Detection of SARS-COV-2 in Placental and Fetal Membrane Samples

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A Research Letter

Condensation: Detection of SARS-CoV-2 RNA RT-PCR in placental and membrane samples after delivery

Short Title: SARS-COV-2 in Placenta and Fetal Membranes
Introduction: Since the first reports of the emergence of the novel coronavirus SARS-CoV-2 and its associated disease (COVID-19), concerns remain about whether the virus is transmissible in pregnant women from the mother to the fetus during either the antepartum period or the process of labor and delivery. One recent review reported that in a small number of cases, two PCR swabs of the placenta were sent in additional to neonatal and cord blood testing, and both placental PCR swabs were negative.1 Other studies have demonstrated the finding of SARS-CoV2 IgM in neonates born to mothers diagnosed with COVID-19 during pregnancy,2,3 findings that may indicate vertical transmission of the virus in utero. We report our experience with placental/membrane SARS-CoV2 RNA PCR swab results after delivery to a series of symptomatic mothers with confirmed COVID-19 infection in pregnancy.

Methods: IRB approval was obtained. All pregnant patients diagnosed with COVID-19 who gave birth between March 1, 2020 and April 20, 2020 at NYU Langone Health were identified by a search of the electronic medical record. Charts were reviewed for documentation of SARS-CoV-2 RNA RT-PCR testing sent from either the placenta or membranes within 30 minutes following delivery. PCR testing for SARS-COV-2 was performed using the cobas SARS-CoV-2 assay (Roche) or the Cepheid Xpert Xpress assay. Placental swabs were obtained from the amniotic surface after clearing the surface of maternal blood (placental PCR). Membrane swabs were obtained from between the amnion and chorion after manual separation of the membranes (membrane PCR).

Maternal COVID-19 illness was categorized as mild, severe, or critical.4 The time interval from maternal diagnosis of COVID-19 to delivery was calculated in days. Infants were tested with nasopharyngeal swabs for SARS-CoV-2 PCR between days of life 1 and
while hospitalized. Hospitalized infants were also assessed for clinical signs and symptoms, including fever, cough, and nasal congestion.

**Results:** Of 32 COVID-19 positive pregnant patients who gave birth in this timeframe, placental or membrane swabs were sent from 11 patients (Table). Three of 11 swabs were positive. None of the infants tested positive for SARS-CoV2 on days of life 1 through 5, and none demonstrated symptoms of COVID-19 infection.

**Discussion:** Of 11 placental or membrane swabs sent following delivery, 3 swabs were positive for SARS-CoV-2, all in women with moderate to severe COVID-19 illness at time of delivery. This is the first study to demonstrate the presence of SARS-CoV-2 RNA in placental or membrane samples. While there were no clinical signs of vertical transmission, our findings raise the possibility of intrapartum viral exposure. Given the mixing of maternal and fetal fluid and tissue at time of delivery, the origin of the detected SARS-CoV-2 RNA in our series is unclear. It may represent contamination from maternal blood, amniotic fluid, or COVID-19 infection of the membranes and amniotic sac. For those infants who were delivered vaginally, contamination with vaginal secretions is also a possible source, although prior studies on vaginal secretions have failed to demonstrate the presence of COVID-19.

Although all of our neonates tested negative in the first 5 days of life, many were born via cesarean deliveries with decreased length of exposure to these tissues, which may be associated with a decreased likelihood of vertical transmission. Additionally, nasopharyngeal testing immediately after delivery may not be the ideal approach to evaluate vertical transmission if exposure occurs at the time of delivery, as the virus may require a longer incubation period before these swabs convert to positive. In summary,
the presence of viral RNA by RT-PCR in placenta/membranes at the time of delivery suggests the need for further research into the possibility of vertical transmission.
References


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DOL= Day of Life, CD= Cesarean delivery, NSVD= Normal spontaneous vaginal delivery