



A RARE CASE OF NEONATE WITH SEVERE LUNG DISEASE SECONDARY TO COVID 19 DISEASE

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ABSTRACT Coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome Corona virus 2 (SARS-CoV-2), has caused a global pandemic affecting many countries. The disease is affecting all age groups but data so far has shown that infants and children seem to be at a lower risk of severe infection. This case emphasizes that neonates too can have life-threatening pulmonary disease that mimics a similar disease course to that described in adults with COVID-19 infection. We report a 21-day-old neonate who presented with fever and significant positive history of COVID 19 infection in family and developed acute respiratory distress syndrome (ARDS). The SARS-CoV-2 polymerase chain reaction (PCR) of nasopharyngeal swab was positive and chest computed tomography had classical changes of COVID 19 infection. Good hydration, lung protective strategies, intravenous immunoglobulin and supportive care led to complete recovery in the patient.

KEYWORDS : acute respiratory distress syndrome (ARDS), Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), Elliptical cricoid, ground glass opacities (GGO), intravenous immunoglobulin (IVIG).

INTRODUCTION

SARS-CoV-2, responsible for the coronavirus disease 2019 (COVID-19), was declared as a pandemic on, 11th March, 2020. COVID-19 infection can affect all age groups but the disease is usually considered to be milder in children than in adults, however, severity in neonates is unknown¹. The presentation of COVID-19 in children and neonates can range from asymptomatic infection, non-specific symptoms to severe respiratory distress. Neonatal transmission of SARS-CoV-2 occurs mainly through droplets from infected mothers / caregivers or through contact with contaminated biological material. Here we report a rare case of 21 day old neonate who developed ARDS with COVID-19 pneumonia and was successfully managed.

CASE REPORT

A twenty-one day-old late preterm male COVID-19 positive neonate was admitted to our neonatal intensive care unit (NICU) in a COVID-19 dedicated institute with complaints of moderate grade fever and convulsions for one day. There was no history of lethargy, irritability or decreased oral intake. On day 15, he was admitted in a private setup with fever and convulsions, where he was screened for sepsis, meningitis and a COVID -19 test as parents were COVID-19 infection positive.

Physical examination of the neonate revealed he was febrile (99° F) with heart rate 166/min, SpO₂ 99 %, blood sugar 120mg/dl and normal systemic examination with no respiratory distress. On further evaluation, septic screen, ionic calcium 1.1 mmol/l (0.8-1.3mmol/l), serum magnesium 2.6 (1.2-2.6 mg/dl), urine microscopy and chest radiograph were all normal.

Over the course of next couple of days, the neonate developed respiratory distress and had a stormy course. Repeat chest radiograph and chest computed tomography (CT) revealed collapse consolidation of left lower lobe with typical patchy and confluent areas of consolidation and ground glass opacities (moderately severe disease, 50-75% involvement) (Fig 1). The baby was managed with oxygen initially by continuous positive airway pressure (CPAP) flow 2-4 L/min and PEEP of 5mmHg but he had worsening distress and with SpO₂ <90%, so was considered for mechanical ventilation. However, there was difficulty in intubating the baby despite coordinated efforts

by a team of pediatrician, otorhinolaryngologist and anaesthetist. Ultimately, we had to resort to emergency tracheostomy and ventilate the neonate.

Patient still continued to deteriorate and his oxygenation index was 25 and was suggestive of acute respiratory distress syndrome (ARDS). At this time, we also evaluated for cytokine storm and it revealed serum ferritin 1502 (22-322ng/ml), C-Reactive Protein (CRP) of 200mg/dl, D-dimer of 13.95 (<0.80µg/ml), lactate dehydrogenase (LDH) 980 (220-430 U/L) and Interleukin-6 of 308pg/ml (<4.40). To curtail the storm antibiotics were upgraded and intravenous immunoglobulin (IVIG) at 0.5 gm/kg/day was given for 5 days. Lung protective ventilation strategies with appropriate high PEEP; low tidal volume (4-6 ml/kg) and with good chest physiotherapy, led to complete recovery.

CT neck with virtual bronchoscopy was done after child was extubated and the report was normal. A zero-degree telescopic laryngeal assessment was done which revealed bilateral vocal cord abduction movements restricted and on further advancement of the scope beyond glottis an elliptical cricoid was visible, which was the reason for difficult intubation. Physiotherapy and supportive care was continued and the baby was discharged on day 62 of life with tracheostomy in situ. He was planned for check bronchoscopy every 3 months till abduction movements of cord are achieved and larynx grows and the airway improves. On follow-up at 2 months the child is thriving well and has no problems on home tracheostomy care.

