The Rare Central Nervous System Findings in Pediatric SARS-COV-2 Patients

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INTRODUCTION

The neurological manifestations of SARS-CoV-2 range from mild symptoms to severe symptoms (1). Concurrently, a growing number of case reports and multicenter studies describe neurological complications of COVID-19 in pediatric population (2). We aimed to present three patients with central nervous system (CNS) involvement due to SARS-CoV-2.

CASE-1

Case-1 was a 15-year-old boy experienced 4 days of vertigo, malaise, ataxia, weakness, fatigue following the COVID-19 infection. His initial brain magnetic resonance imaging (MRI) demonstrated multiple, irregular focal lesions clustered within the bilateral cerebral white matter, basal ganglia, cerebellar peduncles, and cerebellar white matter (Figure 1). He had also T2A (transverse relaxation time A) hyperintense lesions in the cervical and thoracic spinal cord. The magnetic resonance angiography revealed irregularities in the walls of distal middle cerebral, anterior cerebral, and posterior cerebral arteries (Figure 2). The patient was diagnosed with MIS-C and SARS-CoV-2-related CNS vasculitis, and he was treated with methylprednisolone. In the literature, there are few cases of CNS vasculitis associated with COVID-19 in adult patients, and only one pediatric case with focal cerebral arteriopathy (3-4). To our knowledge, this is the first reported pediatric case of COVID-19–related CNS vasculitis with extensive intracranial and spinal involvement. It was observed that the patient's complaints regressed during hospital visits.

Figure 1: The brain MRI (T2A) demonstrated multiple, irregular focal lesions clustered within the bilateral cerebral white matter, basal ganglia, cerebellar peduncles, and cerebellar white matter.

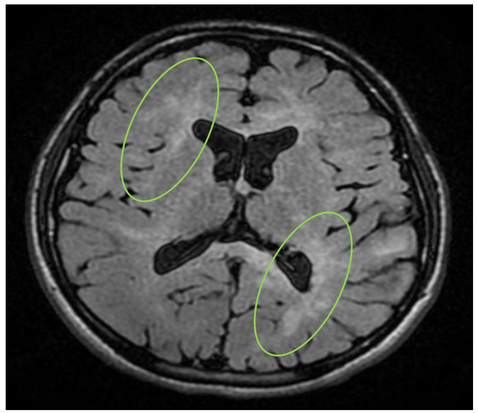
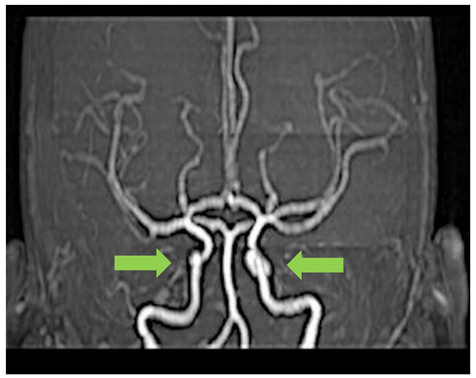


Figure 2: Brain magnetic resonance angiography; revealed irregularities in the walls of distal middle cerebral, anterior cerebral, and posterior cerebral arteries.



CASE-2

Case-2 was a previously healthy 4-year-old boy presented with loss consciousness following a fever of 39 ºC. He had no seizure history, and his past medical history was unremarkable. His electroencephalogram (EEG) recording showed generalized sharp and slow wave activity with a frontal maximum (Figure 3) and the brain MRI showed cortical diffusion restrictions in the bilateral parietooccipital cortex (Figure 4). He had convulsive seizures at the 2nd day, while he had nonconvulsive status epilepticus at the time of admission. His tracheal aspirate RT-PCR and both serum and cerebrospinal fluid (CSF) IgM antibody test results for SARS-CoV-2 was positive. He was diagnosed with SARS-CoV-2-related FIRES due to super-refractory nonconvulsive and convulsive status epilepticus. Status epilepticus persisted for a long time despite several anti-seizure drugs, intravenous immunoglobulin (IVIG), and pulse steroid treatments. However, currently he has severe neurological sequelae in the follow-up.

Figure 3: EEG recording; generalized sharp and slow wave activity with a frontal maximum during nonconvulsive period.

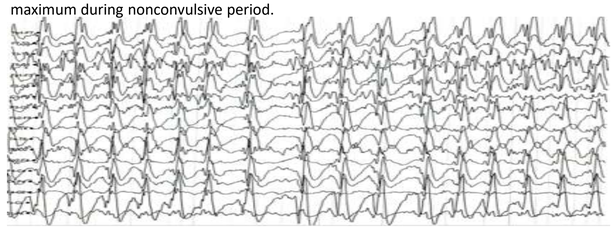
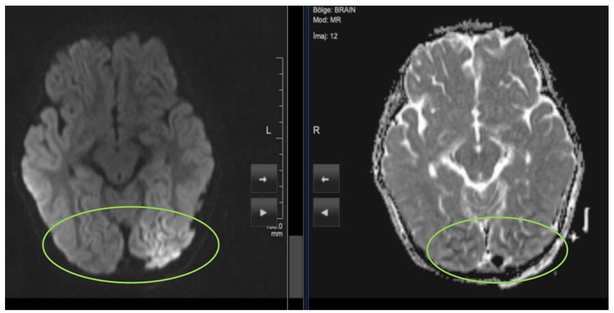


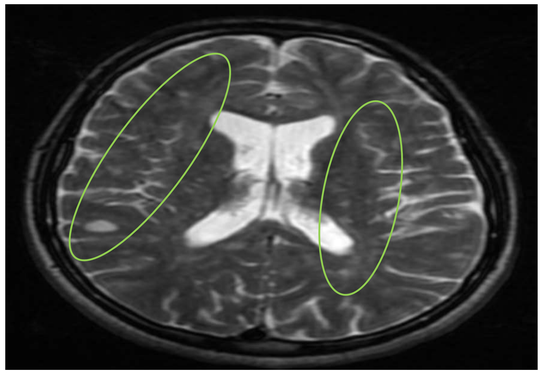
Figure 4: The brain MRI T2A showed cortical diffusion restrictions in the bilateral parietooccipital cortex.



CASE-3

We also report a case of ADEM in a COVID-19-related MIS-C patient who was a previously healthy 15-year-old boy presented with headache, fever, difficulty in walking and speaking. On neurological examination, he had dysmetria, dysdiadokinesis, ataxia, and dysarthria. His brain MRI showed T2A hyperintense lesions in the right lateral thalamus, right half of the splenium of the corpus callosum, and bilateral middle cerebellar peduncles (Figure 5). A rapid clinical improvement and resolution of MRI findings were observed after treatment with methylprednisolone and IVIG. A significant improvement was detected in the long-term follow-up of the patient. Our unique pediatric case highlights the possibility of activation of autoimmunity against the CNS following the SARS-CoV-2 infection and also differs from adult cases with its good prognosis.

Figure 5: Brain MRI showed T2A hyperintense lesions in the right lateral thalamus, right half of the splenium of the corpus callosum, and bilateral middle cerebellar peduncles.



CONCLUSION

It should be kept in mind that there may be severe life-threatening CNS involvement related to SARS-CoV-2 in pediatric patients. There is a need for further studies with long-term follow-up of pediatric COVID-19 patients with severe CNS involvement.

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