

Psychotic Disorder Following Recent SARS-CoV-2 (COVID-19) Infection

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Abstract

SARS-CoV-2 (COVID-19) is commonly associated with flu-like symptoms involving fever, cough, fatigue, and shortness of breath; however, COVID-19 has also been linked with a wide variety of sequelae including increased rates of depression, suicidality, and substance use disorders as well as exacerbation of existing psychiatric illnesses. Potential causes may include those directly related to the infection, such as central nervous system inflammation, or indirectly such as increased stress or isolation. In this case report, a previously healthy 39-year-old female patient with no prior psychiatric or family history of mental illness, presents with psychosis a month after a positive COVID-19 Polymerase Chain Reaction (PCR) test. The patient's family brought the patient to the hospital with reports of uncharacteristic, violent actions and increasingly bizarre behavior. The patient's medical workup was insignificant, and the patient agreed to a voluntary, psychiatric inpatient stay. Diagnosed with a psychotic disorder due to another medical condition, the patient was stabilized with olanzapine. During the stay in the hospital, the patient was compliant with the medication and gradually showed improvements, being able to effectively stay safe without exhibiting any psychotic behaviors or beliefs. While psycho-social factors may have contributed to the patient's initial behaviors, organic causes attributable to COVID-19 is suspected to have caused a new onset psychiatric disease, and was successfully managed with low-dose olanzapine. This case highlights the importance of understanding the impact COVID-19 may have on an individual's neuropsychiatric chemistry and what short-term or long-term effects may result and if it can be prevented.

Keywords: Psychiatric disease • Depression • Mental illness • Psychiatric illnesses • Polymerase chain reaction

Introduction

The sequelae of SARS-CoV-2 (COVID-19) infections have been widely studied following its initial outbreak [1]. Mental health illnesses including depression, anxiety, and even suicidality have increased due to psychosocial stressors such as panic surrounding contracting the virus and quarantining measures restricting social support [2-4]. COVID-19 can cause various health sequelae that affect mental health including fatigue, shortness of breath, impairments in attention and memory, issues with sleep, and headaches [1,5]. Individuals diagnosed with COVID-19 infections are more likely to develop a psychiatric ailment, including sleep disorder, cognitive decline, anxiety, and depression [1,6]. Research has investigated the neurological impacts of COVID-19 infection with evidence that inflammation in nervous tissue, as well as viral permeation through the blood-brain barrier, could play a part in the neurological and psychiatric symptoms of the disease [7,8]. When investigating psychosis following COVID-19 infection, other diagnoses such as primary psychotic conditions and nervous system disorders must be ruled out [9]. We present this case of a patient without prior family or personal psychiatric history to further explore COVID-19 effects. The case demonstrates a unique patient presentation of psychosis and the implications of antipsychotic treatment when stabilizing a diagnosis of psychotic disorder due to another medical condition. The hope of analyzing this case is to contribute to our developing understanding of the virus and its potential sequelae.

Case Presentation

A 39-year-old female patient with no prior medical diagnoses or

prescribed medications and no personal or familial psychiatric history, presented to the Emergency Department (ED) multiple times in December 2021 with increasingly bizarre and atypical behavior. Notably, the patient tested positive for COVID-19 in the ED with a Polymerase Chain Reaction (PCR) test in November 2021. The day of testing, the patient was discharged with instructions for supportive care and self-quarantine. At the time of infection, the patient was unvaccinated and the Delta variant was the most prevalent strain in the United States.

One-month after contracting COVID-19, the patient was fully recovered and returned to the hospital after waking up with dizziness, nausea, and emesis. The patient endorsed paraesthesia in right upper and lower extremity as well as left lower extremity weakness. The patient's neurological exam was unremarkable except for diminished sensation in right upper extremity, and the patient's physical exam was otherwise normal. The patient denied any prior recent neurological or psychiatric symptoms. Vital signs, urinalysis, toxicology, and biochemical panels were within normal limits. A neurological workup for possible stroke, including Computed Tomography (CT) of the head and CT angiography of the head and neck showed no acute abnormalities. The patient noted a family history of complex migraines and a similar episode 4 years prior that spontaneously resolved. No further neurological workup was performed, and the patient was diagnosed with stroke-like symptoms with rule out for cervicogenic causes. During the medical workup, the patient was notably anxious and subsequently threw the phone which accidentally struck a nurse that led to assault charges. Family noted this behavior was highly uncharacteristic.

