

Probable Case of Vertical Transmission of SARS-CoV-2 in a Newborn in Mexico

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Established Facts

- Some coronaviruses have a vertical route of transmission.
- Vertical transmission has not been confirmed in SARS-CoV-2.

Novel Insights

- A positive baby was born to a positive asymptomatic mother.
- Vertical transmission was highly likely to have occurred.

Keywords

Severe acute respiratory syndrome coronavirus 2 · Vertical transmission · Epidemiology

Abstract

Background: Much remains unknown about the transmission of the SARS-CoV-2 virus. Pregnant women are considered part of the risk population, and vertical transmission of other coronaviruses has been suggested; however, this type of transmission in SARS-CoV-2 is believed to be unlikely. **Case Report:** A newborn delivered in term via cesarean section to

an asymptomatic but COVID-19-positive 35-year-old woman started with respiratory distress in the first 30 min of life. A chest radiograph revealed pneumothorax and ground glass opacities. Ventilatory support with continuous positive airway pressure was needed. Given the respiratory failure and the positive test from the mother, the patient was sampled for SARS-CoV-2 (RT-PCR) at minute 30 of life, with a positive result reported at 36 h of life. No complications had been present during pregnancy, and cardiac screening and blood cultures revealed no other etiologies. **Conclusion:** Vertical transmission was highly likely in this case. Clinicians should be alert and report similar cases.

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Introduction

In the end of 2019, a pneumonia of unknown cause originated in Wuhan, China. A new member of the family of the coronaviruses was discovered and later named SARS-CoV-2. As a new viral agent, all humans are vulnerable [1].

Much remains yet unknown about the transmission of this virus. It is believed that it shares, like others in this family, tropism for rhinopharyngeal secretions [2, 3]. It has also been found in feces, serum, urine, semen, tears, and conjunctival secretions [3–7]. Although pregnant women are considered part of the risk population, and a vertical transmission of other coronaviruses has been suggested [8], this type of transmission in SARS-CoV-2 was believed to be unlikely for several reasons: no cases had been reported; in neonatal cases of COVID-19, presence of SARS-CoV-2 in the placenta has not been reported, and most of the cases with mild respiratory symptoms are considered as adaptation in the context of a transient tachypnea of the newborn [9]; symptoms of reported neonatal cases had appeared at the earliest days after birth even when the mother was positive, and most of the neonatal cases were negative for the test [10].

So far, the possibility of COVID in neonates is apparently uncommon, and the rate of infection seems to remain small when the baby is born vaginally, breastfed, or allowed contact with the mother [11, 12]. Vertical transmission is of great concern for obstetricians and neonatologists for the risk it imposes on the newborn and is a major public health concern, for a new way of transmission demands different preventive measures.

Case Presentation

The mother of the patient is a 35-year-old woman who lives in Mexico City, with no prior medical conditions, in a normal weight range, with no history of smoking. This was her third pregnancy, with two prior cesarean sections. Blood type was AB negative. Following established institutional protocol for SARS-CoV-2 management, both parents were tested before admission, and both had a positive result for SARS-CoV-2 obtained by real-time reverse transcription polymerase chain reaction (RT-PCR) of a nasopharyngeal sample 2 days prior to delivery. They were both asymptomatic.

The newborn is a male, delivered by cesarean section at 38 weeks of pregnancy, with no complications during pregnancy, weighing 3,110 g, obtaining a 1-min Apgar score of 7 and a 5-min Apgar score of 8 and a Silverman score of 2, and requiring supplemental oxygen and oropharyngeal suctioning. After the delivery, given the positive test result in the mother, the newborn was not exposed to family members and was transferred to the Neonatal Intensive Care Unit in a solitary sealed room with independent ventilation with the CO-



Fig. 1. Chest X-ray showing left pneumothorax.



Fig. 2. Second chest X-ray showing resolved pneumothorax and ground glass opacities mainly in the right perihilar region.

VID-isolation technique (all personal protected with KN95 mask, glasses, double gloves, and Tyvek® Coveralls). At minute 30 of birth, an RT-PCR test for detection of SARS-CoV-2 in a sample of nose and throat swab was performed. He started with respiratory distress in the first 30 min of life needing supplementary oxygen with an oxygen reservoir reaching supplement oxygen up to 100%;

as there was no improvement, a chest X-ray was requested, showing left pneumothorax with an extension of over 30%, for which a pleural miniseal was placed reaching lung expansion (Fig. 1). However, ventilatory support with continuous positive airway pressure was still needed. At 12 h of life, a blood sample was obtained: Hb 14.6 g/dL, WBC 15,140, Neut 79%, Lymph 13%, Mono 8%, C-reactive protein 1.1 mg/dL, and procalcitonin 23.2 ng/mL. A new chest radiograph detected ground glass opacities mainly in the right perihilar region (Fig. 2). Wide spectrum antibiotics were started (ampicillin [50 mg/kg/do q8h] and cefotaxime [50 mg/kg/do q12h]). A transthoracic echocardiogram performed before intubation reported normal cardiac anatomy (normal mitral valve and nonpulmonary vein stenosis), systolic pulmonary pressure 60 mm Hg (70 mm Hg systolic systemic pressure) measured by aortopulmonary gradient 10 mm Hg, severe tricuspid insufficiency, moderate pulmonary insufficiency, mild dilatation of right cavities, normal biventricular function, no pleural-pericardial effusion, and coronaries without dilatation. At 20 h of life, the patient presented with clinical deterioration, and capillary blood gas analysis revealed transient mild acidosis (pH, 7.24; pCO₂, 55.4 mm Hg; pO₂ 55; bicarbonate, 23.4 mEq/L; base excess -4.7; and lactate 2.9); orotracheal intubation was placed with FiO₂ at 100%, and a milrinone 0.3 µg/kg/min infusion was started. After intubation, a slight improvement was observed: pH = 7.33; pCO₂ = 47 mm Hg; pO₂ = 51; bicarbonate = 24 mEq/L; base excess = -1.7; and lactate = 2.7.

