

CASE REPORT

Possible Vertical Transmission of COVID-19 to the Newborn; a Case Report

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Abstract: Vertical transmission of the novel coronavirus 2019 (COVID-19), has been reported in case reports and series, while the data regarding its transmission is still not enough. Thus, presenting different experiences from various regions could help better understand the virus behavior in pregnancy. We herein report a possible vertical transmission of COVID-19 from a mother to the neonate. A 41-year-old mother with signs and symptoms of acute respiratory illness presented with labor pain and vaginal leak at 37 weeks of gestation. She tested positive for COVID-19 using RT-PCR and underwent emergency cesarean section delivery and gave birth to a girl neonate. The baby tested positive for the COVID-19. Although vertical transmission of COVID-19 has not been proved yet, but there are several lines of evidences suggesting it. Paying close attention to the mother and newborn with COVID-19 and long-term follow-up are needed for better understanding of the virus in pregnancy.

Keywords: Severe acute respiratory syndrome coronavirus 2; COVID-19; Infant, Newborn; Infectious Disease Transmission, Vertical

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1. Introduction

The novel coronavirus 2019 (COVID-19) has infected more than 4 million people and caused more than 300,000 deaths worldwide by May 2020. It has been declared as pandemic by the World Health Organization (WHO) in March 2020 (1). COVID-19 pneumonia is highly infectious and can be transmitted through various routes including respiratory droplets and close contact (2). Infection during pregnancy has been the spotlight of many studies; yet, evidence on vertical transmission is scarce and mostly based on small series and case reports (3-5). COVID-19 infection during pregnancy raises 3 major concerns: first, the treatment and management of pregnant women infected with the virus is still a matter of debate and needs further investigation; second, prenatal and

pregnancy complications are still unknown and it is not well-established whether prenatal COVID-19 infection increases the risk of adverse pregnancy outcomes or not; and third, vertical transmission of the virus from the mother to the child needs further investigation. Recently, a systematic review evaluated all the published articles on pregnant women infected with COVID-19 and reported that vertical transmission of COVID-19 does not occur based on the evidence provided so far (3). However, a growing body of evidence suggests the vertical transmission of COVID-19 from the mother to the child (4-9). Laboratory analysis revealed that amniotic fluid and cord blood from neonates delivered by COVID-19 positive mothers were negative for the virus (8, 10). Thus, the knowledge regarding vertical transmission of COVID-19 is insufficient and adding experience from different regions can help complete the whole picture and understand the behavior of the virus in pregnancy. We herein report a case of vertical transmission of COVID-19 to the newborn, confirmed by laboratory analysis and investigation in Iran.

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2. Case presentation

In our center in Tehran, Iran (Mahdiyeh Hospital affiliated with Shahid Beheshti University of Medical Sciences), From March 1st to April 20th, we screened 25 pregnant women with suspected COVID-19 infection, 9 of whom tested positive using real time polymerase chain reaction (RT-PCR), which found specimens in nasopharyngeal swab of the patients. The neonates born to 8 of these mothers tested negative for COVID-19; however, 1 newborn tested positive 24 hours after birth. The mother of this neonate was a 41-year-old woman, living in Tehran, Iran, with low socioeconomic background and opium addiction. The pregnancy history included gravid 6, parity 4, live 4, and abortion 1. She had the signs and symptoms of acute respiratory illness including shortness of breath and cough. She underwent spiral chest CT-scan which revealed ground-glass opacities in bilateral upper and lower lobes. The laboratory results revealed lymphopenia ($9.2 \times 10^3 / \mu\text{L}$) and elevated C-reactive protein levels (18.8 mg/L). Thus, RT-PCR was done for the mother and the result was positive and she was diagnosed with COVID-19 pneumonia. She presented with labor pain and amniotic fluid leakage and due to previous history of cesarean delivery (4 previous sections), an emergency cesarean delivery was scheduled. The cesarean section was performed with complete protection of the mother, newborn, and the medical team. The result of the delivery was a girl neonate, with 1-min Apgar score of 9 and 5-min Apgar score of 10, and weigh of 3500 gr. The RT-PCR results of the amniotic fluid and neonate (less than 24 hours after birth) were positive for COVID-19 and she was diagnosed with the viral infection. Her chest radiography was normal, and the laboratory results were unremarkable. She was vomiting during the first 24 hours after birth, which was due to opium withdrawal syndrome. She was admitted to the neonatal intensive care unit (NICU) and received supportive care without need for respiratory support. The baby was fed formula as the mother was admitted to the ICU and isolation for supportive care. After 11 days, she tested negative for COVID-19 and the test results at day 14 were also negative. The neonate did not have any symptoms including vomiting, dyspnea, or cough but developed fever (38.6°C) from the 10th day of birth. Conservative therapy was not successful and thus, a lumbar puncture was performed on day 10, which was clear. The fever resolved with appropriate anti-pyretic therapy and antibiotic therapy. The chest radiography was also unremarkable. She was discharged from the hospital with good condition on day 28. The mother also received supportive care in an isolated unit. She was completely symptom free and afebrile. She was discharged in good condition.