One-week later, the patient was brought to the ED by local police after the mother expressed concerns about increasingly abnormal behavior. Per the mother, the patient had been experiencing anxiety, palpitations,

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Received: 12-Jun-2023, Manuscript No. CSRP-23-102070; **Editor assigned:** 15-Jun-2023, PreQC No. CSRP-23-102070 (PQ); **Reviewed:** 30-Jun-2023, QC No CSRP-23-102070; **Revised:** 07-Jul-2023, Manuscript No. CSRP-23-102070 (R); **Published:** 17-Jul-2023, DOI: 10.3371/CSRP.WDAB.071723

and sleep disturbances following COVID-19 infection. These symptoms were growing progressively bizarre and psychotic following the stressors from stroke-like admission. Significant behavior included walking outside barefoot and wearing inappropriate clothing during below-freezing weather, multiple instances of jumping from a moving car, and paranoid delusions regarding the patient's family safety.

While in the ED, psychiatry was consulted for complaints of anxiety and family's concern for the patient's uncharacteristic behaviors. During the initial psychiatry exam, the patient exhibited slightly disorganized thoughts, but was otherwise calm, cooperative, and behaviorally appropriate. The patient reported poor sleep for a week and experiencing severe anxiety due to pending assault charges that could result in incarceration. A urine drug screening yielded negative results for common intoxicants and further testing was omitted due to the absence of substance use history. The patient denied suicidal or homicidal ideations and auditory or visual hallucinations and declined inpatient admission and did not meet involuntary criteria. The patient was discharged with hydroxyzine 25mg every 8 hours as needed for anxiety, and agreed to follow up with outpatient psychiatry.

The following day, the patient was brought back to the ED by the mother who requested the patient be placed on an involuntary psychiatric hold after becoming upset and physically attacking the brother. On exam, the patient was guarded and hypervigilant. The patient continued to deny suicidal or homicidal thoughts but appeared internally preoccupied and demonstrated inappropriate smiling and laughing. The patient agreed to voluntary admission and was admitted to the behavioral health unit.

On the unit, the patient continued on as needed hydroxyzine and was started on olanzapine 5mg at bedtime for signs and symptoms of psychosis and mood instability. Initially, the patient was scant, irritable, and withdrawn, but gradually improved. At the time of discharge, the patient's mood was stable and there were no signs of psychotic symptoms. The patient was discharged after a 4-day inpatient stay following voluntary withdrawal of treatment. Two months later, the patient continued on the same medication and slowly worked with the primary care physician after no reported psychotic symptoms, to transition daily olanzapine to as needed for insomnia at 4 months. The patient has not experienced any recurrence of psychiatric symptoms or readmission in the 12 months since initial presentation.

Results and Discussion

The estimated incidence of first-time psychosis in individuals with a recently resolved COVID-19 infection and no prior personal psychiatric history, family psychiatric history, or drug history is 0.42% [10]. Because of the patient's first-time psychosis outside the typical female age range of early 20s-30s, schizophrenia spectrum disorders were less suspected [11]. While multiple factors may have led to the patient's symptoms, the mother noted abnormal behaviors only after contracting COVID-19 and occurring prior to the neurological incident. It is possible, the neurological incident and possible assault charge further exacerbated the patient's symptoms. However, because the psychosis was suspected to be a consequence of the COVID-19 infection, the diagnosis utilized was psychotic disorder due to another medical condition as shown in Table 1.

Table 1. Diagnostic Criteria of Psychotic Disorder Due to Another Medical Condition adapted from DSM-V-TR.

