International Journal of Pediatrics and Neonatal Health

Volume 5 Issue 4,
April 2021



**Citation:** S Kalane et al. (2021), Early onset SARS-CoV-2 pneumonia in a preterm neonate. Int J Ped & Neo Heal. 5:4, 33-36

**ISSN 2572-4355**

Published by
BiocoreGroup | https://www.biocoreopen.org/ijpn/archive.php

Case report

# Early onset SARS-CoV-2 pneumonia in a preterm neonate

Dr. S Kalane*[1], Dr. A Gokhale [2], Dr. S Patwardhan[3]

[1]*DNB Pediatrics, DNB Neonatology), Consultant, Deenanath Mangeshkar Hospital, Pune 04, India*

[2]*MD OBGY, Consultant, Department of Obstetrics & Gynecology, Deenanath Mangeshkar Hospital, Pune 04, India*

[3]*MD Microbiology, Head department of Microbiology, Deenanath Mangeshkar Hospital, Pune 04, India*

**Corresponding author:** S Kalane
Superspecialty Building, Deenanath Mangeshkar Hospital, Pune 411004, India.
**Tel No:** 02049153379, **E-mail:** drshilpakalane@icloud.com

**Article History:** **Received:** March 18, 2021;
**Accepted:** April 08, 2021;
**Published:** April 17, 2021.

**Keywords:**
SARS-CoV-2, preterm, Vertical transmission, Pneumonia

**Declaration Of Conflicting Interest:** The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Introduction

There is still much unknown regarding the impact of COVID-19 infection on pregnancy. An increasing number of reports center around mildly infected women showing no evidence of fetal infection while a few reports suggesting 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 CSS.

## Case study

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

A female neonate was delivered at 32+3 weeks gestation with birth weight of 1.34 Kg. The neonate was resuscitated as per the current resuscitation guidelines [1,2]. Combined APGAR was 7/17 at 5 minutes. Strict isolation protocol was maintained throughout the 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 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 lab investigations (Table. 1) were suggestive of cytokine storm syndrome (CSS) and multi organ dysfunction [3]. The neonate's OI and P/F ratio was persistently high for 72 hours (40 to 60 and 32 to 60 respectively). Injection Dexamethasone was admin-istered following which improvement in respiratory function was observed. Echocardiography showed severe pulmonary hypertension. Repeat RT-PCR on ET secretions at 96 hours of life was positive for E and N genes of SARS-CoV-2. Computed tomography (CT) scan chest done as per parent's request showed findings consistent with COVID-19 pneumonia (Fig. 1). The neonate succumbed to multi organ dysfunction on day 8 of life.

| | 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 | | |

**Table 1** Main laboratory findings in the neonate

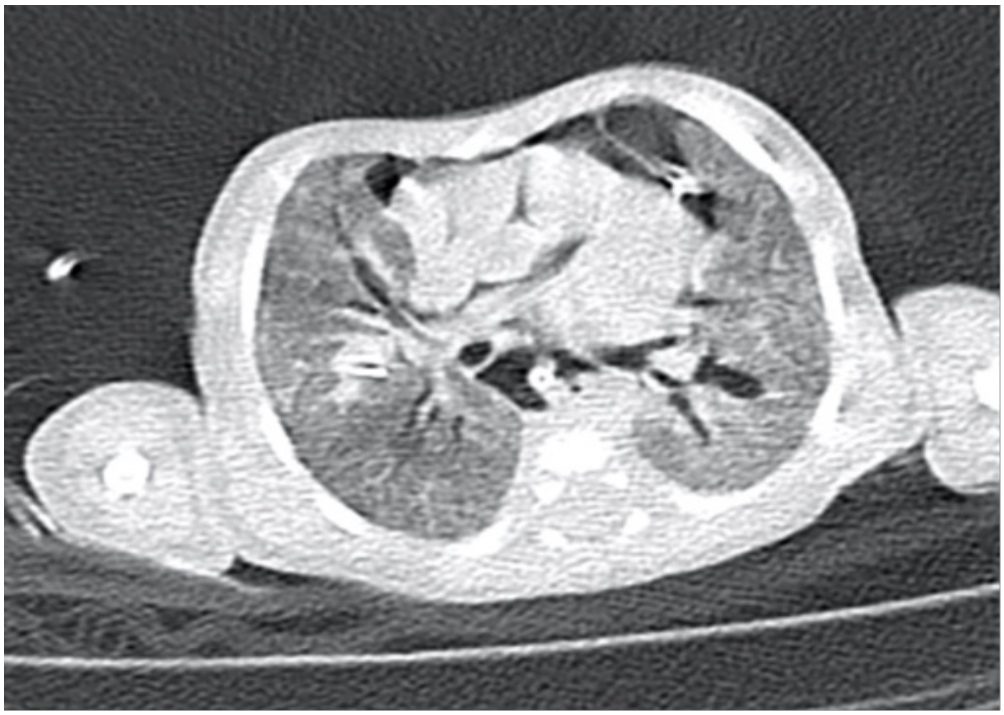

Fig 1 CT scan chest done on day 7 of life is suggestive of interstitial infiltrates and bilateral ground glass opacities. These findings are consistent with COVID-19 pneumonia.

## Discussion

Our case represents a case of congenital COVID-19 infection in a live born preterm neonate probably acquired through vertical transmission. Vertical transmission is supported by the following findings: Mother was tested RT-PCR positive 7 days before delivery, she was not in labor, the amniotic mem-branes were intact before birth, strict isolation protocol was maintained throughout the neonatal care. The RT-PCR tested on neonate's ET secretions within 24 and at 96 hours of life were positive for SARS-CoV-2 [2, 4]. Other investigations of raised inflammatory markers and findings of ground glass opacities on CT scan chest in presence of sterile blood and ET secretions for the other organisms, support the di-agnosis of SARS-CoV-2 pneumonia [5]. We have determined this case to be a probable case of vertical transmission 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 absence of clinical response to surfactant administration, absence of typical radiological findings of MAS on CXR, raised IL-6 levels at 48 hours, sterile blood cultures (test-ed at 3 different time points) and ET secretions for gram positive or gram negative organisms or fungus make these differentials an unlikely cause [6].

Congenital SARS-CoV-2 infection may occur with a frequency not yet defined. All health care work-ers (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 guideline [2]. 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).

**Conflicts of interest:** None

**Funding:** None

## Authors contribution:

- Dr. S Kalane - participated in conceptualization, literature search, drafting the article, and approval of the final manuscript.
- Dr. A Gokhale – contributed in substantially revising the article, literature search (obstetric) and ap-proval of the final manuscript.
- Dr. S Patwardhan – contributed in drafting the article, literature search (virus specific) and approval of the final manuscript

**Acknowledgment:** We thank Dr Uday Devaskar for his valuable inputs while preparing the manuscript. We also thank Dr Suneel Godbole, Dr Parikshit Prayag, Dr Rajan Joshi on their important inputs to the initial draft of the manuscript.

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