Early onset SARS-CoV-2 pneumonia in a preterm neonate – Probably acquired through vertical transmission

Dr Shilpa Kalane (drshilpakalane@gmail.com)  
Deenanath Mangeshkar Hospital, Pune

Dr Asha Gokhale  
Deenanath Mangeshkar Hospital, Pune

Dr Sampada Patwardhan  
Deenanath Mangeshkar Hospital, Pune

Case Report

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Abstract

With the increasing number of published case reports and studies, probability of newborns acquiring COVID-19 infection through vertical transmission is on rise. Although the modes of transmission for neonatal COVID-19 infection are becoming clearer, the clinical spectrum in the form of radiology and laboratory parameters have still not been studied well. We report a case of a preterm neonate, whose mother had tested positive for COVID-19 infection before delivery. The neonate was asphyxiated and had meconium aspiration syndrome. RT-PCR of her endotracheal secretions for COVID-19 tested positive within 24 hours of life and at 72 hours. The laboratory investigations were suggestive of cytokine storm syndrome (CSS) and the CT scan chest supported the diagnosis of COVID-19 pneumonia. This is probably the youngest neonate with COVID-19 infection showing CSS.

Introduction

There is still much unknown regarding the impact of COVID-19 infection on pregnancy. An increasing number of reports centre around mildly infected women showing no evidence of foetal infection, while a few reports suggest vertical transmission. Vertical transmission from mother to the baby, however small, will have profound health implications for obstetric and neonatal care. Here, we report a case study demonstrating probable vertical transmission of COVID-19 in a preterm neonate. This is probably the youngest neonate to have COVID-19 infection with clinical features of cytokine storm syndrome.

Case Study

A 29-year-old gravida 2, para 0, was admitted to our hospital in July 2020 for decreased fetal movements. She had a history of fever and cough 7 days before delivery and tested positive for SARS-CoV-2 by real-time polymerase chain reaction (RT-PCR). Her routine blood tests were normal, and the ultrasound examination showed oligohydramnios with a middle cerebral artery pulsatility index <5th centile with a biophysical profile of 6/8. Emergency caesarean section was performed, with an intact amniotic membrane, in full isolation. Amniotic fluid was meconium stained.

A female neonate was delivered at 32+3 weeks gestation with a birth weight of 1.34 kg. The neonate was resuscitated as per the current resuscitation guidelines [1,2]. The combined APGAR was 7/17 at 5 minutes. A strict isolation protocol was maintained throughout neonatal care. Initial chest X ray (CXR) was suggestive of pneumonia. Endotracheal (ET) secretions collected within 24 hours of life for RT-PCR were positive for the E and N genes of SARS-CoV-2. On day 2, the neonate had deterioration in respiratory
condition requiring HFOV and inhaled nitric oxide. The laboratory investigations (Table. 1) were suggestive of cytokine storm syndrome (CSS) and multi-organ dysfunction [3]. The neonate'sOI and P/F ratio were persistently high for 72 hours (40 to 60 and 32 to 60, respectively). Dexamethasone was administered following which improvement in respiratory function was observed. Echocardiography showed severe pulmonary hypertension. Repeat RT-PCR on ET secretions on day 4 of life was positive for the E and N genes of SARS-CoV-2. Computed tomography (CT) scan chest performed on the 7th day of life as per parents' request showed findings consistent with COVID-19 pneumonia (Fig. 1). The neonate succumbed on day 8 of life to multiorgan dysfunction.

Discussion

Our case represents a probable case of congenital COVID-19 infection in a live-born preterm neonate. Congenital infection is supported by the following findings: The mother was not in labor, the amniotic membranes were intact before birth, and a strict isolation protocol was maintained throughout neonatal care. The RT-PCR results tested within 24 and 96 hours of life were positive for SARS-CoV-2. Other investigations of raised inflammatory markers and findings of ground glass opacities with pneumonia on CT scan chest support the diagnosis of SARS-CoV-2 infection [4]. We have determined this case to be a probable case of congenital SARS-CoV-2 infection as opposed to a confirmed case because of lack of testing for the COVID-19 gene targets in placenta, cord blood or in NP swab taken at birth of the neonate.

