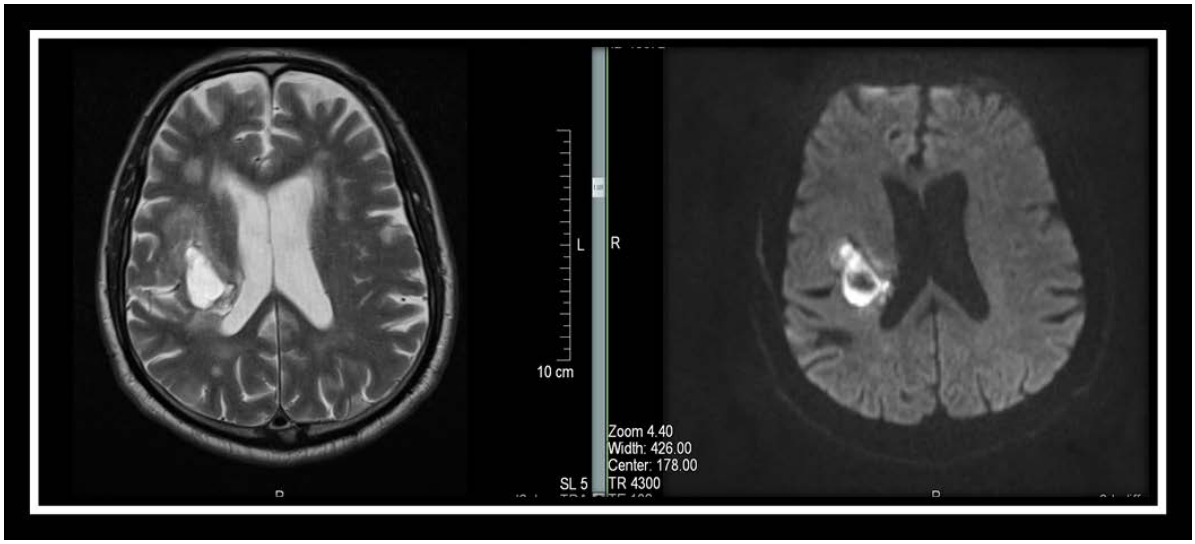

Figure 1: Right basal ganglia subacute bleed

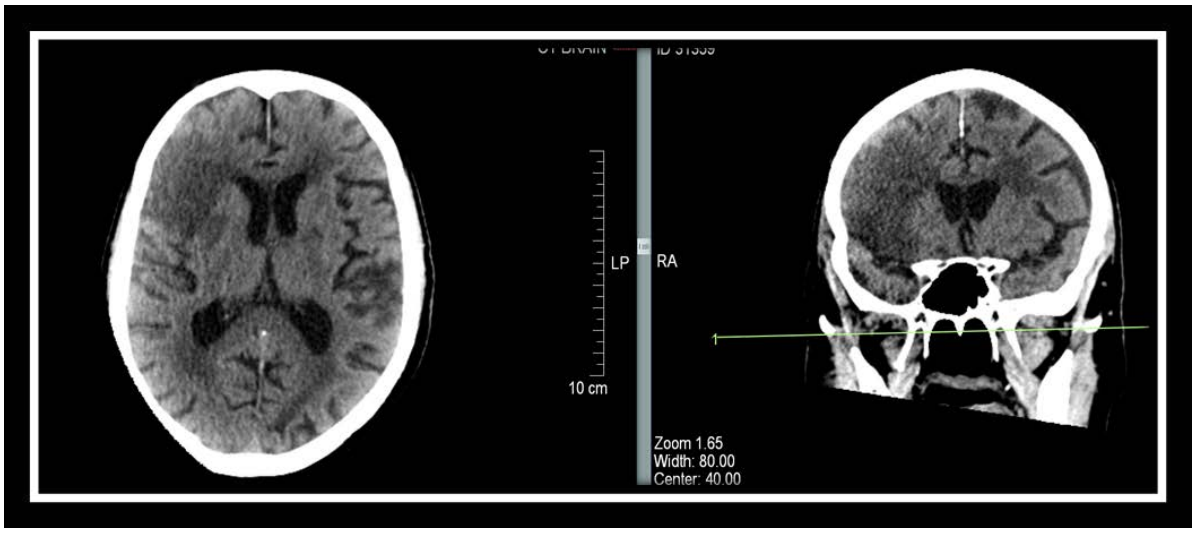

Figure 2: Ill-defined hypo attenuated area seen to involve the right fronto-parietal lobe with effacement of the sulci, in keeping with right MCA territory infarct

