Case Report

Manar Ahmed Kamal*

Basal ganglia infarction and COVID-19 infection in an elderly patient: A case report

https://doi.org/10.1515/tnsci-2020-0194
received September 25, 2021; accepted October 13, 2021

Abstract

Background – Coronavirus disease 2019 (COVID-19) has spread rapidly worldwide since the first cases were observed in Wuhan, China. Patients with COVID-19 develop multiple neurological symptoms, including headache, disturbed consciousness, and paresthesia, in addition to systemic and respiratory symptoms.

Case presentation – We presented a 57-year-old woman admitted to the emergency department in December 2020 – with complaints of slurred speech, confusion, and left upper limb weakness after one week of positive nasopharyngeal swab sample SARS-CoV-2.

Conclusions – While the patient had previous comorbidities like hypertension and diabetes, she had no prior history of ischemic stroke or thrombosis, so we conclude that unilateral acute basal ganglia infarction may be a unique neurological manifestation after COVID-19 infection in an elderly patient with previous comorbidities.

Keywords: basal ganglia infarction, neurological manifestation, case report, COVID-19, hematological characters

1 Background

Coronavirus disease 2019 (COVID-19) is a novel disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). SARS-CoV-2 has spread rapidly worldwide since the first cases in Wuhan, China, were observed in December 2019 [1]. Patients with COVID-19 develop neurological symptoms, including headache, disturbed consciousness, and paresthesia [2], in addition to systemic and respiratory symptoms. Stroke is one of the most typical neurological manifestations associated with COVID-19 [3,4]. Also, basal ganglia hemorrhage [5,6] and altered mental status are neurological manifestations of coronavirus disease 2019 [5]. We describe a case of basal ganglia infarction associated with COVID-19 in a female elderly patient. The report is early published as a preprint in Research Square [7].

2 Case presentation

A 57-year-old woman presented to the emergency department (ED) in December 2020 – with complaints of slurred speech, confusion, and left upper limb weakness. Her medical history included suffering from a persistent fever, severe headache, cough, fatigue, anosmia, dysgeusia, sore throat, vomiting, dizziness, fatigue, and bony pain, and the reverse transcription-polymerase chain reaction (RT-PCR) assay of nasopharyngeal swab sample was positive for SARS-CoV-2 from one week before presentation in ED. The patient also has diabetes mellites and hypertension in her medical history. All routine diagnostic tests were done, and the patient’s blood analysis showed an increase in red blood cells (RBCs), lymphocytes count, a marked increase in C-reactive protein (CRP), and D-dimer due to infection. She had a slightly decreasing mean corpuscular hemoglobin concentration and a marked increase in fasting blood glucose (FBS) as diabetes (Table 1). The patient weight was 70 kg; height: 150 cm; body mass index (BMI): 31 kg/m²; and the blood pressure: 140/100 mm Hg sitting. The pulse was 90/min, and oxygen saturation was 90%. Chest computed tomography (CT) and magnetic resonance imaging (MRI) on the brain were done for the patient. CT of the lung showed few right-side apical small ground-glass consolidation patches with bilateral mild subpleural lower lobar ground-glass haze more accentuated on the right side that scientifically referred to right-side viral pneumonia because of COVID-19. Few scattered sub-centimetric emphysematous bullae were noted with fine scattered subpleural atelectatic bands. Mediastinal structures are normal with a

* Corresponding author: Manar Ahmed Kamal, Faculty of Medicine, Benha University, Fareed Nada Street, Benha City, Qalubiya Governorate, 13511, Egypt, e-mail: manar170393@fmed.bu.edu.eg, manarahmedkamal37@gmail.com, manar_ahmedkamal@yahoo.com, tel: +20-112-282-6853
ORCID: Manar Ahmed Kamal 0000-0003-4339-1788

Open Access. © 2021 Manar Ahmed Kamal, published by De Gruyter. This work is licensed under the Creative Commons Attribution 4.0 International License.
The patient’s blood analysis showed an increase in RBCs, lymphocyte count, a marked increase in CRP, and a slight increase of D-dimer due to infection. In addition, she had a slight decrease in mean corpuscular hemoglobin concentration and a significant rise in FBS as she has diabetes.

**Abbreviations:** RBCs: blood red blood cells (erythrocytes); HCT: hematocrit; MCV: mean corpuscular volume; MCH: mean corpuscular hemoglobin; MCHC: mean corpuscular hemoglobin concentration; MPV: mean platelet volume; WBCs: white blood cells; INR: the international normalized ratio; S.G.O.T: serum glutamic oxaloacetic transaminase; S.G.P.T: serum glutamic pyruvic transaminase; ALT: alanine aminotransferase; AST: aspartate aminotransferase; CRP: C-reactive protein.

