An Intoxicated Child With a Rare Complication Related to COVID-19

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Case Report

A 5-year-old boy presented to the emergency room due to vomiting and altered mental status. The patient was noted to be confused and lethargic with decreased respiratory effort, leading to intubation for mechanical ventilation. After detailed history was obtained, it was revealed that the patient possibly ingested several tablets of sertraline and/or risperidone at an unknown time prior to arrival. History also revealed that he had slurred speech, ataxia, and a fall with trauma to forehead 1 day prior to arrival. Urine drug screen was negative, and head computed tomography (CT) was unremarkable. He tested positive for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) via polymerase chain reaction (PCR) testing from nasopharyngeal swab. Chest X-ray revealed right lower lobe consolidation. Considering that this was not an incidental finding, but rather that he was showing severe coronavirus disease 2019 (COVID-19) infection in the setting of acute respiratory failure, patient was started on dexamethasone and a 5-day course of remdesivir, as per COVID-19 treatment guidelines.1

When sedation was weaned in hopes of extubation, patient was noted to be alert, but he was not able to move upper or lower extremities. He was unable to protrude tongue, had no cough reflex and minimal gag reflex was noted. He demonstrated full extraocular muscle movements, with lateral gaze nystagmus. Magnetic resonance imaging (MRI) of brain and spine was conducted and revealed findings suggestive of transverse myelitis of cervical cord involving C1 to C4 (Figure 1). Magnetic resonance angiography (MRA) and magnetic resonance venography (MRV) were normal. Lumbar puncture (LP) was performed with unremarkable basic cerebrospinal fluid (CSF) analysis. Levels of CSF angiotensin converting enzyme (ACE), myelin basic protein, and kappa free light chain were unremarkable. Central nervous system (CNS) demyelinating disease panel including anti-myelin oligodendrocyte glycoprotein (MOG) IgG, anti-myelin-associated glycoprotein (MAG) IgM, and neuromyelitis optica (NMO)/aquaporin-4 (AQP4) IgG were all negative. Other CSF studies including enterovirus and herpes simplex virus (HSV) PCR, West Nile IgM and IgG, and anticardiolipin IgM and IgG were all negative. Additionally, respiratory viral PCR panel was negative. Serum mycoplasma IgG was positive, but IgM was negative. Autoimmune panel was negative. Folate and vitamin B levels were normal. Patient was started on intravenous methylprednisolone for 5 days. Despite high dose steroid treatment, the patient remained markedly quadriplegic, without any improvement. Pediatric neurology then recommended starting plasma exchange. He underwent 10 sessions of plasmapheresis. Physical and occupational therapy were initiated at the onset of illness in hopes of achieving improvement of motor and sensory function.

Final Diagnosis

Acute transverse myelitis (ATM) related to COVID-19.

Hospital Course

Repeat spine MRI done at day 18 of hospital admission was consistent with previous and showed no major change. Patient had some minimal motor improvement, however, given his condition, decision was made to have surgical placement of gastrostomy and tracheostomy tubes. Patient was weaned off sedatives and opioid withdrawal was treated with a clonidine taper. Once

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stabilized, patient was transferred to neurological inpatient rehabilitation center.

While at the neuro-rehab facility, where he was admitted for 6 weeks, patient received intense physical therapy and occupational therapy. He was noted to have significant improvement, resulting in take-down of his gastrostomy and tracheostomy tubes. He was subsequently discharged home, and he continues to receive physical and occupational therapy 3 times weekly.

Patient is feeding well by mouth and gaining weight appropriately. Currently, neurological exam is remarkable for significant improvement in upper extremities’ motor function with little movement of the right arm and hand and fully recovered movement of the left arm and hand. He appears to be spastic on the lower extremities, and continues to require the use of a wheelchair. He has clear diction and is able to communicate clearly with speech. He has been able to continue performing well in school. He continues to follow closely with Pediatric Neurology and General Pediatrics.