Prematurity, MAS, asphyxia and early onset sepsis are the closest differentials to the mentioned clinical and laboratory findings. However, the absence of a clinical response to surfactant administration, the absence of typical radiological findings of MAS on CXR, raised IL-6 levels at 48 hours, and the chest CT scan showed ground glass opacities consistent with SARS CoV-2 pneumonia in the absence of any other infection and ET secretions positive for RT-PCR twice points towards COVID-19 infection [5,6].

Congenital SARS-CoV-2 infection may occur with a frequency not yet defined. All health care workers (HCWs) attending a suspected or confirmed COVID-19 mother's delivery or the neonate should recognize this risk and use appropriate personal protective equipment (PPE). Neonates should be tested as soon as possible for SARS-CoV-2 RNA in cord blood, placental specimens and nasopharyngeal swabs, without waiting the 24 hours indicated in the guidelines. (5). This would establish the prevalence of SARS-CoV-2 in neonates of infected women and allow classification of those infected based on the process (in utero, intrapartum or postpartum).

Declarations

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Conflicts of interest : None
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Table

Table. 1 Main laboratory findings in the neonate
|                         | DOL1  | DOL3   | DOL4  | DOL5  | DOL6   | DOL7  |
|-------------------------|-------|--------|-------|-------|--------|-------|
| **Blood cell count**    |       |        |       |       |        |       |
| WBC/L                   | 33130 | 12260  | 11620 | 11970 | 12850  | 18580 |
| Hb (g/dL)               | 17.4  | 10.7   | 12.7  | 10.6  | 11.4   | 8     |
| Platelets/L             | 255000| 99000  | 79000 | 73000 | 102000 | 79000 |
| Lymphocytes/L           | 42    | 7.4    | 4.6   | 9.8   | 11.2   | 16.7  |
| Neutrophils/L           | 49.8  | 82.7   | 84    | 81.6  | 63.9   | 57.5  |
| Monocytes/L             | 5.4   | 2.5    | 4.4   | 8.1   | 11.1   | 12.3  |
| **ABG**                 |       |        |       |       |        |       |
| pH                      | 6.89  | 7.18   | 7.24  | 7.42  | 7.12   | 7.39  |
| PCO2 (mmHg)             | 44    | 48     | 39    | 32    | 44     | 33    |
| PO2 (mmHg)              | 53    | 32     | 57    | 57    | 51     | 70    |
| BE (mmol/L)             | -24.7 | -10.5  | -10.7 | -3.7  | -15    | -4.2  |
| Lactate (mmol/L)        | 11.4  | 2.5    | 13    | 7.6   | 4.3    | 10    |
| OI                      | 34    | 56     | 38.5  | 21    | 14     | 3     |
| P/F                     | 53    | 32     | 39    | 95    | 85     | 233   |
| **Blood biochemistry**  |       |        |       |       |        |       |
| Na (mmol/L)             | 132   | 138    | 136   |       |        |       |
| K (mmol/L)              | 2.5   | 3.9    | 3.3   |       |        |       |
| Ca++ (mmol/L)           | 107   | 96     | 89    |       |        |       |
| Creatinine (mg/dl)      | 1.12  | 1.5    | 0.9   |       |        |       |
| CRP (mg/dL)             | 0.48  | 5.19   | 30.02 |       |        |       |
| PCT (mcg/L)             |       | 1.09   |       |        |        |       |
| Total Serum Bilirubin/Conjugated Bilirubin (µmol/L) | 9.28 / 0.68 | 16.1 / 1.53 | 13.15 / 1.85 | 9.12 / 1.58 |
| FDP (ng/ml)             |       |        |       |       | 905.2  |       |
| IL6 (pg/ml)             |       |        |       |       | >200   |       |
| PT/aPTTK                |       |        |       |       | 37.7 / 67.4 |       |
| **Blood culture**       | Sterile | Sterile | Sterile | Sterile | Sterile | Sterile |
*All samples were collected from umbilical arterial catheter. The blood cell count was suggestive of neutrophilic predominance with thrombocytopenia and anemia (non hemolytic). High IL6 and FDP levels were suggestive of cytokine storm in this neonate.

**Figures**

![CT scan chest (axial cut) done on day 7 of life is suggestive of interstitial infiltrates and bilateral ground glass opacities. These findings are consistent with COVID-19 pneumonia.](image-url)