### Table 1: Laboratory tests and examinations

| Laboratory tests | Patient-level | Normal level | Unit |
|------------------|---------------|--------------|------|
| Complete blood count (CBC) | | | |
| Hemoglobin (Hb) | 13.2 | 12–16 | g/dL |
| RBCs | 5.39 | 3.8–4.8 | ×10⁹/µL |
| HCT | 45.1 | 36–46 | L/L |
| MCV | 83.7 | 80–101 | fl |
| MCH | 26.5 | 26–32 | pg |
| MCHC | 29.3 | 31–34 | g/dL |
| Platelet count | 337 | 150–400 | ×10³/µL |
| WBCs | 6.5 | 4–11 | ×10³/µL |

### Differential leucocyte count

| 1. Neutrophils | 45 | 40–80 | % |
| 2. Segmented | 42 | 0–8 | % |
| 3. Lymphocytes | 45 | 0–8 | % |
| 4. Monocytes | 8 | 20–40 | % |
| 5. Eosinophils | 2 | 2–10 | % |
| 6. Basophils | 2 | 1–6 | % |
| 7. INR | 0.10 | 1–3 | |
| Serum creatinine | 0.9 | 0.6–1.10 | mg/dL |
| S.G.O.T (AST) | 32 | 30–40 | U/L |
| S.G.P.T (ALT) | 38 | Up to 40 | U/L |
| FBS | 238 | 99 or lower | mg/dL |
| CRP | 31.7 | below 3.0 | mg/L |
| D-dimer | 0.720 | below 0.500 | ng/mL |
| Ferritin | 109.9 | 12–263 | ng/mL |

The patient’s blood analysis showed an increase in RBCs, lymphocyte count, a marked increase in CRP, and a slight increase of D-dimer due to infection. In addition, she had a slight decrease in mean corpuscular hemoglobin concentration and a significant rise in FBS as she has diabetes.

**Abbreviations:** RBCs: blood red blood cells (erythrocytes); HCT: hematocrit; MCV: mean corpuscular volume; MCH: mean corpuscular hemoglobin; MCHC: mean corpuscular hemoglobin concentration; MPV: mean platelet volume; WBCs: white blood cells; INR: the international normalized ratio; S.G.O.T: serum glutamic oxaloacetic transaminase; S.G.P.T: serum glutamic pyruvic transaminase; ALT: alanine aminotransferase; AST: aspartate aminotransferase; CRP: C-reactive protein.

### 3 Discussion

Basal ganglia infarction is a rare type of cerebral infarct with unique clinical manifestations [8]. As in this report, many factors may lead to basal ganglia infarction, including diabetes mellitus [9] and recently COVID-19. Among patients with diabetes, the risk of vascular events is significantly increased compared to nondiabetics [9]. The patient was a confirmed case of SARS-CoV-2 Infection, which agrees with the evidence that elderly patients...
are more susceptible to infection [10]. Our patient developed right-sided viral pneumonia, a significant cause of death in patients with cerebral infarction. Nakagawa and colleagues showed that the pneumonia mortality rate in patients with basal ganglia infarcts was significantly higher than in patients with or without cerebral hemispheric strokes in other locations [11]. Due to right-sided viral pneumonia, the patient was admitted to ICU to protect her life. There is ample evidence that COVID-19 may be associated with many neurological conditions [4] such as stroke [3], facial nerve palsy [12], Guillain-Barré syndrome [13], and basal ganglia hemorrhage [5,6]. A case series conducted in 2020 on 3,556 hospitalized patients with a diagnosis of COVID-19 infection showed that the incidence of ischemic stroke in COVID-19 patients was relatively lowered; 32 patients (0.9%) had imaging proven ischemic stroke [14], while Tan and colleagues report that the pooled incidence of acute ischemic stroke (AIS) in COVID-19 patients was about 1.2%, with a high mortality rate [3]. However, the underlying stroke mechanism of COVID-19 remains debatable [3]. Elevated D-dimer is prominent in COVID-19 patients with concomitant ischemic stroke, but further mechanistic studies are required to elucidate their role in the pathogenesis of AIS. However, multiple studies described neurological complications of COVID-19; no previous evidence presented the association between basal ganglia infarction and COVID-19 infection.

4 Conclusions

While the patient had previous comorbidities like hypertension and diabetes, she had no prior history of ischemic

Figure 1: Computerized tomography (CT) on the lung. Multiple axial contiguous thin cuts were taken through the chest and have shown few right-side apical small ground-glass consolidation patches with bilateral mild subpleural lower lobar ground-glass haze more accentuated on the right side; in addition to mild to moderate cardiomegaly and right adrenal lesion with fat-rich adenoma.

