

DOI: <https://doi.org/10.33314/jnhrc.v19i1.3312>

Vertical Transmission of COVID-19: A Case Report and Review of Literature

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ABSTRACT

Coronavirus disease 2019 (COVID-19) pandemic will continue to affect pregnant women with possibility of vertical transmissions. However, knowledge and evidences regarding vertical transmission of COVID-19 are just emerging. This information is very crucial in the obstetrical care of COVID-19 infected women as well as in the care of newborn born to COVID-19 positive mothers. We report a case of vertical transmission in a neonate born to asymptomatic COVID-19 infected mother. Newborn was immediately shifted to isolation nursery and formula feed was started. The nasopharyngeal swab of newborn taken at 42 hours of life tested positive for SARS-CoV-2 by RT-PCR. Therefore the vertical transmission in COVID-19 is possible. Despite this, the neonatal outcome is good.

Keywords: Asymptomatic mothers; COVID-19; neonate; nasopharyngeal swab; vertical transmission

INTRODUCTION

There is limited information on COVID-19 related clinical problems, complications, and outcomes in pregnancy and even less information on the vertical transmission potential of COVID-19 infection. Studies have been done on amniotic fluid, cord blood, vaginal swab, and neonatal throat swab samples to document the presence of severe acute respiratory syndrome coronavirus (SARS-CoV-2) that could suggest intrauterine transmission.^{1,2} But the occurrence of trans-placental transmission of SARS-CoV-2 infection remains highly debated and more evidence are to be generated.

CASE REPORT

A 30-year-old multigravida at 39 weeks and 3 days of gestation was admitted in the COVID-19 ward. She tested positive for COVID-19 by RT-PCR as per government guidelines, a day before admission with cycle threshold (Ct) value of 34 for ORF1ab gene and 34 for N gene. She did not have symptoms consistent with COVID-19. She was tested COVID-19 positive previously by RT-PCR with Ct value 18 for ORF1 ab gene, 20 for N gene and 17 for E gene, ten days prior as a part of contact tracing. She was asymptomatic for the duration.

The woman was admitted for progressive abdominal pain but there was no per vaginal leaking or bleeding. She had a history of lower segment caesarean section (LSCS) two year back. On further evaluation, she was in

labour and underwent an emergency LSCS (November 8, 2020) under standard infection control precautions.

She delivered a term male baby with a birth weight of 3100 grams and normal Apgar scores. Skin to skin contact with mother and delayed cord clamping was avoided. The baby was transferred to isolation nursery for tachypnea which settled at 2 hour of life with oxygen given via head box at 6 litre per minute. The tachypnea was concluded to be Transient Tachypnea of Newborn. The baby was started on formula feeding. The institutional infection control protocol was practiced during newborn management.

The neonate did not have or developed symptoms of COVID-19 and the clinical examinations were insignificant with no congenital anomalies on repeat evaluation. Hence, further investigations were not employed. Nasopharyngeal swab for SARS-CoV-2 RT-PCR sent at 42 hours of life was tested positive with Ct value of 34 for ORF1 tab and 34 for N gene. Since it is not within the hospital protocol to routinely send feto-maternal samples; placental tissue, amniotic fluid, and cord blood for RT-PCR for SARS-CoV-2, thus these samples were not collected. The baby was discharged at 53 hours of life with breastfeeding and rooming-in instructions as per WHO recommendations. On follow-up, the baby was breastfeeding well with a normal examination. Both mother and neonate tested negative for SARS-CoV-2 by RT-PCR repeated on 14th day from last positive report.

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DISCUSSION

In our study, the mother was SARS-CoV-2 positive but asymptomatic, and after delivery, the neonate was immediately isolated from the mother. Neonatal RT-PCR was positive for SARS-CoV-2 done within 48 hours of life. Thus, it is highly likely that SARS-CoV-2 in neonate was transmitted during the antenatal period through a vertical route. Other most common routes of transmission like respiratory aerosol from mother were interrupted as the baby was isolated immediately. Skin to skin contact, breastfeeding, fomite, and transmission from health care worker has been either prevented or controlled following standard protocols. Although it is difficult to establish vertical transmission, it is highly likely to be the cause of COVID-19 in our case.

During any disease outbreak, the possibility of vertical transmission and its effect on the developing fetus is of great concern. However, this is difficult to establish as it requires evidence from a variable point of time of gestational ages during pregnancy and in-depth evaluation of fetal outcome. As of yet, vertical transmission of SARS-CoV-2 has been thought to be possible in a minority of cases of maternal COVID-19 infection in the third trimester, with rates of infection being similar to those of other pathogens causing congenital infections.³

Among 936 neonates born to COVID-19 infected mothers³, 27 neonates had their nasopharyngeal swab positive for the viral RNA sent within 48 hours of life, the rate of vertical transmission was 3.2%. Similarly the rate was 2% in China and 2.7% outside China. Also, SARS-CoV-2 RNA was positive in 2.9% in cord blood, 7.7% of placenta samples and 0% of amniotic fluid.³ These findings implicate that vertical transmission of COVID-19 may be very likely with lower rate of transmission.

In a study, 86 neonates born to COVID-19 infected mothers were tested for vertical transmission, only 4 were positive (4.6%). Out of 4 positive cases, only one had symptoms which was fever.⁴ Among 83 neonate born to infected mothers, 3.6% tested positive.⁵ Both of above study implies possibility of vertical transmission with lower risk. However RT-PCR testing of amniotic fluid, placenta, or cord blood are required to establish virological evidence for intrauterine vertical transmission.⁵

SARS-CoV-2 infection is largely transmitted droplets and close contacts after delivery and less likely, through vertical transmission.³⁻⁷ Therefore, precaution measures during delivery and post-delivery remains vital in preventing COVID-19 in newborns.

However, more evidences are yet to be generated concerning the vertical transmission of COVID-19 and the ability of the virus to cross the placenta in utero; variation in susceptibility by gestational age, severity of maternal infection, fetal outcomes, clinical course in neonates, potential teratogenic effects, viral effects on the uterine vasculature and placental tissue.⁸ Evidences present are largely from third trimester studies thus the rates of vertical transmission and its effect on fetal morbidity and mortality in early pregnancy are difficult to assess.^{3,8} Thus, further studies during the first and second trimesters, focusing on long-term maternal and fetal outcomes are needed and RT-PCR testing of amniotic fluid, placenta, and cord blood to confirm these findings is highly recommended.

CONCLUSIONS

Vertical transmission in COVID-19 is a possibility. Despite this, the neonatal outcome is good. RT-PCR testing of amniotic fluid, placenta, and cord blood in addition to swab testing are necessary to firmly establish vertical transmission. Further studies are required on vertical transmission of COVID-19, especially during early pregnancy.

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