

Unmasking the Hidden Threat: Post-COVID-19 Ischemic Stroke in a Young Adult

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Abstract

As of February 2024, over 774 million confirmed cases of COVID-19 and more than seven million deaths have been reported globally. Severe complications from COVID-19, such as cerebrovascular events, are prevalent, with research indicating that cerebrovascular accidents (CVAs) can occur in up to 6% of COVID-19 patients. This study presents a case of ischemic stroke in a 28-year-old male with no known risk factors, occurring 14 days after a COVID-19 infection. The patient's neurological examination revealed significant weakness in the right upper and lower limbs. Magnetic resonance imaging (MRI) findings were consistent with an acute ischemic stroke. The diagnosis of ischemic stroke was based on clinical symptoms and radiological findings. Cardiovascular evaluation did not find characteristic risk factors. SARS-CoV-2 IgG antibodies tested positive, indicating previous infection. This case underscores the importance of considering COVID-19 as a potential precipitating factor for ischemic stroke, even in young individuals without other vascular risk factors. (**International Journal of Biomedicine. 2024;14(4):709-711.**)

Keywords: COVID-19 • SARS-CoV-2 • ischemic stroke

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Introduction

As of February 2024, there have been over 774 million confirmed cases of COVID-19 and more than seven million deaths reported globally. Several reports emphasize the emergence and mutations of COVID-19. According to the World Health Organization (WHO), between January 8 and February 4, 2024, over 503,000 new COVID-19 cases were reported, resulting in 10,000 fatalities and 1,300 intensive care unit (ICU) admissions. Additionally, data from the United Kingdom indicate that since the beginning of July 2023, daily hospital admissions due to COVID-19 and the number of patients hospitalized primarily because of the virus have doubled.¹⁻⁶

While the majority of COVID-19 patients do not develop severe complications necessitating medical

intervention, a noteworthy proportion regrettably do. Among these severe consequences, cerebrovascular events resulting in neurological deficits are notably prevalent. Research indicates that the prevalence of cerebrovascular accidents (CVAs) in COVID-19 patients can be as high as 6%.⁷⁻¹⁰

Arterial CVAs predominantly affect the elderly and individuals with risk factors such as obesity, hypertension, diabetes, and hyperlipidemia. Moreover, the initiation of anticoagulation therapy in COVID-19 patients has been associated with an increased risk of hemorrhagic events. Conversely, the immobility and hypercoagulability observed in COVID-19 patients are believed to contribute to the occurrence of an ischemic type of stroke.¹⁰ Moreover, Sagris and colleagues, in their work "COVID-19 and ischemic stroke," identify "four possible pathophysiological axes seem to be related to thromboembolism and stroke in patients diagnosed with COVID-19: (i) immune-mediated thrombosis and hypercoagulopathy, (ii) the alternative renin-angiotensin system (RAS) pathway, (iii) cardio embolism and COVID-19-associated cardiopathy, and (iv) SARS-CoV-2-mediated damage of the neurovascular unit."¹¹

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In the current study, a case of ischemic stroke in a young individual is presented after 14 days of COVID-19 infection despite the absence of risk factors. The diagnosis was based on clinical presentation and radiological findings in an MRI brain. This clinical case highlights the importance of screening for SARS-CoV-2 as a potential precipitating factor for ischemic stroke, even at a young age, after excluding other vascular risk factors.

Case Report

A 28-year-old male patient, medically free, visited the emergency department with acute presentation of right upper and, to a lesser extent, lower limb weakness after taking his lunch, lasting for 3 days. These symptoms were not associated with other neurological manifestations.

The patient had no history of chronic medical conditions such as hypertension, diabetes mellitus, dyslipidemia, ischemic heart diseases, peripheral vascular diseases, or a hypercoagulable state. There was no family history of strokes or ischemic vascular diseases at a young age, and the patient had no history of medical illness related to ischemic vascular insult.

Neurological examination: right-sided pronator drift, elbow and wrist extension weakness of the right upper limb, and knee flexion weakness of the right lower limb. There were no other neurological findings. The patient mentioned that he had severe flu-like symptoms: fever, malaise, and recurrent dry cough, with difficulty breathing three weeks before the onset of weakness, which persisted for one week.

An MRI of the brain was conducted five days after the onset of symptoms. It showed an abnormal focal signal at the left parietal periventricular white matter, noted with a bright T2/FLAIR signal and a low intense T1 signal with corresponding diffusion restriction, denoting its acute ischemic nature. The lesion measured 1.3 cm in the anteroposterior dimension, fulfilling the radiological criteria of ischemic insult in the brain within two weeks (Figure 1).

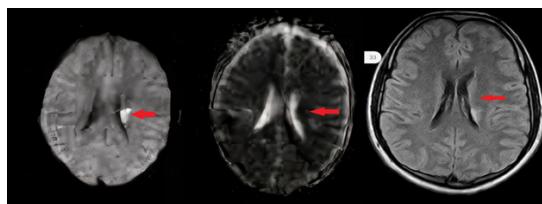


Fig.1. Brain MRI: An abnormal focal signal at the left parietal periventricular white matter. A bright T2/FLAIR signal with corresponding diffusion restriction in DW/ADC map imaging denoting its acute ischemic nature.