Discussion

This case started off with a different presentation than most others of SARS-CoV-2 infection. Our patient was initially thought to be suffering from the intoxicating effects of substance ingestion including a mixture of sertraline and risperidone tablets. Side effects of risperidone ingestion alone include lethargy, confusion, hypotension, tachycardia, dysrhythmia, and spasms. Data on effects of co-ingestions, namely risperidone and selective serotonin reuptake inhibitors, report presentations such as lethargy, coma, seizure, tachycardia, bradycardia, hypotension, and fever. Akyol et al. reported a case of delayed respiratory depression after risperidone overdose. Sertraline is reported to cause mild effects like tremors, lethargy, nausea, agitation, confusion, and vomiting.

Acute transverse myelitis is a rare, demyelinating disorder which uncommonly occurs in children. The neurological disease typically presents with a rapid onset of weakness, loss of sensation, bowel, and bladder dysfunction. It may occur with several neurological disorders including multiple sclerosis and neuromyelitis optica, however, when occurring in isolation, it is most commonly due to an infection, as evidenced in our patient. There are several subtypes of ATM, including longitudinally extensive transverse myelitis (LETM) which occurs in 65% to 85% of pediatric patients. In 64% to 76% of cases, there is cervicothoracic involvement involving 3 or more segments. While MRI is required for diagnosis, there is value in CSF studies as well. Lymphocytosis and elevated protein are present in 20% to 50% of cases; however, studies may be unremarkable in some cases as well.

Traditionally, the most common post-infectious causes of ATM are Enterovirus, Epstein Barr Virus, West Nile Virus, and Influenza. CSF studies were negative for all these 5 infectious agents in our case. Neurological manifestations in children affected by
SARS-CoV-2 are relatively common but are often non-specific. Only 1% of children present with severe symptoms of encephalopathy, seizures, and meningeal signs, and this has been extensively reported. There are multiple factors that may be involved in the pathophysiology of neurological complications related to COVID-19, as described by Schober et al. There is evidence that the SARS-CoV-2 viral S (spike) protein binds to ACE 2 receptor which is present in endothelial cells in the brain, in the pons, medulla, and components of the cerebral vasculature. Alternatively, the virus may enter host cells binding to a neuronal adhesion molecule, neuropilin. It is also known, that COVID-19 causes a prothrombotic state and this may result in thrombotic strokes which have been reported in children with acute COVID-19. Additionally, there are theories of autoimmunity and immune dysregulation causing neurological manifestations of COVID-19.

Currently, there are no standardized tests for COVID-19 antibodies in CSF to be used in clinical practice. Additionally, in patients with neurological symptoms, CSF SARS CoV-2 PCR resulted positive in 6% of patients and 12% had positive COVID-19 experimental antibody testing in CSF.

In a clinical review by Román et al which looked at 43 patients with COVID-19 associated ATM, 3 pediatric patients were described. These were a 3-year-old Navajo girl in the United States, a 14-year-old girl in Turkey, and an 11-year-old girl from Iran. Per further literature review, we located another case of a 9-year-old girl from Iran with LETM and a 11-year-old girl from India with concurrent LETM and Guillain-Barre syndrome. Most recently, a 7-month-old girl presented with LETM and myopericarditis and 10-year-old boy from Turkey presented with cute demyelinating encephalomyelitis (ADEM) and ATM. The case in this report had an unusual presentation with concomitant substance ingestion while SARS-CoV-2 was thought to be an incidental finding, rather than a causative agent for this patient’s clinical presentation.

Conclusion

Much is unknown about coronavirus disease (COVID-19). Information is emerging and evolving daily. Cases of transverse myelitis in COVID-19 have been reported in few adult patients and even fewer pediatric patients. Practitioners should keep ATM on their list of differentials for neurological complications of SARS-CoV-2 infections and initiate aggressive treatment with a multidisciplinary approach.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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