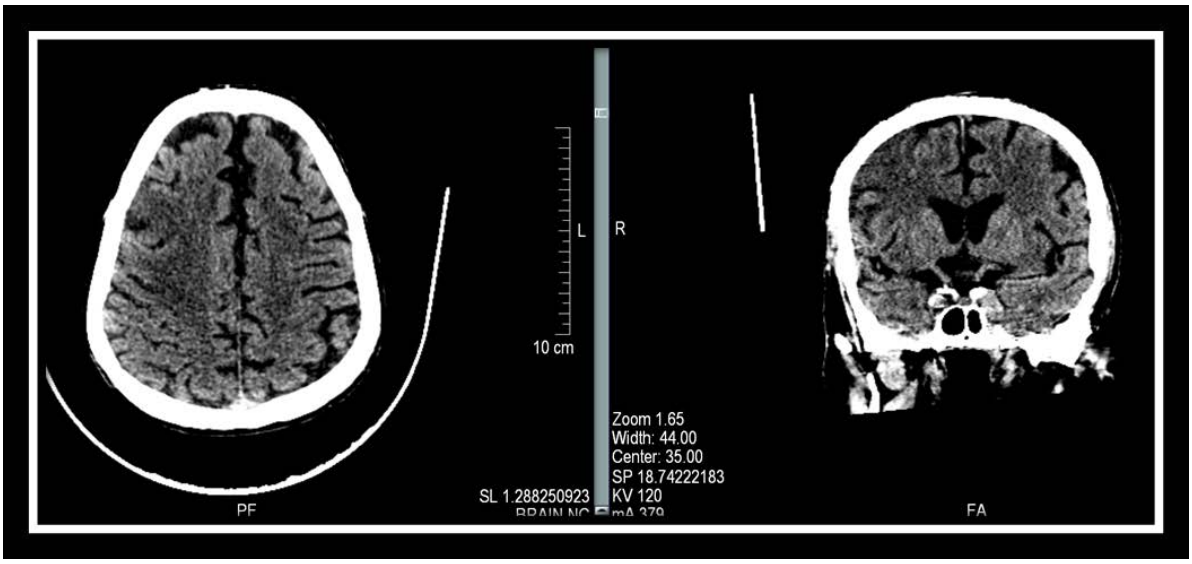

Figure 3: Ill-defined hypodense area seen right frontal lobe with minimal mass effect on the related cortical sulci, in keeping with acute infarct