DISCUSSION:

There are limited studies on neonatal COVID-19 infection and there is no clear evidence of vertical transmission despite some reports suggesting this possibility in neonates.^{2,3} Horizontal transmission seems to be the most likely route of SARS-CoV-2 infection, as was the case even in our patient. In the largest pediatric population-based study with 2143 cases, over 90% ranged from asymptomatic to moderate in their clinical presentation⁴. This study also showed that the proportion of severe and critical cases in under 1 year of age was 10.6%, compared to 7.3, 4.2, 4.1 and 3.0% among the 1-5, 6-10, 11-15 and > 15 year subsets respectively, suggesting that infants may be at higher risk of severe respiratory failure than initially thought.⁴ Another systematic

review of 2228 (children and newborns) revealed that (92%) were asymptomatic and those who were symptomatic had either fever (96%) or cough (91%) as the most common manifestation.⁵

The management protocol of a severe COVID-19 infection in neonates is still evolving. Chest CT scan helps in early identification of classical COVID-19 findings which range from GGO, local patchy shadow, consolidation with surrounding halo sign, fresh mesh shadow and tiny nodules.^{6,7} COVID-19 pneumonia is associated with a severe inflammatory response, including high pro-inflammatory cytokines such as interleukin-6 (IL-6) which were observed in our case. By the end of first week, some patients may present with hypoxemia and hypoperfusion and in due course may develop life threatening complications like ARDS, myocarditis, septic shock, disseminated intravascular coagulation, multisystem inflammatory syndrome, acute kidney injury or liver dysfunction.⁸

The pediatric mechanical ventilation consensus 2020 from the European Society for Pediatric and Neonatal Intensive care recommends oxygen supplementation to maintain SpO₂ > 88%, Oxygenation Index (OI) <4 or Oxygen Saturation Index (OSI) <5 for infants with ARDS.⁹ CPAP or non-invasive ventilation (NIV) should be used as a first line approach with due risk of aerosol contamination and strict use of personal protective equipment (PPE). Severe cases should be managed with appropriate lung protective strategies, allowing permissive hypercapnia and accepting pH 7.20.⁹

No specific antiviral drugs have been proven to be effective in neonates as per currently available data. IVIG as an early adjuvant treatment in

critical patients at 0.3–0.5 g/kg/day for 5 days has shown to have better efficacy in treating severe COVID-19 patients.^{10,11}

Elliptical cricoid, is a rare congenital subglottic stenosis and usually presents with respiratory distress, stridor, recurrent croup or upper airway obstruction. Neck radiograph reveals hourglass deformity of subglottic airway and bronchoscopy can clinch the diagnosis.¹² The need for laryngotracheal reconstruction is rare as the larynx grows with age and the airway improves.

To conclude this case emphasis that severe presentation in neonates are being increasingly encountered as more cases are being reported. Fever as a symptom is a hallmark for COVID-19 and screening of all newborns with fever should be practiced rigorously during this pandemic times.

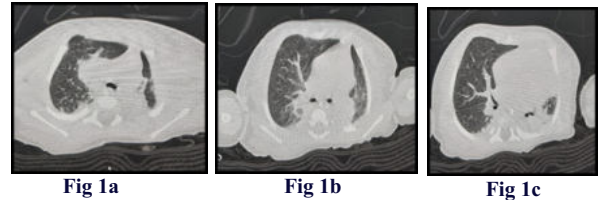


Figure1 CT images reveal---collapse consolidation of left lower lobe with typical patchy and confluent areas of consolidation, surrounding ground glass opacities (GGO) in both upper lobe (Fig 1a), lingual lobe (Fig 1b) and right & left lower lobe (Fig 1c).

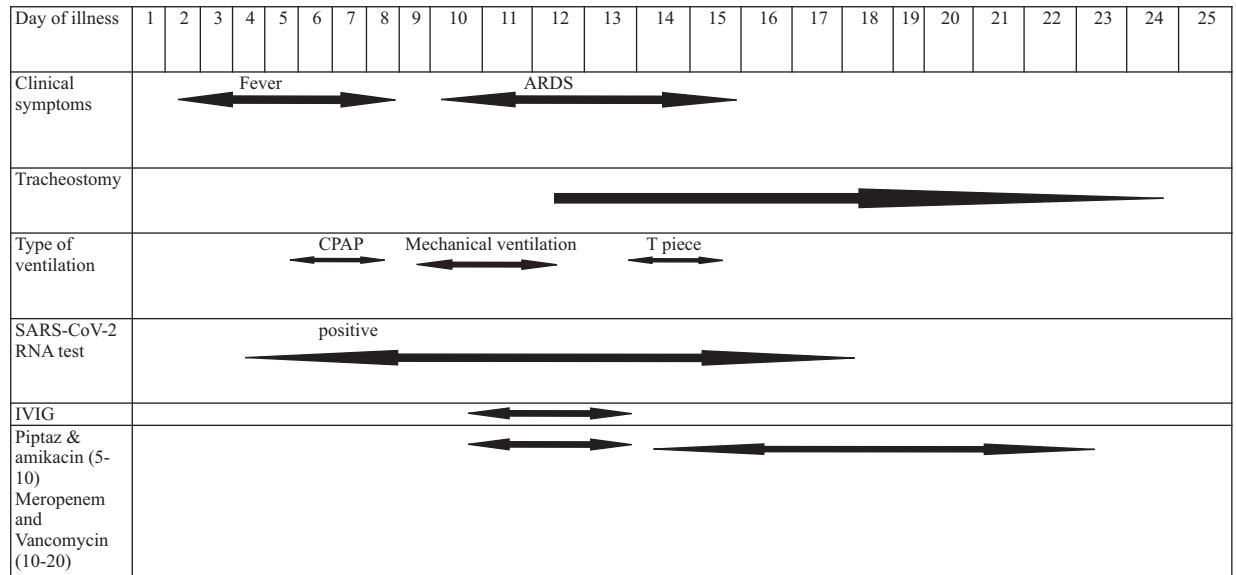


Fig 2: - Timeline of clinical course of SARS-CoV-2 infection in our neonate with ARDS

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