- Prominent hallucinations or delusions impairing social, occupational, or other important areas of functioning
- Evidence (history, physical examination, laboratory findings) that disturbance is the direct consequence of another medical condition
- Disturbance not better explained by another mental disorder
- Disturbance does not occur exclusively during course of delirium

Note: Diagnosis can occur with or without specifiers - delusions and hallucinations as well as the severity.

Throughout history, some viruses have led to psychosis including the 1918 Spanish influenza, Severe Acute Respiratory Syndrome (SARS), and Middle East Respiratory Syndrome (MERS). Evidence suggests that viruses causing epidemics and pandemics lead to 0.9-4% of individuals developing psychosis or psychotic symptoms [12,13]. Preliminary findings suggest that COVID-19-related psychosis may result from direct mechanisms, such as blood-brain barrier disruption and cytokine activation leading to neuroinflammation, as well as indirect mechanisms including stress, isolation, and uncertainty [7,8]. Additionally, the use of steroids in treating viruses has been linked to and is concerning for precipitating psychosis. As seen with prior steroid treatments like the SARS outbreak in Hong Kong, numerous steroid-treated patients were suspected to have psychiatric complications [14]. Adhering to National Institute of Health guidelines, treating COVID-19 entails administering steroids (dexamethasone) for any hospitalized patient on oxygen [15]. While this was not the case for the patient, it raises the possibility of psychosis caused by the infection itself or steroid-induced psychosis.

Additionally, some strains of coronavirus have been found to be more strongly linked to psychiatric disorders. Although not COVID-19, analysis of two particular coronavirus strains, HKU1 and NL63, showed increased serious psychiatric symptoms compared to two other tested strains (229E and OC43) [16]. Investigating disparities among the multiple COVID-19 variants and subvariants could offer valuable insight into psychiatric tendencies, including whether the patient's suspected Delta variant has a higher propensity for psychiatric-linked dispositions. Additionally, as a whole, the COVID-19 pandemic has caused a 25% increase in anxiety and depression worldwide [17]. It is important to acknowledge that the pandemic may have played a role in the development of psychiatric symptoms whether directly from an infection or indirectly from societal adaptations.

Interestingly, certain antipsychotics such as haloperidol have demonstrated antiviral activity while others such as olanzapine did not [18]. Notably, our patient was treated with low dose olanzapine and as needed hydroxyzine after recovering from COVID-19. Nevertheless, for patients with concurrent COVID-19 infection and acute psychosis, medications with antiviral and even anti-inflammatory properties, such as chlorpromazine, could be considered [19].

During treatment, providers should understand that there is still much that is not understood. In a large United Kingdom study, it appears psychiatric sequelae of COVID-19 could last up to, and potentially beyond, half a year [10]. While the patient reported symptoms for approximately one month, treatment interventions prevented symptoms from lasting longer or reemerging.

Conclusion

This case highlights the importance of ruling out other possible causes of psychotic presentations, while considering COVID-19-induced psychosis as a differential for individuals who have contracted and/or recovered from COVID-19 infection. It also highlights use of olanzapine as effective treatment for future, similar patient presentations. Moving forward, further research should investigate the association between coronavirus strains and psychiatric symptoms and disorders, as well as develop best practices for monitoring, preventing, and intervening to alleviate the illness' impact on mental health.

Declaration

Previous presentation

This manuscript represents original material that is not under consideration elsewhere and/or has not been presented or previously published.

Disclosures

Dr. Dustin Wong, Amanda Bernardini, and Adam Newlin report no financial relationships with commercial interests or any other competing interests.

Patient privacy statement

The authors confirm that the details of this case have been disguised to protect patient privacy. Written consent of the manuscript to discuss the case for others to read was obtained from the patient.

Acknowledgement

There were no grants for this manuscript, but we would like to thank Dr. James James and Dr. Howard Levin for guidance in writing this report.

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How to cite this article: Wong, Dustin, Amanda Bernardini, and Adam Newlin. "Psychotic Disorder Following Recent SARS-CoV-2 (COVID-19) Infection." *Clin Schizophr Relat Psychoses* 17 (2023). Doi: 10.3371/CSRP.WDAB.071723.