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CASE REPORT

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Anorexia nervosa and COVID-19 infection: Clinical case report

Mladena Simeunovic-Ostojic[1] | **Evy E. Herremans**[1] | **Khoa Thai**[2] | **Joyce Maas**[1]

[1]Center for Eating Disorders Helmond, Mental Health Center Region Oost-Brabant, Boekel, The Netherlands

[2]Star-shl Medical Diagnostic Center, Rotterdam, The Netherlands

Correspondence
Mladena Simeunovic-Ostojic, Center for Eating Disorders Helmond, Mental Health Center Region Oost-Brabant, PO Box 3, Boekel 5427 ZG, The Netherlands.
Email: m.simeunovic-ostojic@ggzoostbrabant.nl

Abstract

The true risk of COVID-19 infection in anorexia nervosa (AN) including the duration of viral RNA shedding and infectivity is still unclear. We report on a case of a patient with severe AN with a mild course of COVID-19 and prolonged viral RNA shedding for at least 39 days after symptom onset. A careful evaluation of long-term infectivity must include viral load, live virus isolation, and viral genome sequencing.

KEYWORDS

anorexia nervosa, COVID-19, eating disorders, prolonged viral shedding

1 | INTRODUCTION

Recent research demonstrated a J-curved relationship between Body Mass Index (BMI) and COVID-19, indicating that both underweight and obese COVID-19 patients have a higher morbidity and mortality risk than patients with normal weight.[1–3] Intuitively, and based on these results, it might be expected that patients with anorexia nervosa (AN) infected with COVID-19 would be at high risk of developing serious illness due to malnourishment and alterations in immune functions. However, in line with rather counter-intuitive observations of fewer symptomatic common viral infections in patients with AN, one observational small study[4] investigating COVID-19 severity in a wide heterogeneous AN population of 34 adults (BMI 12.0–21.3 kg/m^2) and 13 children (percentage median BMI 68.5–129%) found that COVID-19 was mostly a mild disease. Importantly, one patient was asymptomatic, while two patients developed pneumonia, of whom one required intensive care management. As also acknowledged by the authors, their findings were limited due to small sample size and data collection constraints. Correspondingly, a number of studies do confirm that infection rates and mortality may actually be higher with the more severe cases in later stage of AN due to delayed diagnosis of infections (Ref. [5], for review).

Because of the paucity of and contradiction between studies on infection rates in AN,[4,6–10] and in particular a lack of studies on the incidence of asymptomatic viral infections, the true risk of COVID-19 infection including the duration of viral RNA shedding and infectivity is still unclear. Hence, COVID-19 preventive actions among patients with comorbid severe AN requiring hospitalization may be challenging, considering consequences of underdiagnosing COVID-19 on the individual level and the risk of nosocomial outbreaks in congregate inpatient settings.

Herein, we report on a case of a patient with severe AN with a mild course of COVID-19, who had a positive nucleic acid amplification test (NAAT) from her nasopharyngeal specimens for at least 39 days after symptom onset. This article provides a commentary on ongoing dilemmas that clinicians have faced in interpreting the test results indicating prolonged viral shedding.

2 | CASE PRESENTATION

A 19-year-old, non-smoking, single woman diagnosed with AN at the age of 16 was presented to our tertiary eating disorders (ED) care center at the beginning of October 2020 with complaints of gradual loss of 25 kg in 6 months.

Her physical examination showed marked malnutrition and paleness. BMI was 12.1 (height: 1.70 m; weight: 35 kg). Heart, lung, and abdominal examinations were normal. Her body temperature was 36.7°C, systolic blood pressure 97 mmHg, diastolic blood pressure 82 mmHg, pulse 54, and oxygen saturation 98% while the patient was breathing ambient air. Electrocardiography was normal. Blood routine tests were hemoglobin (hgb): 8.9 mmol/L (7.5–10.0), white blood cell (WBC): 2.0×10^9/L (4.3–10.0), platelet (PLT): 159×10^9/L (150–400), lymphocyte: 0.7×10^9/L (1.5–4.0). neutrophils: 1.1×10^9/L, monocytes: 0.1×10^9/L (0.2–1.0), aspartate aminotransferase (AST): 21 U/L (0–31), alanine aminotransferase (ALT): 42 U/L (0–34), creatinine: 67 mg/dl (45–84), C-reactive protein (CRP): <4 μg/ml (0–10), albumin: 45 g/dl (35–52), ferritin: 237 μg/L (15–150), total bilirubin: 9 μmol/L (0–21), and D-Dimer <190 μg/L (0–500).

We learned that both her parents, who shared the same household, were diagnosed with COVID-19, and her father had been hospitalized for severe COVID-19 infection 11 days before her onset of symptoms. Five weeks prior to presentation, she noticed a loss of sense of smell (anosmia) and taste (ageusia), and tested positive for COVID-19 3 days after symptom onset. The patient experienced no symptoms other than total anosmia and ageusia, which had resolved in 10 days. She described herself as someone who is never sick, and could not remember ever being seriously ill due to a flu-like or other virus.

Twenty-nine days after symptoms onset and 6 days before hospitalization, she was positive for her nasopharyngeal and oropharyngeal swab SARS-CoV-2 RNA test during routine screening, while she was completely free of symptoms. However, as the patient could experience re-activation of a long-lasting virus carriage or might be re-infected, as well as potential effects of diseases that hamper the immune response, she was admitted to a COVID-19 isolation ward for adult psychiatric inpatients. At the time of this admission, the patient had no complaints, and there were no positive physical examination findings suggesting a respiratory tract infection. On the first day of hospitalization, the NAAT was negative whereas the NAAT was positive on the fourth day. The NAAT result turned negative again on the seventh day followed up by four negative nasopharyngeal swab NAAT performed in the next 2 months. In addition, SARS-CoV-2 IgG were detected 38 days after her first NAAT. However, the concentrations of IgG to the N-gene were low; 35 and 33.5 BAU/ml, after 102 and 106 days of initial positive NAAT, respectively.

