

Insight from a COVID-19-Infected Lactating Mother with A Healthy Breastfed Infant

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ABSTRACT

During the coronavirus disease 2019 (COVID-19) global epidemic, whether severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) can be transmitted to infants through breastfeeding has attracted extensive attention. In this report, we present a COVID-19-infected lactating mother with a healthy breastfed infant and discuss related issues. A 33-year-old lactating woman presented with two consecutive positive SARS-CoV-2 tests over 2 days. The test results of her two-month-old daughter and 8-year-old son were both negative. In this patient, the results of IgG and IgM were both positive. Chest CT showed multiple patchy ground-glass shadows in the right lower lung and left lung. She was diagnosed with COVID-19. The patient was advised to suspend breastfeeding. After antiviral treatment with lopinavir/ritonavir and interferon- α , the test results for SARS-CoV-2 were all negative on the 4th, 5th and 6th hospital days. A Chest CT reexamination on hospital day 6 suggested remarkable absorption of the shadows in both lungs. There was no recurrence of a positive SARS-CoV-2 test after discharge. The infant's repeated nasopharyngeal swabs for SARS-CoV-2 were all negative. Given that close maternal-infant contact is the main way for infants to become infected with SARS-CoV-2, breastfeeding should be suspended to prevent mother-to-infant transmission of SARS-CoV-2.

Keywords: COVID-19, SARS-CoV-2, Infant, Breast-Feeding, Close Contact

Background

Coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) shows high potential for person-to-person transmission and thus contributes to a large spread of infection across the globe (Ciotti *et al.*, 2020). Respiratory droplets are the main route of transmission, but SARS-CoV-2 can also be transmitted by close contact or the digestive tract. Family clusters of infection are the major cause of COVID-19 transmission (Hu *et al.*, 2020). During the COVID-19 global epidemic, lactating women, as a special group, have also attracted extensive attention in the context of family clusters of infection, especially regarding whether SARS-CoV-2 could

be transmitted to infants through breastfeeding (Zhang *et al.*, 2020; Cui *et al.*, 2020). Although maternal-infant transmission through breastfeeding has not been either confirmed or ruled out, limited data on pediatric patients showed that infants could be infected with SARS-CoV-2 via close maternal-infant contact during family life (Le *et al.*, 2020; Wang *et al.*, 2020). Herein, we report a COVID-19-infected lactating woman with a healthy breastfed female infant. However, unlike most reported family clusters where the infants were infected and symptomatic, the infant described here has always been healthy, and repeated nasopharyngeal swabs were negative for SARS-CoV-2.

Case Presentation

A 33-year-old lactating woman presented with two consecutive positive SARS-CoV-2 tests over 2 days. The patient was initially quarantined due to a neighbor diagnosed with COVID-19 living in the same building. Meanwhile, her father, husband, two-month-old daughter and 8-year-old son were also referred to the quarantine station. The patient was advised to suspend breastfeeding. The next day, the patient developed swelling and pain in the right breast with a transient fever of 38.0 °C. The patient was diagnosed with acute mastitis and received symptomatic treatment. The patient's temperature soon returned to normal. On the 2nd and 3rd days after quarantine, the family members were tested for SARS-CoV-2 by real-time reverse transcription-polymerase chain reaction (RT-PCR) via nasopharyngeal swabs. The patient, her father and her husband all tested positive in two consecutive tests and was diagnosed with asymptomatic COVID-19, but the test results of her two-month-old daughter and 8-year-old son were both negative. The patient did not have any recent travel history. The possible transmission chain might be through her father, who had been in close contact with the neighbor diagnosed with COVID-19. Then, the patient and her husband were infected by her father, because they were in close contact as part of family life. The female infant and her brother had always appeared healthy. However, the patient had no runny nose, sore throat, cough, expectoration, chest distress or dyspnea, and her baby daughter and older son also did not develop any symptoms.