The patient was started on dual antiplatelet therapy, and a stroke blood work-up was requested, including a blood panel for factors of stroke at a young age (factor V Leiden, antithrombin III, antiphospholipid, anticardiolipin antibody titers, D-dimer and fibrinogen levels), all of which were negative. Furthermore, cardiovascular etiologies such as cardiac arrhythmias, cardiac thrombus, or valvular diseases

were ruled out after Holter monitoring and echocardiography. Carotid Doppler ultrasound showed grossly normal hemodynamic studies with no evidence of atheromatous plaques on both sides (Figure 2).

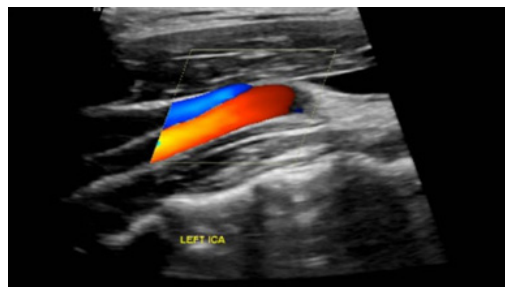


Fig.2. Carotid Doppler ultrasound of the left ICA: Grossly normal hemodynamic picture with no evidence of atheromatous plaques or stenosis.

The patient was sent for SARS-CoV-2 IgM and IgG titers testing, which revealed a negative result for IgM but a striking reactivity for the IgG antibody (more than 40,000 IU/mL; the negative threshold is up to 50 IU/mL), indicating post-SARS-CoV-2 exposure within weeks.

The patient reported that his weakness started to improve with regular physiotherapy exercises. During follow-up over the following three months, he denied any recurrence or worsening neurological symptoms. Subjectively and objectively, muscle power improved, and he was ambulating without assistance.

Discussion

We report a case of ischemic stroke in a young patient. The patient had no definite risk factors except for exposure to COVID-19 infection three weeks prior. A multicenter series of 26 patients with COVID-19 and either ischemic or hemorrhagic events reported that 27% were younger than 50 years.¹⁰ As far as we know, no reported cases involving individuals younger than 30 years.

In our case report, the patient was presented with severe flu-like symptoms, fever, malaise, and frequent dry cough. Moreover, elevated IgG antibodies indicated post-viral illness exposure either to SARS-CoV-2 or Influenza. Nevertheless, Merkler et al. observed that cases presenting in the emergency department with respiratory illness associated with acute ischemic stroke were 7.6 times higher with COVID-19 cases than in those with influenza.⁸ The current case shows SARS-CoV-2 IgG antibody positivity (more than 40,000 IU/ml), correlating with post-SARS-CoV-2 exposure or vaccination. At the same time, the latter is excluded as the patient declared that vaccination occurred two years ago. Our findings coincide with Janes et al.,¹² who investigated the association between ischemic stroke and COVID-19. The results showed that severe COVID-19 infection is an independent risk factor for ischemic stroke, and it was a causal rule in 32.1% of cases, 28.6% as a relevant cofactor, and 39.3% as a possible trigger factor.¹²

Furthermore, the risk of hypercoagulability among COVID-19 cases was associated with abnormalities in D-dimer and fibrinogen levels,⁸ which were normal in the current case. Additionally, the average time between the onset of stroke and COVID-19 infection was reported to range from 0 to 40 days;¹³ this criterion was fulfilled in the current patient.

The positivity of the SARS-CoV-2 IgG antibody test may be associated with other neurological diseases, such as autoimmune neurological diseases such as autoimmune encephalitis associated with status epilepticus or in the spectrum of demyelinating diseases, which are less likely as a differential diagnosis in the current case. Based on brain MRI findings, the provisional radiological diagnosis is consistent with an ischemic lesion, embolic in size, and involvement of anterior circulation in the brain.⁸

Several studies have reported that cerebral venous sinus thrombosis (CVST) is a common complication of COVID-19 among young adults. CVST is often associated with hypercoagulopathies as a predisposing risk factor. However, it presents clinical findings and pathological consequences that differ significantly from arterial complications. In contrast to these findings, this case study highlights ischemic stroke as a complication of COVID-19 in a young adult rather than CVST. This distinction is crucial for clinicians, as it underscores the need to consider a broader spectrum of cerebrovascular events when diagnosing and treating young COVID-19 patients. Despite the rarity of ischemic strokes in this demographic, the present case emphasizes the importance of thorough screening and evaluation for various types of cerebrovascular complications post-COVID-19 infection.¹⁴⁻¹⁶

Conclusion

This case report highlights the potential for ischemic stroke in young patients following COVID-19 infection, even in the absence of traditional risk factors. The findings emphasize the importance of SARS-CoV-2 screening in patients presenting with acute neurological symptoms. Clinicians should know about this potential complication to ensure timely diagnosis and intervention.

Competing Interests

The authors declare that they have no competing interests.

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