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Letter to editor: Case report of long COVID-19 with psychosis in a child

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1. Introduction

Research regarding neuropsychiatric complications following SARS-CoV-2, including anxiety, depression, and cognitive impairment is rapidly increasing. Additionally, there is an emergence of case reports documenting new onset of psychotic symptoms after COVID-19 in adults (e.g., DeLisi, 2021; Ferrando, 2020). However, there is limited literature on psychosis following COVID-19 in youth. We report the case of a pediatric patient with no previous history of significant mental illness who presented with persistent neuropsychiatric symptoms including psychosis after COVID-19.

2. Case report

An 11-year-old girl presented to our Child & Adolescent Psychiatry Clinic 10 months after testing positive for SARS-CoV-2 via PCR test. Her initial COVID-19 symptoms were loss of taste and smell with no respiratory symptoms or fever. Three weeks after testing positive, she exhibited sudden onset of neuropsychiatric symptoms including psychosis with visual and auditory hallucinations, tinnitus, vertigo, and anxiety. During one early psychotic episode, the child saw and heard bombs and believed she was in a war battle; behavioral responses included darting across the room, hiding under tables, and inability to communicate due to extreme fear. Other hallucinations were seeing and hearing a herd of buffaloes stampeding and viewing aquatic animals in the bathtub. Patient was prescribed fluoxetine 10 mg/day which was increased to 20 mg/day and provided some benefit for anxiety.

Five months after testing positive for COVID-19, the patient was unable to attend school due to worsening of above-mentioned symptoms and onset of new symptoms. She displayed aggression toward her younger brothers and herself (e.g., hitting her head). She also experienced confusion with disorganized behavior (e.g., mistaking butter knives for forks while eating, putting toothpaste on the wrong end of her toothbrush, walking into walls believing there were doors), and screaming and flailing her arms when upset. Over the next 5 months, symptoms relapsed and remitted. Guanfacine 1 mg/day was added with mild improvement in anxiety. She presented to our Clinic 10 months after her positive COVID-19 test with daily hallucinations of seeing and hearing monsters at home and school. Patient's mental health history prior to COVID-19 illness revealed learning, attention, and fine motor difficulties, and mild anxiety. There was no history of psychosis. Functioning before COVID-19 infection showed adequate school performance and independent daily living skills.

We obtained blood tests 11 months after symptom onset. Antibodies to SARS-CoV-2 spike glycoprotein were detected at a level of >250 U/mL (prior to receiving the COVID-19 vaccine), which confirmed a previous COVID-19 infection. To rule out lupus and other rheumatologic diseases, antinuclear antibody (ANA) was obtained. ANA was positive with 1:320 nuclear dot pattern but was deemed noncontributory with normal complement levels, double stranded DNA antibody, ENA antibody panel, inflammatory markers, chemistry panel, and quantitative immunoglobulins. Pediatric autoimmune neuropsychiatric disorders associated with streptococcal Infections (PANDAS) was ruled out because patient presented without a sudden onset of obsessive-compulsive symptoms, restrictive eating behaviors, and/or tics; with a negative throat culture for Group A streptococcus; and normal levels of antistreptococcal antibody titers. Serum autoimmune encephalopathy panel and multiple tests for causes of psychosis (e.g., ceruloplasmin,

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heavy metals, IgG and IgM for Lyme disease) were negative.

To target possible brain inflammation, a 5-day course of prednisone 40 mg/day was given with no benefit. To target psychosis, we prescribed aripiprazole 2–10 mg/day with no reduction in psychotic symptoms. Thus, aripiprazole was replaced with risperidone 3.5 mg/day resulting in slight reduction in hallucinations but increase in appetite with weight gain. Subsequently, haloperidol 3 mg/day was prescribed instead of risperidone.

Fifteen months after testing positive for COVID-19, the patient was admitted to inpatient pediatrics. Repeat MRI with and without contrast was unremarkable. CSF analysis including autoimmune encephalopathy panel was negative. EEG revealed intermittent short epochs of bilateral left>right temporal slowing that sometimes appeared sharply contoured suggesting underlying neuronal dysfunction. While hospitalized, the patient received intravenous immunoglobulin (IVIG) 2 gm/kg over 2 days. Within 3 days of the IVIG, the patient began to show improvement with fewer hallucinations and marked reduction in frequency and severity of periods of confusion with disorganized behaviors. Her symptoms reemerged 4 weeks after IVIG. Another IVIG infusion was given with mild improvement 2 weeks after infusion that lasted only 1 week.

3. Discussion

Psychosis following COVID-19 has been documented in multiple case reports in adults (e.g., DeLisi, 2021; Ferrando et al., 2020; McAlpine et al., 2021). In discussing their case, DeLisi (2021) considers the viral hypothesis of schizophrenia, noting that multiple factors may converge to increase a person's risk for psychosis including genetics, viral exposure, brain inflammation, and environmental factors. Bartley and colleagues (2021) described three teenagers who exhibited neuropsychiatric symptoms following COVID-19 ranging from anxiety with mood lability to psychosis with delusions and paranoia. Two of the patients had anti-SARS-CoV-2 antibodies and antineural antibodies in their CSF (Bartley et al., 2021).

Our patient's psychotic symptoms and marked confusion with disorganized behavior followed a mild case of COVID-19. Workup for etiologies of psychosis and encephalitis was negative with the exception of positive COVID-19 spike antibodies 11 months after symptom onset and bilateral temporal slowing on EEG. Oral steroids provided no benefit. Targeting psychiatric symptoms with psychotropic medications was minimally effective. Thus, the child received IVIG. Two case studies suggest that IVIG treatment for psychosis following COVID-19 infection may reduce psychotic and other neuropsychiatric symptoms in adolescents (Bartley et al., 2021) and adults (McAlpine et al., 2021). Javed and Shad (2021) reviewed 3 cases of adolescents who presented with psychosis after COVID-19 infection (symptoms lasted 1 week, 7 weeks, and 6 months). Patients were responsive to psychotropic medications, steroids, and/or IVIG. In our patient, IVIG was associated with subtle improvement in the patient's psychosis and disorganized behaviors. Since haloperidol was started just prior to IVIG, it is possible that haloperidol also contributed to clinical improvement

We suggest psychotic disorder due to long COVID-19 as the most likely diagnosis. This diagnosis was reached by exclusion of other diagnoses based on history and laboratory results. The delay of over a year in diagnosis and treatment for this girl may have limited our ability to identify a definitive etiology for her psychosis.

Declaration of Competing Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article. The contents of the article are original and have not been published previously or submitted for consideration, wholly or in part, to any other publication.

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