

CASE REPORT

Possible Early Vertical Transmission of COVID-19 from an Infected Pregnant Female to Her Neonate: A Case Report

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ABSTRACT

Severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-19) has emerged as a public health emergency in recent times. The reported data on the mode of transmission of coronavirus disease 2019 (COVID-19) are largely through contact, droplet, airborne and fomite transmission methods with vertical transmission being a rare entity. We hereby report a case of a probable vertical transmission of SARS-CoV-19 from an infected pregnant female to her neonate. The transmission has been confirmed by a positive RT-PCR at 16 h of life along with a positive IgG antibody test for SARS-CoV-19 in the baby and after excluding the possible environmental contamination of the sample. The baby was asymptomatic during the course of hospital stay and was discharged from the facility on Day 9 of life.

KEYWORDS: SARS-CoV-2, neonate, vertical transmission, RT-PCR

INTRODUCTION

The novel coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) is a highly infectious disease that was first detected in Wuhan City [1]. The disease was declared as a pandemic by the WHO and till date it has involved ~213 countries across the globe. According to the WHO scientific report, the virus spreads through contact, droplet, airborne and fomite transmission methods [2]. The transmission of virus through feces, urine, blood,

animal-to-human and breast milk is less well substantiated. Although some reports of vertical transmission have been described, but it is unclear whether these occurred via the transplacental or the transcervical route or through environmental exposure [3–5]. It is important to investigate as whether and how SARS-CoV-2 reaches the fetus, so as to, optimize pregnancy management, prevent neonatal infection and improve pregnancy outcomes and eventually better understand SARS-CoV-2 pathophysiology in the fetus and the neonate.

CASE

A 37 + 2 weeks baby girl weighing 2590 g at birth was born to 24-year-old pregnant woman who lived in a 'red zone' area in New Delhi. Red zone areas are identified as hotspot districts reporting a large number of COVID-19 cases and having a high growth rate. The health ministry of New Delhi has classified 450 hotspot districts under the 'red zone' as on 28 June 2020. She is a housewife and lives in a house with three rooms and a common washroom along with seven family members. Her husband works as a sanitation worker in the outborn nursery at Dr. RML Hospital, New Delhi.

Her husband developed fever, cough and breathlessness on 06 June 2020. Blood tests revealed normal count, CRP and ferritin levels. RT-PCR test for SARS-CoV-2 infection from pharyngeal swab sampling was reported positive on 09 July 2020. He was advised for isolation in a government facility ~60 km away from his residence. Repeat testing done after 1 week of isolation in the facility was also positive. Although his breathlessness got resolved after 4 days of admission but cough persisted for ~1 month after onset of symptoms.

Her antenatal period was uneventful till 08 June 2020 (34 weeks of postmenstrual age). On 9 June 2020, she developed mild grade fever. Blood tests revealed normal counts, renal and liver function test, CRP and ferritin levels. Her RT-PCR test for SARS-CoV-2 infection from pharyngeal swab sampled on the same day was positive. She got admitted in the corona isolation ward in our hospital as she was unwilling for home isolation. However, she became asymptomatic on the next day of admission (i.e. 10 June 2020).

At admission, she was afebrile and her blood pressure was 100/80 mm Hg, with a respiratory rate of 18 bpm and heart rate of 88 bpm. She had no cough or sputum. Fetal heart rate monitoring showed no abnormality. Repeat RT-PCR test for SARS-CoV-2 infection from pharyngeal swab sampling done after 2 weeks of admission was again positive. However, the repeat RT-PCR test done 2 days before delivery (i.e. 6 July 2020) was negative. The antenatal surveillance testing for fetal well being done during the course of hospital stay before delivery were normal. On 8 July 2020, she complained of pain in lower

