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(CASE REPORT)

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# Unraveling the neurological mysteries of COVID-19: A fatal case of pediatric stroke

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## Abstract

A 15-year-old girl presents to a local hospital with headache, fever, generalized tonic clonic seizures, blurred vision and loss of consciousness. A brain MRI showing atrophy, ischemic changes and leukomalacia was followed with a positive COVID-19 test that warranted an admission to an isolation center. A presumptive diagnosis of meningeal encephalitis was made and treatment with ceftriaxone and vancomycin was initiated with serial measurements showed low vitals, electrolytes and Glasgow Coma Score daily until her death.

**Keywords:** COVID-19; Encephalitis; Ischemic Changes; Leukomalacia; Refeeding syndrome

## 1. Introduction

Most children infected with SARS-CoV-2 are either asymptomatic or have upper respiratory tract infections, but there have been cases of neurological symptoms observed in both adults and children 1.

There is an increased risk of stroke associated with SARS-CoV-2 compared to other coronaviruses and seasonal infections in adults 2. It is important to consider COVID-19 in the differential diagnosis for children presenting with new neurological symptoms, positive inflammatory markers, and suggestive imaging findings 1.

The pathophysiology of acute ischemic stroke in COVID-19 is not fully understood and requires further study. Possible mechanisms include immune-mediated or para-infectious events, a hypercoagulable state from systemic inflammation and cytokine storm, viral mimicry of the host resulting in autoantibodies, viral super antigen sequences, antibody or T-cell recognition of viral antigens, or formation of immune complexes 1,3,4,5. Direct viral-induced endothelitis or endotheliopathy, leading to angiopathic thrombosis, has also been observed in some neurotropic viruses such as Varicella zoster 6.

It is important to note that the potential causes of childhood stroke are diverse and often differ from those seen in adults. Common causes of stroke in children include congenital heart disease, prothrombotic states, nonatherosclerotic arteriopathies, head and neck trauma, sickle cell disease, and infection. Vasculitis of the intracranial vessels secondary to meningitis, collagen vascular disease, ischemic infarction due to intracranial focal arteriopathy after varicella infection, and herpes zoster ophthalmicus are also important causes of stroke in children 7.

## 2. Case presentation

A 15-year-old girl with no significant past medical history presented to a local hospital with two months of headache, fatiguability, high grade fever, generalized tonic clonic seizures, blurred vision and loss of consciousness. She was admitted to the hospital for 21 days and treated with antibiotics for meningeal encephalitis. She had a brain CT scan on the 11th day of her hospital stay which was normal. She also had a CSF analysis on the 16th day of her hospital stay

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which showed increased protein level, increased glucose level (123 mg/dl) and normal WBCs count. Then she developed right side weakness with focal convulsions. She also had a fever which lasted for one week. The patient was referred to a pediatric hospital and admitted there for one week. She had a brain MRI which showed generalized brain atrophy, the brain stem showed elements of diffuse abnormal signal changes indicating leukomalacia, on top there are multiple abnormal high signals foci involving the brain stem on both thalami more prominent on the right side with nodular and linear enhancement.

The findings were suggestive of multiple lacunar infarctions or ischemic changes along the brain stem and thalami more prominent on the right side. Afterwards she had a positive COVID-19 PCR result, and she was referred to a COVID-19 isolation center, where she was admitted to the ICU.

On admission to the isolation center, she was ill but not pale, jaundiced or cyanosed. Her body weight was 38 kg. She had a pulse rate of 110 bpm, blood pressure of 122/60 mmHg, mean arterial pressure of 79 mmHg, respiratory rate of 17, partial pressure of oxygen of 97 mmHg. The patient had normal first and second heart sound and no added sound on heart auscultation and she had normal air entry in both lungs. She had a Glasgow Coma Score (GCS) of >12, hypotonia with hyperreflexia and power grade of >2. Her pupils were reactive and equal in size. The suspected cause for her neurological signs was presumed to be autoimmune encephalitis. She received 100 mg phenytoin plus 1 g paracetamol on admission. She was put on nasogastric tube feeding: 250 ml every 3 hours, paracetamol 3 ml every 6 hours, phenytoin 95 mg in 250 ml normal saline twice per day, ceftriaxone injection 1 gm per day. Vancomycin 570 mg per day. IV immunoglobulin 70 gm for 5 days (15 gm per day 5g TDS over 4 hours). Epitam syrup 10 mg.