At 36 h of life, the sample for SARS-CoV-2 was reported back as positive. He was reported as stable, still under mechanic ventilation. Blood tests results for inflammatory response were as follows: procalcitonin 38 ng/mL (<0.5), ALT 14 U/L, AST 79 U/L, LD 933 U/L (120–246), CK 922 UI/L (46–171), CK-MB 31 ng/mL (0–24), fibrinogen 265 mg/dL (200–400), and D-dimer 1.5 mg/dL (0.05–0.26). No other infectious agents were found in cultures. At day 3, the parents requested to be transferred to a public institution, and further decisions of treatment and diagnosis were out of our hands.

Seven days after delivery, we obtained permission in an institution with the necessary equipment for the analysis of the placenta, fallopian trumps, and cotyledon samples, preserved in formaldehyde, which were extracted by NucliSense EasyMag®; Biomerieux, and DNAeasy blood and tissue®; Qiagen, and then analyzed as the nose and throat swab with the StepOne Thermocycler (Applied Biosystems) according to Berlin protocol, with negative results for E and RdRP genes but positive for RNase P as internal sample control.

The patient was discharged for recovery from the public hospital at the 4th week, and a follow-up consultation at 3 months old was performed in our outpatient clinic, finding an asymptomatic baby, with normal saturation and respiratory pattern, with no need for supplementary oxygen nor inhaled bronchodilator therapy. There was no evidence of pulmonary sequelae.

Discussion

Some coronaviruses, such as 229E, OC43, NL63, and HKU1, which are common respiratory viruses, have proven to have a vertical route of transmission [8], and the vertical transmission of SARS-CoV-2 has indeed been suspected by other groups, although with limitations on the evidence necessary to establish causality given negative re-

sults of SARS-CoV-2 in the placenta [13–15]. However, there is a recent publication of a patient with fetal distress and positive RT-PCR SARS-CoV-2 in the placenta [16].

The early onset of symptoms (immediately after birth), the lack of comorbidities that could explain the evolution, the early damage in pulmonary tissue as shown in the thoracic X-ray, a positive test in the mother, a positive result (RT-PCR test) for SARS-CoV-2 in the patient, and the inflammatory response with no other infectious agents in cultures make this route of transmission highly probable in this particular case. Even if clinical complications could be explained by other factors, contagion could only have occurred in utero.

Important limitations should be outlined. A confirmatory RT-PCR test was needed. Both the transfer to another institution and a shortage of diagnostic tests in our country, especially at the time this case presented in the pandemic, impeded confirmation. Also, the inadequate management of the placenta, fallopian trumps, and cotyledon increases the possibility that the negative RT-PCR test in these tissues was a false-negative result [17, 18].

The purpose of this case report is to alert to the possibility of vertical transmission, even in asymptomatic pregnant women. Suspicion of COVID-19 in newborns with respiratory distress should exist and alert clinicians for precautionary measures both for the newborn and the health personnel. Establishing protocols for adequate preservation and testing of the placenta is an urgent need to confirm or discard beyond doubt this route of transmission.

Conclusion

We believe that vertical transmission was highly likely to have occurred in this case. Clinicians should be alert and take all the diagnosis and treatment protocols in positive mothers to report similar cases if found.

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Statement of Ethics

Written informed consent, for the anonymous publication of clinical information and any accompanying images of this case report, was obtained from the parents of the patient.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Mendoza-Hernández M.: managed the literature searches, substantial contributions to the conception of the work, revising it critically for important intellectual content, final approval of the version to be published, and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Huerta-Niño de Rivera I.: substantial contributions to the conception of the work, revising it critically for important intellectual content, final approval of the version to be published, and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Yoldi-Negrete M.: substantial contributions to the design of the work, drafting the work for important intellectual content, final approval of the version to be

published, and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Saviñon-Tejeda P.: substantial contributions to the conception of the work, revising it critically for important intellectual content, final approval of the version to be published, and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Franco-Cendejas R.: managed the literature searches, substantial contributions to the conception of the work, revising it critically for important intellectual content, final approval of the version to be published, and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. López-Jácome L.E.: substantial contributions to the conception of the work, revising it critically for important intellectual content, final approval of the version to be published, and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Navarro-Castellanos I.: managed the literature searches, substantial contributions to the conception and design of the work, drafting the work and revising it critically for important intellectual content, final approval of the version to be published, and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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