

## Case Report

# Prolonged Detection of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) RNA in an Obstetric Patient With Antibody Seroconversion

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**BACKGROUND:** There is a growing understanding of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease 2019 (COVID-19) in the general population. The unique immunology of pregnancy may result in variations from the reported course of disease.

**CASE:** A 27-year-old primigravid woman presented with mild COVID-19 symptoms at 28 2/7 weeks of gestation, testing positive for SARS-CoV-2 infection by nasopharyngeal swab reverse transcription-polymerase chain reaction (RT-PCR). Antibody seroconversion was detected at 36 6/7 weeks of gestation. She presented for delivery at 38 1/7 weeks of gestation, and her SARS-CoV-2 RT-PCR test result was positive. Severe acute respiratory syndrome coronavirus 2 RNA remained detectable 34 days postpartum and 104 days from her initial positive test.

**CONCLUSION:** Prolonged viral shedding of SARS-CoV RNA may occur in the pregnant patient. If prevalent, this complicates the interpretation of a positive SARS-CoV-2 RT-PCR test result in the asymptomatic gravid patient.

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The clinical course of coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has been

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Each author has confirmed compliance with the journal's requirements for authorship.

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### Teaching Points

1. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) RNA presence as identified by reverse transcription-polymerase chain reaction can persist for greater than 100 days from initial infection in a pregnant patient.
2. A positive SARS-CoV-2 RNA result in an asymptomatic obstetric patient may reflect prolonged RNA presence from a remote infection rather than an acute infection.
3. Maternal antibody testing may be a useful adjunct in SARS-CoV-2 screening in the obstetric population to determine acuity of infection.

noted to vary among populations.<sup>1,2</sup> The physiologic changes in the immune and cardiopulmonary systems in pregnancy have historically resulted in a disproportionate incidence of adverse outcomes when faced with viral respiratory pathogens.<sup>3,4</sup> Paradoxically, it appears that these same physiologic immune changes may contribute to less severe manifestations of COVID-19 compared with nonpregnant patients in the current pandemic.<sup>5</sup> The milder or asymptomatic disease state in pregnancy may result in an under-recognition of acute SARS-CoV-2 infection. This concern for an increased prevalence of asymptomatic infection has prompted adoption of SARS-CoV-2 RNA screening on hospital admission to many obstetric units.

As SARS-CoV-2 testing capabilities become more robust, literature is now emerging to describe the clinical course of the infection within the general population, related to viral shedding and antibody seroconversion. The immunologic state of the gravid patient may create a unique viral host environment that does not conform to the expected course described in literature related to nonpregnant patients.

We present a case of prolonged detection of SARS-CoV-2 RNA by nasopharyngeal sampling in an asymptomatic pregnant patient more than 100 days from her acute symptomatic infection and after antibody seroconversion.

### CASE

A 27-year-old previously healthy nulliparous woman presented to the emergency department at 28 2/7 weeks of gestation with a 1-day history of pleuritic chest pain, nonproductive cough, and minimal dyspnea on exertion. She was afebrile with normal vital signs and unremarkable laboratory testing results. She declined radiologic imaging. Her test targeting SARS-CoV-2 infection by reverse



transcription-polymerase chain reaction (RT-PCR) was positive. Given her mild symptoms, she was discharged home and advised to self-quarantine. She remained afebrile, with resolution of symptoms 3 days after initial presentation.

The pregnancy thereafter proceeded without complication. Ultrasonographic fetal growth assessment at 34 0/7 weeks of gestation demonstrated appropriate interval growth. At the patient's request for testing, SARS-CoV-2 immunoglobulin (Ig) G antibodies were detected in the maternal sera at 36 6/7 weeks of gestation. She presented to the labor and delivery unit at 38 1/7 weeks of gestation in early labor with spontaneous rupture of membranes and no COVID-19 symptoms. On admission to the obstetric unit, a nasopharyngeal swab was collected per hospital protocol for universal SARS-CoV-2 RT-PCR screening and yielded a positive result within 2 hours of collection. Given the unknown significance of this finding, infection-prevention measures were activated as per unit guidelines for the management of a patient with SARS-CoV-2 infection. After labor augmentation, she underwent an uncomplicated vacuum-assisted vaginal delivery of a 3,810-g male neonate, with 1- and 5-minute Apgar scores of 8 and 9, respectively. The patient was counseled on the recommendation for newborn separation in the setting of maternal SARS-CoV-2 infection, which she declined.