Figure 2: MRI on the brain. MRI on the brain has shown acute right basal ganglia infarct. (a) FLAIR, (b) DWI, (c) ADC, and (d) PWI.
stroke or thrombosis, so we conclude that unilateral acute basal ganglia infarction may be a unique neurological manifestation after COVID-19 infection in an elderly patient with previous comorbidities. The most predicted mechanism depends mainly on D-dimer changes. The learned Lesson of this case report is the rapid bringing of the patient if they have any of the following symptoms (FAST): F: Facial drooping, A: Arm weakness, S: Speech difficulties, and T: Time to call for an emergency. The learned Lesson for doctors is accurate medical history-taking and rapid.

**List of abbreviations**

| Abbreviation | Description |
|--------------|-------------|
| COVID-19 | coronavirus disease 2019 |
| ED | emergency department |
| SARS-CoV-2 | severe acute respiratory syndrome coronavirus 2 |
| RT-PCR | reverse transcription-polymerase chain reaction |
| RBCs | red blood cells |
| CRP | C-reactive protein |
| FBS | fasting blood glucose |
| BMI | body mass index |
| CT | chest computed tomography |
| MRI | magnetic resonance imaging |
| rt-PA | intravenous recombinant tissue plasminogen activator |
| ICU | intensive care unit |
| AIS | acute ischemic stroke |
| FAST | facial drooping |
| A | arm weakness |
| S | speech difficulties |
| T | time to call for an emergency |

**Acknowledgment:** I am glad to send a direct, special thanks to Prof. Dr. Huda Abdalla El-Sayed Ramadan, Faculty of Veterinary Medicine, Zagazig University, Zagazig, Egypt, for her unending support and encouragement.

**Conflict of interest:** Authors state no conflict of interest.

**Data availability statement:** The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

**References**

1. Oran DP, Topol EJ. Prevalence of asymptomatic SARS-CoV-2 infection: a narrative review. Ann Intern Med. 2020;173(5):362–7.
2. Wu Y, Xu X, Chen Z, Duan J, Hashimoto K, Yang L, et al. Nervous system involvement after infection with COVID-19 and other coronaviruses. Brain Behav Immun. 2020 Jul;87:18–22.
3. Tan YK, Goh C, Leow AST, Tambah PA, Ang A, Yap ES, et al. COVID-19 and ischemic stroke: a systematic review and meta-summary of the literature. J Thromb Thrombolysis. 2020;50(3):587–95.
4. Whitaker A, Anson M, Harky A. Neurological manifestations of COVID-19: a systematic review and current update. Acta Neurol Scand. 2020;142(1):14–22.
5. Haddadi K, Ghasemian R, Shafizad M. Basal ganglia involvement and altered mental status: a unique neurological manifestation of coronavirus disease 2019. Cureus. 2020;12(4):4–9.
6. Daci R, Kennelly M, Ferris A, Azeem MU, Hamzei-Sichani F, et al. Bilateral basal ganglia hemorrhage in a patient with confirmed COVID-19. Am J Neuroradiol. 2020;41(10):1797–9.
7. Kamal MA. Basal ganglia infarction a rare neurological manifestation of COVID-19 in an elderly patient: a case report. doi: 10.21203/rs.3.rs-553242/v1.
8. Wagner SJ, Begaz T. Basal ganglion stroke presenting as subtle behavioural change. Emerg Med J. 2008;25(7):459.
9. Gutierrez J, Esenwa C. Secondary stroke prevention: challenges and solutions. Vasc Health Risk Manag. 2015 Aug;11:437.
10. Kamal MA, Alamiry KR, Zaki M. Sex and age differences in telomere length and susceptibility to COVID-19. J Biomed Res Environ Sci [Internet]. 2020 Nov;1(7):303–10. Available from: https://www.jelsciences.com/articles/jbrs1159.
11. Nakagawa J, Sekizawa K, Aral H, Kikuchi R, Manabe K, Sasaki H. High incidence of pneumonia in elderly patients with basal ganglia infarction. Arch Intern Med. 1997;157(3):321–4.
12. Codeluppi L, Venturelli F, Rossi J, Fasano A, Toschi G, Pacillo F, et al. Facial palsy during the COVID-19 pandemic. Brain Behav. 2021;11(1):1–5.
13. Uncini A, Vallat JM, Jacobs BC. Guillain-Barré syndrome in SARS-CoV-2 infection: an instant systematic review of the first six months of pandemic. J Neurol Neurosurg Psychiatry. 2020;91(10):1105–10.
14. Yaghi S, Ishida K, Torres J, Mac Grory B, Raz E, Humbert K, et al. SARS-CoV-2 and stroke in a New York healthcare system. Stroke. 2020 Jul;51(7):2002–11.