On day 2 of admission to isolation center the patient had a repeated COVID-19 PCR with a positive result again. She had a pulse rate of 95 bpm, blood pressure of 106/58 mmHg, mean arterial pressure of 74 mmHg, respiratory rate of 20, partial pressure of oxygen was 99 mm Hg. She did not receive supplemental oxygen. GCS of 10/15 (E4, V1, M5), pupils were normal in size and reactive bilaterally. Cardiopulmonary examination was normal. Her abdomen was soft, no hepatosplenomegaly, no lymphadenopathy. She had a normal chest x-ray. She had a decreased serum potassium, decreased serum sodium, increased Erythrocyte Sedimentation Rate (ESR), decreased serum calcium (Table 1), normal D-dimer and C-reactive protein that was suggestive of refeeding syndrome, so nasogastric tube feeding was decreased from 250 ml every 3 hours to 150 ml every 4 hours.

| Potassium (mEq/L) | Sodium (mEq/L) | Calcium (mg/dL) | ESR (mm/hr) |
|---|---|---|---|
| 2.7 | 122 | 7.5 | 45 |

On Day 3, pulse rate was 106 bpm. Blood pressure was 108/83 mmHg. Mean arterial pressure was 91 mmHg. Respiratory rate was 15. GCS was 10. Pupils had normal size and were reactive bilaterally. Cardiopulmonary examination was normal. She had upper limb hyperreflexia and hypertonia, normal power and tone in lower limb, normal CRP (4 mg/L), and white blood cell count of 5000/mm3. She deteriorated with decreased level of consciousness, decreased platelets from 96,000 to 11,000 mm3. She also developed hyponatremia, hematuria and was eventually planned for blood and platelets transfusion.

She received dextrose and normal saline maintenance by rate of 40 ml/hour, and random blood glucose check every 6 hours. Unfortunately, she passed away at the end of day 3.

## 3. Discussion

This case report highlights the need for clinicians to consider SARS-CoV-2 as a potential cause of new neurological symptoms in children. The increased risk of stroke associated with COVID-19 compared to other infections emphasizes the importance of early diagnosis and appropriate management. Further research is needed to fully understand the pathogenesis of ischemic stroke in children with COVID-19 and to assess the long-term neurological and cognitive outcomes.

## 4. Conclusion

The study found numerous neurological complications associated with COVID-19 that are yet to be fully understood including weakness, reduced level of consciousness and focal neurologic deficit. A number of abnormal lab findings were found and despite rigorous replacement, the patients eventually died. This study will benefit physicians in recognizing the neurologic symptoms related to COVID-19 and find better ways in management.

## Compliance with ethical standards

### *Acknowledgments*

We whole heartedly dedicate our case report to the victims of the Sudanese armed conflict that broke out in April of 2023, hoping an end to the conflict can arrive quickly to end the suffering of thousands of displaced citizens.

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

### *Statement of ethical approval*

Ethical approval was acquired from the department of research sciences and development from the Ministry of Health in Sudan

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

## References

[1] Tiwari L, Shekhar S, Bansal A, Kumar S. COVID-19 associated arterial ischaemic stroke and multisystem inflammatory syndrome in children: a case report. The Lancet Child & Adolescent Health. 2020 Oct;

[2] Merkler AE, Parikh NS, Mir S, Gupta A, Kamel H, Lin E, et al. Risk of Ischemic Stroke in Patients With Coronavirus Disease 2019 (COVID-19) vs Patients With Influenza. JAMA Neurology. 2020 Jul 2;77(11).

[3] Jiang L, Tang K, Levin M, Irfan O, Morris SK, Wilson K, et al. COVID-19 and multisystem inflammatory syndrome in children and adolescents. The Lancet Infectious Diseases. 2020 Aug;

[4] Ellul MA, Benjamin L, Singh B, Lant S, Michael BD, Easton A, et al. Neurological associations of COVID-19. The Lancet Neurology. 2020 Jul;19(9).

[5] Paniz-Mondolfi A, Bryce C, Grimes Z, Gordon RE, Reidy J, Lednicky J, et al. Central nervous system involvement by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). Journal of Medical Virology. 2020 Jun 9;92(7):699–702.

[6] Gilden D, Cohrs RJ, Mahalingam R, Nagel MA. Varicella zoster virus vasculopathies: diverse clinical manifestations, laboratory features, pathogenesis, and treatment. The Lancet Neurology. 2009 Aug;8(8):731–40.

[7] Mittal SO, ThatiGanganna S, Kuhns B, Strbian D, Sundararajan S. Acute Ischemic Stroke in Pediatric Patients. Stroke. 2015 Feb;46(2).