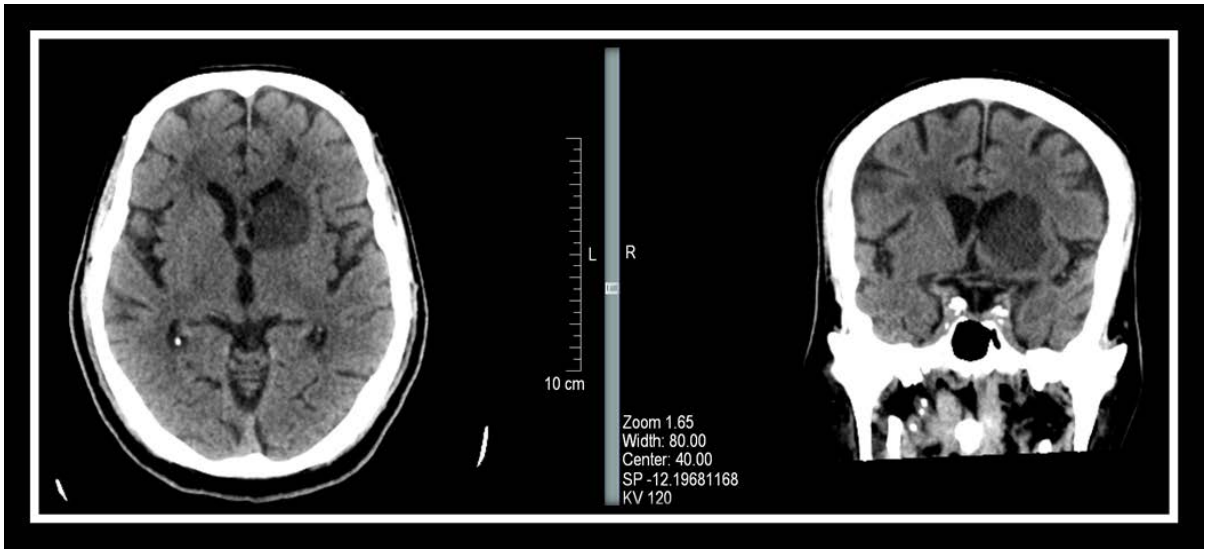

Figure 4: Left caudate head infarct

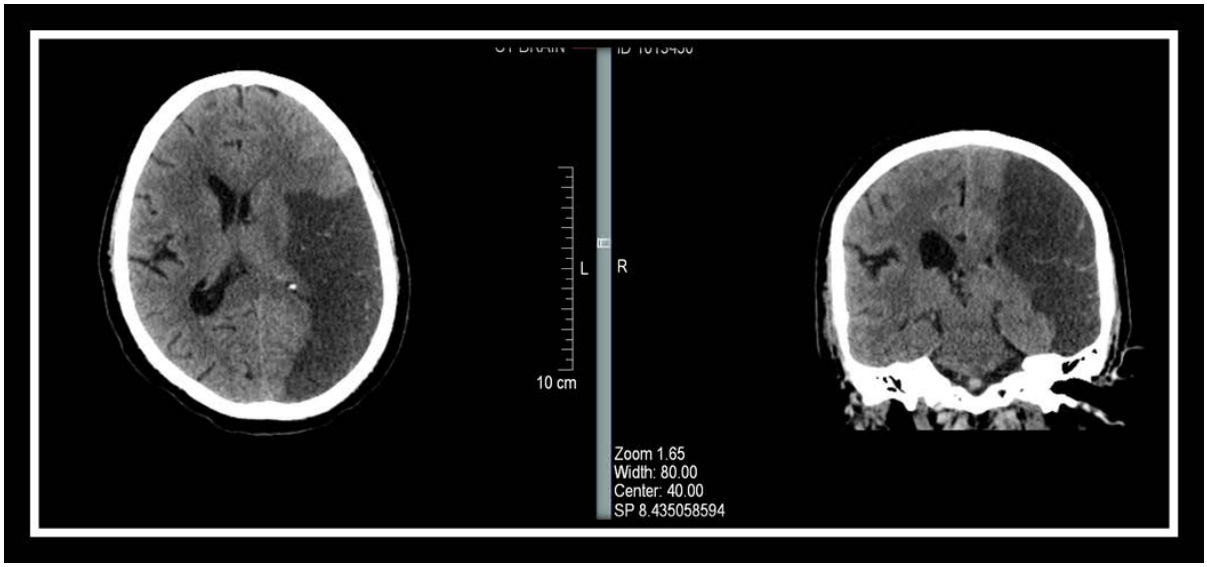

Figure 5: Large left MCA territory infarct with rightward midline shift

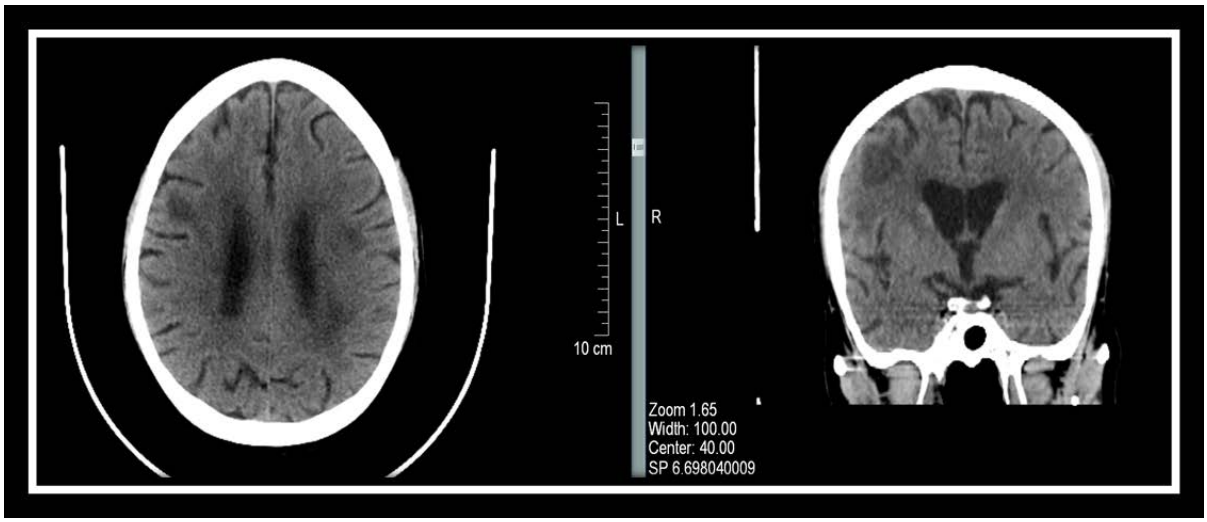

Figure 6: Right frontal hypodensity in keeping with acute infarct

examination indicated left-sided body weakness. A computerized tomography (CT) scan of the brain revealed a right middle cerebral artery (MCA) ischemic infarction (Figure 2). Further deterioration was noted in which this case ended by mortality.

CASE 3

A 78-year-old male, who was a known case of T2DM, was diagnosed with COVID-19 and admitted to the field ICU on day seven after his diagnosis for oxygen supply administration and monitoring. He suddenly developed an onset of atrial fibrillation along with leukocytosis, elevated inflammatory markers, and desaturation. In addition, the patient developed new neurological deficits, which manifested as left hand spastic paresis and left positive Babinski sign. An emergency CT scan of brain was done and showed right frontal infarct (Figure 3). The patient received therapeutic doses of an anticoagulant starting on the first day of his admission. Despite all measurements, this patient deteriorated and died.

CASE 4

A 72-year-old male presented to the emergency room with a history of dysarthria. Neurological assessment showed mouth deviation to the right side with right-sided body weakness. He was hypertensive and had a past medical history of coronary artery disease. A PCR screening test was done, and the result was positive for COVID-19. The patient was immediately examined radiologically using a CT scan of the brain, which revealed an acute infarct in the left gyrus rectus. The patient was found to