To evaluate for vertical transmission, umbilical cord blood, placental tissue, and neonatal meconium samples were tested and found to be negative for SARS-CoV-2 infection by RT-PCR. Breast milk was also tested by RT-PCR to exclude viral presence and was negative. The cord blood was positive for IgG antibodies to SARS-CoV-2. Neonatal nasopharyngeal swabs were collected per hospital protocol at 24 and 48 hours of life and were negative for SARS-CoV-2 infection by RT-PCR. The neonatal course was complicated by hyperbilirubinemia requiring 24 hours of phototherapy on day of life 2. The neonate was discharged home on day of life 4 with no further complications.

Testing to document resolution of SARS-CoV-2 RNA presence in the patient's nasopharyngeal cavity by obtaining a negative RT-PCR test result was conducted in the postpartum period. Severe acute respiratory syndrome coronavirus 2 RNA remained detectable until 34 days postpartum and 104 days from her initial positive test result. The patient remained without COVID-19 symptoms and ultimately tested negative for SARS-CoV-2 by RT-PCR 50 days after delivery and 120 days from her initial positive test result (Appendix 1, available online at <http://links.lww.com/AOG/C23>).

## DISCUSSION

There is an urgent need to define the expected clinical course and predictable sequence of disease resolution for the novel disease state of COVID-19. After the onset of COVID-19 symptoms, SARS-CoV-2 RNA is detected on nasopharyngeal swab by RT-PCR for approximately 3 weeks, becoming nondetectable thereafter in the majority of patients.<sup>6,7</sup> The duration of SARS-CoV-2 RNA detection after acute infection

has not been described in the obstetric population. Reports of prolonged shedding after acute infection are emerging in the nonobstetric medical literature, and it is found to be more prevalent in male patients, those with comorbidities, and those with severe manifestations of disease.<sup>8,9</sup> Li et al<sup>10</sup> have reported a subset of patients with COVID-19 with a similar demographic and clinical profile to have a median viral RNA shedding time of 53 days (maximum 83 days) after symptom resolution.

Our patient is the antithesis of the clinical profile associated with prolonged viral shedding, yet she demonstrates the ongoing presence of SARS-CoV-2 RNA in her nasopharynx more than 100 days from her initial positive test result. Despite an understanding of the dynamic immunologic changes of pregnancy, there are limited data regarding the effect of gestation on viral clearance. The delayed clearance of respiratory viral pathogens during pregnancy has been suggested but not conclusively determined.<sup>11</sup> Although there is potential for an unrecognized idiosyncratic etiology of prolonged RNA positivity specific to our patient that is unrelated to pregnancy, there is also the distinct possibility that the immune modifications of pregnancy could result in delayed viral clearance of SARS-CoV-2 after acute infection in the obstetric patient. Given the unexpected finding of a persistent positive RT-PCR result on her admission testing, the lack of guidance in regard to management of prolonged asymptomatic viral shedding in pregnancy, and potential risks to the newborn, we chose to proceed with a test-based strategy to determine when to recommend discontinuation of transmission-based precautions. The test-based strategy for asymptomatic patients, as described in interim guidance from the Centers for Disease Control and Prevention, calls for ongoing testing until two negative samples are obtained more than 24 hours apart.<sup>12</sup> Therefore, the patient has undergone interval collection of nasopharyngeal specimens in the postpartum period. Testing has demonstrated continuous RNA detection, indicating that any pregnancy-related prolongation of SARS-CoV-2 clearance may also extend into the postpartum period.