Physical examination upon admission revealed that vital signs were within normal limits at presentation, with a heart rate of 66 times/min, blood pressure of 110/56 mmHg, respiratory rate of 18 times/min, and temperature of 36.0 °C. Her right breast was slightly swollen, with increased skin temperature and tenderness. There were no abnormal findings in the lungs and heart. Laboratory examinations showed that the routine blood test indicated a white blood cell count of $3.40 \times 10^9/L$, a neutrophil count of $1.53 \times 10^9/L$, and a lymphocyte count of $1.57 \times 10^9/L$. The C-reactive protein level was 26.91 mg/L, and the serum amyloid A level was 156.1 mg/L. The coagulation test showed that the fibrinogen level was 5.21 g/L, and the D dimer level was 0.84 µg/mL. IgG and IgM were both positive. Chest computed tomography (CT) on hospital day 2 showed multiple patchy ground-glass

shadows in the right lower lung and left lung (Fig. 1A and Fig. 1B). The patient was diagnosed with COVID-19 and acute mastitis.

The patient received antiviral treatment with lopinavir/ritonavir and interferon- α and symptomatic treatment on the first day of hospitalization. The routine blood test on hospital day 5 showed a white blood cell count of $3.92 \times 10^9/L$, a neutrophil count of $1.91 \times 10^9/L$, and a lymphocyte count of $1.62 \times 10^9/L$. The C-reactive protein and serum amyloid A levels decreased to 9.84 mg/L and 89.8 mg/L, respectively. The D dimer returned to normal (0.34 $\mu\text{g/mL}$). On the 4th, 5th and 6th days after hospitalization, the test results for SARS-CoV-2 were all negative by RT-PCR via nasopharyngeal swabs. A Chest CT reexamination on hospital day 6 suggested remarkable absorption of the shadows in both lungs (Fig. 1C and Fig. 1D). The patient was discharged from the hospital on hospital day 7. There was no recurrence of a positive SARS-CoV-2 test during the 14-day quarantine period after discharge. A chest CT reexamination 2 weeks after discharge suggested the complete absorption of the shadows in both lungs (Fig. 1E and Fig. 1F). Her baby daughter and older son were still asymptomatic, and their subsequent repeated nasopharyngeal swabs were still negative for SARS-CoV-2.