have low oxygen saturation on room air, leukocytosis, and elevated d-dimer in addition to inflammatory markers. Therefore, he was admitted to the field ICU for oxygen supply administration and treatment. He was maintained on therapeutic doses of an anticoagulant, antiviral medications, and antibiotics. The patient disoriented for seven days after admission. A brain CT scan was repeated and revealed new infarcts in the left caudate nucleus and left frontal lobe with extension to the previous infarct in the left gyrus rectus (Figure 4). Unfortunately, this patient was declared dead after that event.

CASE 5

A 55-year-old male was admitted to field ICU because of increased oxygen requirements and high inflammatory markers. He was a known case of hypertension. A therapeutic anticoagulant and antibiotics were started upon admission. The patient developed a sudden onset of right-sided body weakness that was noted on the sixth day after admission. The patient was examined by a neurologist who advised an immediate CT brain scan. A CT scan indicated an MCA infarct (Figure 5). This patient was transferred to another facility for further management of pneumonia and post-stroke rehabilitation.

CASE 6

A 69-year-old male, who was a known case of hypertension, was admitted to the fieldICU for management of COVID-19-associated pneumonia. The patient was started on antibiotics andtherapeutic doses of an anticoagulant. Despite receiving the anticoagulant, the patient suddenly developed the onset of a stroke, which was clinically manifested by left upper limb weakness on sixth day after admission. A brain CT scan showed a right frontal acute infarct (Figure 6). This patient deteriorated by pulmonary and neurological complications and was declared dead.