abdomen. Induction of labor was started at 11:00 am and baby was delivered vaginally through clear liquor on 08 July 2020 at 8:58 pm. Apgar scores at 1 and 5 min were 8 and 9, respectively. Delayed cord clamping was done but skin-to-skin contact was not done as per the unit protocol. The transition period was uneventful and the clinical examination revealed no gross congenital anomaly. The mother had been wearing a surgical mask throughout the delivery, and the baby had no contact with the mother after birth. The infant was transferred to the outborn NICU 10 min after birth for close observation and the mother was transferred to the corona isolation ward after delivery. The baby was fed on formula which she was tolerating well. Blood tests of the neonate revealed negative sepsis screen, normal blood chemistry and electrolytes. A pharyngeal swab specimen collected immediately from the infant (16 h) after birth was positive and the qualitative IgG antibody test done from baby's serum was also positive for SARS-CoV-2 infection. However, the qualitative IgM antibody test done from baby's serum was negative for SARS-CoV-2 infection. To rule out the remote possibility of horizontal transmission from the healthcare workers taking care of the baby after birth, we also collected the pharyngeal swab specimen from all the healthcare workers whosoever has come in contact with the baby on day of birth and the results of those specimens were also negative. The baby remained admitted in the NICU for 9 days and the repeat pharyngeal swab specimen obtained on second and third days after birth was negative. The baby was discharged from NICU on Day 9 of life. At 1 month follow-up, baby was on exclusive breastfeeding, anthropometric parameters were normal for age and neurological examination was normal.

DISCUSSION

Intrauterine transmission of SARS-CoV-2 virus at present can neither be confirmed nor denied due to the scarcity of existing data [6]. In this report, we are ascribing the neonatal infection due to SARS-CoV-2 virus to be due to possible intrauterine transmission from the mother to her unborn fetus. This can be explained by following facts: positive RT-PCR test for COVID-19 from pharyngeal swab of newborn at 16 h after birth, negative RT-PCR test for

COVID-19 from pharyngeal swab of healthcare workers taking care of the baby after birth ruling out the remote possibility of horizontal transmission and less likely by the positive virus-specific IgG antibody detected in neonatal blood sera samples as detection of these antibodies can simply indicate transplacental transmission of antibodies from the mother to the infant [4]. To date, there has been limited evidence to support possible vertical transmission of the virus. In a recent meta-analysis including 17 studies [330 newborns underwent early RT-PCR tests (defined as RT-PCR test within the first 2 days of life)], 9 of the 330 newborns were tested positive for SARS-CoV-2 with an average pooled incidence of vertical transmission 16 per 1000 newborns (95% CI 3.40–73.11). However, pharyngeal swab for COVID-19 in all except one study was positive 24 h after birth. In one study where it was positive within 24 h, the exact timing of the result is not mentioned [7].

Although in the index case, we tried to observe complete sterility in collecting the pharyngeal swab specimen for RT-PCR test from the newborn, but caution must be taken in interpreting the results of the present study as the positive RT-PCR from the early (<24 h) pharyngeal swab specimen may simply indicate ‘false-positive’ result due to the contamination of neonate’s nasopharyngeal specimen by SARS-CoV-2 RNA in the amniotic fluid as we have not done RT-PCR test for COVID-19 in the amniotic fluid specimen [8].

In the previous case reports for possible vertical transmission of SARS-CoV-2 using antibody test and cytokine levels, the elevation of IgG antibody and cytokine levels was uniformly observed in all neonates but the increase in IgM antibody levels was seen in only three neonates [3, 4]. In the present case, quantitative estimation of the antibody levels in neonates was not possible due to the lack of infrastructure, however, SARS-CoV-2 specific qualitative IgM antibody test was negative and IgG antibody test was positive. IgM is a challenging way to diagnose many congenital infections. IgM antibodies are too large to cross the placenta and so detection in a newborn reasonably could be assumed to reflect fetal production following in utero infection. However, most congenital infections are not diagnosed based on IgM detection due to following reasons: lower

diagnostic accuracy of IgM-based assays (sensitivity 70–88% and specificity 96–99% for diagnosis of transplacental infections) than molecular diagnostic tests based on nucleic acid amplification and detection, increased chances of cross reactivity, testing challenges and poorly developed adaptive immunity resulting in impaired antibody production in the neonates compared with adults [3, 9]. Hence, the role of detection of SARS-CoV-2-specific IgM and IgG antibody in the neonatal sera for diagnosis of early infection at present is limited.

One of the limitations of the present report is that we could not estimate the Ct values of each positive RT-PCR reaction of the mother and the newborn. However, at present the evidence is not strong enough to routinely recommend using this parameter to guide either infectiousness or severity of disease due to COVID-19 [10]. Hence, the apex body in India for biomedical research does not recommend to rely on Ct values for either determining the infectiousness or deciding management protocols of COVID-19 [11].

CONCLUSION

The present case report reaffirms as well as raises concerns regarding possible early vertical transmission of SARS-CoV-2 infection in a neonate during last trimester of pregnancy. Cumulative data of vertical transmission are necessary to have a better knowledge on the global influence of SARS-CoV-2 on maternal, fetal and neonatal health.

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