3. Discussion

The vertical transmission of COVID-19 is a matter of debate and the clinical evidence is extremely scanty. In the current study, we reported the possible vertical transmission of COVID-19 from a mother to a newborn less than 24 hours after birth. In our report, the newborn girl tested positive in the first 24 hours of her life after a cesarean delivery. Although we do not have the RT-PCR results of the placenta, but we believe that the transmission has been vertical as the neonate and amniotic fluid tested positive for the virus less than 24 hours after birth. The current case can contribute to the literature regarding the knowledge of COVID-19 in pregnancy. Recently, Wang et al. (5) reported a neonate with positive RT-PCR after 36 hours of birth from a 34-year-old woman who was diagnosed with COVID-19. The presented case provides the possibility of vertical transmission of COVID-19, while the probability could not be confirmed with laboratory analysis (5). In another recent study of a neonate delivered by cesarean section from an infected mother, there were elevated IgM antibody levels and abnormal test results for IL-6 and IL-10 cytokines 2 hours after birth. The increase in IgM antibody level implies that the neonate was infected in utero, as IgM antibody usually does not appear until 3 to 7 days after infection and cannot be transmitted through the placenta (6). Alzamora et al. (11) also reported a 41-year-old woman undergoing cesarean delivery and the neonate tested positive for COVID-19, 16 hours after delivery. IgM and IgG were positive for the mother on the fourth day after giving birth (9 days after the onset of symptoms). The positive RT-PCR test result on the first day of life indicated the possibility of vertical transmission, which is similar to our study (11). In a recent review, Lamouroux et al. (12) reviewed the literature and included the data on 68 deliveries and 71 neonates with maternal infection in the third trimester of pregnancy. Only 4 cases were tested positive within 48 hours of birth and they provided several evidence for and against vertical transmission (12).

In a systematic review by Della Gatta et al. (3), which included 51 pregnant women with positive test results for COVID-19, they concluded that the high rate of preterm delivery by cesarean delivery was a reason for concern. However vertical transmission was completely rejected by the results of this review (3). Karimi-Zarchi et al. (7) reviewed data of published articles or official websites up to March 4, 2020, to investigate the the risk of vertical transmission of COVID-19 to the fetus of infected mothers. They finally included 31 pregnant women with positive COVID-19 test results. They reported 2 maternal mortalities, however, there was no evidence for intrauterine transmission of COVID-19 from infected pregnant women to their fetuses. Chen et al. (8) described the clinical characteristics of 9 pregnant patients with

COVID-19 infection during the third trimester and demonstrated that there is no evidence for intrauterine transmission of COVID-19; the results were further confirmed by another systematic review (13).

In conclusion, vertical transmission of COVID-19 through placenta is still unclear and the existing data in this regard is very limited. However, the current case and similar previous reports support the probability of the virus causing COVID-19 being transmitted vertically through the placenta. This is supported by the fact that test results of the neonates become positive within the first day of life. The long- and short-term effects of COVID-19 infection on the neonates are still unclear and should be investigated in follow-ups. The knowledge on vertical transmission of COVID-19 is insufficient and adding experience from different regions can help complete the whole picture and understand the nature of the virus in pregnancy.

4. Conclusion

The fact that the neonate in our case report tested positive for COVID-19 within the first day of her life adds to the body of evidence suggesting the possibility of vertical transmission of this disease.

5. Declarations

5.1. Acknowledgements

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5.2. Authors' contributions

All authors met the criteria for gaining authorship based on the recommendations of the International Committee of Medical Journal Editors.

5.3. Conflict of interest

There isn't any conflict of interest to be declared regarding the manuscript.

5.4. Ethical issues

This study was carried out according to the Declaration of Helsinki. Also, written informed consent for publication of the manuscript and the related individual data were obtained from the patient (ethics code: IR.SBMU.MSPREC.1399.460).

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