DISCUSSION

COVID-19 is associated with different neurological complications, including acute cerebrovascular diseases, especially in patients with more severe infections[5]. Many publications highlight the relationship between COVID-19 and stroke and have reported COVID-19 as a risk factor for stroke[6]. We report six cases of COVID-19-related stroke who received therapeutic doses of anticoagulants. These findings indicate the significant relationship between COVID-19 and stroke. In the literature, it has been reported that the incidence of ischemic stroke is higher than that of hemorrhagic stroke in COVID-19 patients[7,8]. A small percentage (4.6%) of COVID-19 patients develop acute ischemic stroke, whereas 0.5% have intracerebral hemorrhages[7]. As reported in our study, five out of six patients developed ischemic stroke, and one single case developed intracerebral hemorrhage. Most of the reported cases were above seventy years old and had underlying disorders, especially hypertension, DM, dyslipidemia, and a previous medical history of ischemic heart disease. Complicated COVID-19 and stroke share the same risk factors, including old age, and comorbidities, such as hypertension and diabetes[9]. During admission, all cases presented with severe infection, which was evident by the requirement for high levels of oxygen in addition to elevated inflammatory markers and D-dimer, all of which appear to be prominent in COVID-19 patients with concomitant acute ischemic stroke[10]. This finding can be explained by sepsis-induced coagulopathy in which the COVID-19 virus binds to angiotensin-converting enzyme 2 (ACE2), which is present on brain endothelial cells and induces vasoconstriction after which tissue injury occurs[3]. It has been reported that patients may develop a stroke after a median duration of ten days with the infection[8]. As shown in our study, the majority of cases developed COVID-19-related stroke in less than ten days, which indicates rapid deterioration followed by stroke development. However, it was found that hemorrhagic stroke need more time to appear compared to ischemic stroke. The mortality rate was reported to be 38% among the COVID-19-related stroke patients[8]. Moreover, the risk of death increases by three times in COVID-19 patients with history of stroke[11]. We reported four mortalities who were diagnosed with COVID-19-related stroke, which is considered to be a significant number. All cases were confirmed to have cerebrovascular disease based on medical imaging, including MRI and CT scans.

CONCLUSION

Patients with COVID-19 may develop a new onset of cerebrovascular disease. Although all patients in our study were started on therapeutic doses of anticoagulants, they still developed a new onset of cerebrovascular disease. This finding indicates that COVID-19 is a significant risk factor for stroke, especially in severe cases that present with co-morbidities. Physicians should be aware of the relationship between COVID-19 and stroke to prevent delayed diagnosis and to decrease the rate of mortality.

Authorship Contribution: All authors share equal effort contribution towards (1) substantial contributions to conception and design, acquisition, analysis and interpretation of data; (2) drafting the article and revising it critically for important intellectual content; and (3) final approval of the manuscript version to be published. Yes.

Potential Conflict of Interest: None.

Competing Interest: None.

Sponsorship: None.

Acceptance Date: 20 October 2021

REFERENCES

1. World Health Organization. Coronavirus Disease (COVID-2019).
2. Attaway AH, Scheraga RG, Bhimraj A, et al. Severe covid-19 pneumonia: pathogenesis and clinical management. Br Med J 2021;372:n436.
3. Hess DC, Eldahshan W, Rutkowski E. COVID-19-related stroke. Trans Stroke Res 2020;11(3):322-25.
4. Zakeri A, Jadhav AP, Sullenger BA, et al. Ischemic stroke in COVID-19-positive patients: an overview of SARS-CoV-2 and thrombotic mechanisms for the neurointerventionalist. J Neurointerven Surg 2021;13(3):202-6.
5. Mao L, Jin H, Wang M, et al. Neurologic manifestations of hospitalized patients with coronavirus disease 2019 in Wuhan, China. J Am Med Ass Neurol 2020;77(6):683-90.
6. Markus HS, Brainin M. COVID-19 and stroke-A global World Stroke Organization perspective. Intern J Stroke 2020;15(4):361-4.
7. Li Y, Wang M, Zhou Y, Chang J, et al. Acute cerebrovascular disease following COVID-19: a single center, retrospective, observational study. Stroke Vasc Neurol 2020;5(3):279-84.
8. Bhatia R, Srivastava MP. COVID-19 and stroke: Incidental, triggered or causative. Ann Indian Acad Neurol 2020;23(3):318-24.
9. Zhou F, Yu T, Du R, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. The Lancet 2020;399(10229):1054-62.
10. Tan YK, Goh C, Leow AS, et al. COVID-19 and ischemic stroke: a systematic review and meta-summary of the literature. J Thromb Thrombolysis 2020;50(3):587-95.
11. Gabriel JM. Stroke as a complication and as a prognostic factor for COVID-19. Neurologia 2020;35(5):318-22.