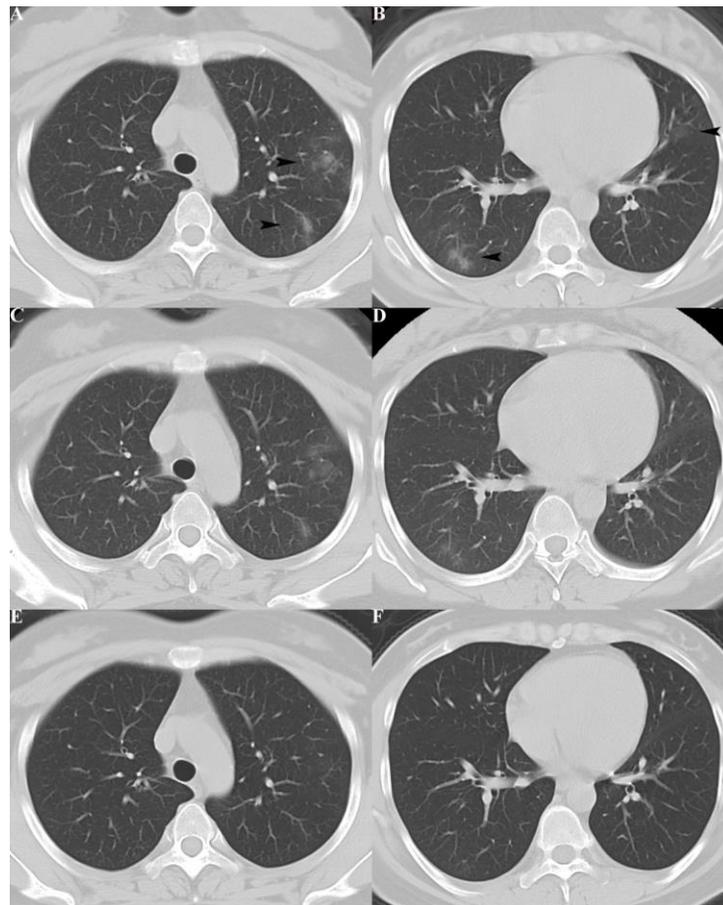


Figure 1: The dynamic evolution of chest CT manifestations in the lactating mother infected with COVID-19

Chest CT on hospital day 2 showed multiple patchy ground-glass shadows in the right lower lung and left lung (A and B, black arrow).

A Chest CT reexamination on hospital day 6 suggested remarkable absorption of the shadows in both lungs (C and D).

A chest CT reexamination 2 weeks after discharge suggested the complete absorption of the shadows in both lungs (E and F).

Discussion

Family clusters of COVID-19 caused by close family contact are the main cause of SARS-CoV-2 infection in infants (Ji *et al.*, 2020), which is undoubtedly the top priority in prevention and control work. In the family cluster of COVID-19 infection described here, all three adults were infected, including the lactating mother, but the 2-month-old infant and her brother were not infected. At present, no SARS-CoV-2 has been detected in the breast milk of mothers with COVID-19 (Zhang *et al.*, 2020; Cui *et al.*, 2020). However, because of the limited number of research cases, these results have not been either confirmed or ruled out. The consecutive negative test results for SARS-CoV-2 in this infant also indirectly indicated that infants might not become infected with COVID-19 through breast milk. However, due to the increasing number of cases during the global outbreak of COVID-19, whether there is SARS-CoV-2 in breast milk needs further study.

Even if infants are not infected through breast milk, close mother-infant contact during family life might also spread the virus to infants. Fortunately, the infant reported here was not infected by SARS-CoV-2. It is presumed that the lack of infection in this infant might be related to the presence of asymptomatic patients and/or exposure to a low viral load. The absence of clinical symptoms in all three adults was consistent with this inference. Nevertheless, considering that breastfeeding also carries a risk of contact transmission, breastfeeding should be temporarily suspended until infected mothers' nucleic acid tests turn negative and they are released from medical isolation.

During the COVID-19 global epidemic, limited information is available about children with COVID-19, especially infected infants (Cui *et al.*, 2020; Le *et al.*, 2020; Wang *et al.*, 2020; Ji *et al.*, 2020; Yasri and Wiwanitkit, 2020). Infants were often less susceptible to middle east respiratory syndrome coronavirus (MERS-CoV) and severe acute respiratory syndrome coronavirus (SARS-CoV) than adults or had a benign course of infection with mild respiratory symptoms or no symptoms. These results might be related to low exposure, presence of asymptomatic or mildly symptomatic patients, the immature immune system and relatively gentle immune inflammatory response in children and other unidentified

factors (Memish *et al.*, 2014; Hon *et al.*, 2003). This impression has also been reported for infants during the COVID-19 epidemic. However, these cases are not exactly the same, because people of all ages are susceptible to COVID-19, although the susceptibility may be different (Cui *et al.*, 2020). Therefore, infants who are not infected should also be quarantined for observation and repeated nucleic acid detection, as in our case.

Conclusions

Whether there is SARS-CoV-2 in breast milk needs further study. However, given that close mother-infant contact is still the main way for infants to become infected with SARS-CoV-2, breastfeeding should be temporarily suspended to protect susceptible infants and prevent mother-to-infant transmission of SARS-CoV-2.

Informed Consent Statement: Informed written consent was obtained from the patient for publication of this report and any accompanying images.

Conflict-of-Interest Statement: The authors declare that they have no conflict of interest.

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