Our treatment strategy was to monitor the patient closely. After additional testing and consultation with an infectious disease specialist, she was transferred to the inpatient ED setting 10 days after the last positive test.

3 | DISCUSSION

The clinical features of COVID-19 infection vary from asymptomatic, mild flu-like disease to critical illness, with the latter associated with overactive inflammatory immune responses, leading to a cytokine storm and acute respiratory distress syndrome. The main risk factors defined for severe COVID-19 are age, male gender, obesity, and comorbidities.

Our patient was a young woman with AN without any accompanying disease. She reported total anosmia and ageusia within 10 days after onset of symptoms that correspond with previous research reporting median duration of anosmia to be around 10 days in subjects with mild COVID-19 (Ref. [11], for review). However, in contrast to a previous study reporting that the median time to achieving a negative swab is 22 days (interquartile range 15–31 days) in subjects with mild COVID-19,[11] our patient had prolonged detectable SARS-CoV-2 by NAAT (often referred to as "viral shedding") for 39 days. She had her first positive NAAT result on Day 3 after symptom onset and tested positive thereafter on Days 29 and 39, with alternating negative NAAT on Days 35, 42, 77, and 91 after symptom onset, without symptomatic recurrences, making prolonged virus shedding likely given the prolonged timeframe after initial infection.

It is worth mentioning that a positive NAAT may not be a reliable marker for determining the infectious risk of COVID-19 patients as the viral RNA detected could either be from nonviable virus (noncontagious) or from viable replicating virus (infectiousness).[12] Indeed, the CDC suggests that immunocompetent patients with mild to moderate COVID-19 may shed viable virus for up to 10 days, and duration of RT-PCR positivity is usually less than 20 days following symptom onset.[13] Most patients with more severe-to-critical illness or those who are immunocompromised probably remain infectious no longer than 20 days and duration of RT-PCR positivity is prolonged for >3 weeks, with median duration of 50.5 days from symptom onset.[13–20] One of the notable findings from published studies is that viable virus shedding can persist for 54 days in an immunocompetent child, suggesting the infectious virus shedding may be associated with other factors.[21]

In case of COVID-19-infected patients with AN, the duration of viral replication is uncertain as there are no reports yet on the viral shedding in this population. The only possible negative prognostic factors for the prolonged viral clearance observed in this patient, despite symptoms of COVID-19 being mild, were severe malnourishment accompanied by leukopenia. Indeed, most recent reviews propose a more complex immunological profile of AN than in primary malnutrition.[22] However, it is unclear at this moment to what extent these differences represent an immunocompromised state or even manifest features of superior immunocompetence in the patients' ability to mount an optimal immune response to viral antigens. However, the association between COVID-19 and intense cytokine release raises the possibility that the "immunosuppressed" or "superior immunocompetent" patient with acute AN is paradoxically protected, as it may attenuate the inflammatory response associated with severe disease. Yet, this comes at the cost of increased risk of prolonged viral clearance, although several other causes of re-positive tests for SARS-CoV-2 are possible including false-negative and false-positive RT-PCR tests or reinfection. Potential explanations for the intermittently negative NAAT test include a viral load below the detection limit of the assay, specimen source, quality and timing of specimen collection, and the possible occurrence of false-negative results at molecular test. Although it is less likely that our patient would have multiple false-positive results, there was a chance her repeat positive tests may have been a false-positive due to contamination, cross-reactivity with other human coronaviruses or human error during sample collection, transport, or analysis. To further investigate the potential for a false-positive test result, we re-analyzed the relative light units (RLU) thresholds of our patient's repeat tests. The RLU value required for detection was relatively low for the first swab (weak positive) and turned high for the third swab (>1000) confirming a true positive results.[23] While the quantification of viral load, live virus isolation, and viral genome sequencing could not be performed due to the hospital's limitations, reinfection seems less likely due to the isolation and physical contact avoidance with any source of infection prior to and during hospitalization, and time between the two positive RT-PCR (<3 months) in conjugation with the absence of new clinical symptoms or signs of viral infection exacerbations. Furthermore, our patient had already developed SARS-CoV-2 immunoglobulin G indicating that the acute phase of the disease and probable viable virus shedding were exceeded. Therefore, the risk of transmission was considered to be very low. Indeed, this is further evidenced by no transmission events to either patients or other mental health providers after admission on the ED unit.

4 | CONCLUSION

To our knowledge, ours is the first description of a case of a patient with severe AN, who experienced a mild form of COVID-19 and prolonged viral RNA shedding for >3 weeks. This unusually prolonged viral shedding in mild COVID-19 infection is likely to be due to malnourishment-induced leucopenia. Clinicians should therefore take utmost care when assessing COVID-19 infection in AN. A careful evaluation of long-term infectivity must include additional testing, including the viral load, live virus isolation, antibody response, and viral genome sequencing.

AUTHOR CONTRIBUTIONS

Mladena Simeunovic-Ostojic was involved in conceptualization, writing–original draft, and writing–review and editing. Evy Herremans, Joyce Maas, and Khoa Thai were involved in writing–original draft, and writing–review and editing.

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None.

CONFLICT OF INTEREST

None.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

ETHICAL APPROVAL

We hereby confirm that the present study conforms to the ethical standards and guidelines of the journal.

CONSENT

The patient was provided with information about the report and written informed consent was obtained.

ORCID

Joyce Maas https://orcid.org/0000-0001-8049-8942

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