After the description by Breslin et al<sup>13</sup> of a high prevalence of asymptomatic women presenting for inpatient obstetric care in New York City, many obstetric units began to implement the practice of universal testing of patients for SARS-CoV-2 infection on hospital admission. Reports suggest increased rates of asymptomatic patients testing positive for SARS-CoV-2 RNA in the obstetric population compared with their community's overall disease-prevalence rate.<sup>14,15</sup> These



screen-positive patients are presumed to be either asymptomatic or presymptomatic for COVID-19 with an acute SARS-CoV-2 infection. Our case illustrates that the asymptomatic gravid or postpartum patient who screens positive for SARS-CoV-2 RNA on hospital admission may represent a remote SARS-CoV-2 infection with prolonged SARS-CoV-2 RNA shedding rather than an acute disease state.

The RT-PCR test (Cepheid) used in this study has a limit of detection of 100 RNA transcript copies/mL<sup>16</sup> and shows equivalent performance compared with the RT-PCR test developed by the Centers for Disease Control and Prevention.<sup>17</sup> The delineation between a positive RT-PCR test result and true infectivity is a clinical challenge, because RT-PCR testing does not distinguish infective from inactive virus. Emerging studies suggest that viral infectivity, as represented by the ability to isolate SARS-CoV-2 by culture, diminishes within 8–9 days after symptom onset despite ongoing RT-PCR positivity.<sup>18,19</sup> Therefore, when screening an asymptomatic obstetric patient, understanding the timing of a patient's acute infection may be clinically useful as it relates to her degree of contagion, clinical management, and recommended societal interaction.

Although the clinical significance of SARS-CoV-2 antibodies has not been established with regard to immunity, the presence of antibodies in asymptomatic patients with RT-PCR positivity is compatible with a postacute stage of disease and, therefore, may have utility in distinguishing acute from remote infection when presented with an asymptomatic patient who tests positive for SARS-CoV-2 infection. The identification of IgM and IgG antibodies against SARS-CoV-2 occurs between 2 and 4 weeks after onset of clinical illness, with a decrease in IgM by week 5 and the persistence of IgG thereafter.<sup>18,20</sup> In our case, had the patient's initial positive SARS-CoV-2 test result at 28 weeks of gestation not been documented, an erroneous presumption of an acute asymptomatic infection would have been made at the time of hospital admission for delivery—when in fact her acute infection occurred 10 weeks earlier. For asymptomatic patients who present with a SARS-CoV-2 RNA–positive screening test and in whom a prior SARS-CoV-2 infection has not been documented, a positive SARS-CoV-2 IgG test result may be useful evidence to support the diagnosis of a remote infection with persistent RNA shedding compared with the alternative diagnoses of presymptomatic or asymptomatic acute infection. The performance characteristics of the SARS-CoV-2 IgG assay used at our institution demonstrates 100% sensitivity and 99.9% specificity with testing at 13 days after an initial

positive RT-PCR test result.<sup>21</sup> Utilization of quality antibody testing may allow for better clarity regarding the timing of acute infection in the asymptomatic screen-positive obstetric patient.

Based on review of the available biomedical literature using PubMed and Google Scholar search between June 2 and 5, 2020, using the terms “COVID-19,” “SARS-CoV-2,” “antibodies,” “nasopharyngeal,” and “viral shedding,” along with the obstetric-specific terms “pregnancy,” “obstetric,” and “maternal,” our case demonstrates a favorable maternal and neonatal outcome in the setting of the longest reported presence of viral RNA by nasopharyngeal sampling after acute infection and postseroconversion in the COVID-19 pandemic and the first report of prolonged SARS-CoV-2 RNA detection in an obstetric patient. In the absence of a clear understanding of postacute viral shedding in the pregnant population and the potential for prolonged RNA positivity after acute disease, interpretation of a positive screening SARS-CoV-2 test in the asymptomatic pregnant patient should be interpreted with caution. Reverse transcription-polymerase chain reaction nasopharyngeal positivity does not necessarily represent acute asymptomatic or presymptomatic infection, and there may be a role for antibody testing in asymptomatic pregnant patients who test positive for SARS-CoV-2 RNA as part of a universal screening protocol. Further study is needed to determine the relationship among the duration of SARS-CoV-2 RNA detection, the degree of infectivity, and antibody seroconversion in pregnancy to better guide diagnostic management and infection-control practices.

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