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Case Report

Multisystem inflammatory syndrome-neonate: youngest COVID survivor

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ABSTRACT

The novel corona virus disease (COVID-19) caused by the severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) is a global public health concern, primarily transmitted through respiratory droplets; though other routes of transmission are documented but not been fully demonstrated. At risk included all age groups, somehow for reasons unknown infants and children appears to be at a lower risk of severe infection, but recently children with hyper inflammatory syndrome and multi-organ dysfunction associated with COVID-19 have been increasingly reported. We report a case of 31-week neonate of 1.292 kg confirmed with SARS-CoV-2 infection, at birth, born to a COVID positive mother, initially developed respiratory distress at birth and abrupt progression to severe distress and later developed pneumothorax and hyper-inflammation (MIS-N). Respiratory support, corticosteroids, enoxaparin, antimicrobials, and other preterm care were given, and finally recovered and discharged after 30 days (1.812 kg). This case highlights the severe presentation of COVID-19 in a pre-term neonate. To the best of our knowledge this is apparently the youngest covid survivor till date reported in world. Clinical data on COVID-19 in new-born is extremely limited, so it is important to understand that these conclusions are based on limited data and our understanding will continue to evolve.

Keywords: COVID-19, Hyper-inflammation, MIS-N, Preterm, Pneumothorax

INTRODUCTION

COVID-19 infection has led to a global pandemic apparently sparing no age group, even neonates. Paediatric population appears to be relatively less affected. Among various modes of transmission reported, vertical transmission from mother was also documented and reported but rare. Although rare, few cases of fetal inflammatory response syndrome (FIRS) and multisystem inflammatory syndrome-neonate (MIS-N) have been reported.[3] Here we present a case of premature newborn infant infected with severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) associated with MIS.

CASE REPORT

A 31-week gestational age, preterm female neonate weighing 1.292 kg born to COVID positive primi mother on 01 May 2021, 7:21 pm at a tertiary hospital in Delhi-NCR, via lower segment caesarean section (LSCS) due to premature rupture of membranes with APGAR scores 7/10 and 8/10 at 1 min/5 min. As per COVID protocol, neonate was isolated, transferred to COVID-neonatal intensive care unit (NICU) under strict precautions after routine new-born care. In view of severe respiratory distress, neonate was ventilated with conventional mechanical ventilation. Early rescue surfactant (curosurf 2.5 ml/kg) was administered as X ray chest revealed hyaline membrane disease changes (Figure 1) and later repeat surfactant was administered after 6 hours as baby continued to have distress and X ray still had ground glass opacities (Figure 2). Nasopharyngeal-oropharyngeal swabs taken at birth, were positive for SARS-CoV-2 by rapid antigen and real time-polymerase chain reaction (RT-PCR). On day-3 of life, baby was extubated but had respiratory distress for which high-flow nasal cannula

(HFNC) support was required for next four days. On day-4, neonate was hemodynamically unstable, required inotrope support. Suspecting MIS-N, inflammatory markers were sent which revealed hyper-inflammation, results in Table 1. 2D echocardiography (ECHO) screening was done for cardiac involvement as pro-brain natriuretic peptide (pro-BNP) was elevated (2543 pg/ml) had no significant findings. Multi system involvement with respiratory distress, cardiogenic shock, lymphopenia were observed in our case. Dexamethasone (0.15/kg/dose TDS) and enoxaparin (1 IU/kg/dose BD) were started. On day-6, child developed right sided pneumothorax (Figure 4), as child was hemodynamically stable, no active intervention done and later resolved spontaneously. Later inflammatory markers were monitored at regular intervals which were decreasing (Table 1). On day-10 of illness, baby developed petechiae, so enoxaparin was stopped after a course of 7 days, and as inflammatory markers were decreasing, steroid dose was tapered and finally stopped with a duration of 14 days. Along with this, child was simultaneously treated with antimicrobial coverage as per unit protocol and stopped when blood culture reported sterile. Moreover, the neonate had newborn jaundice, hypocalcemia, anemia of prematurity, which were managed accordingly. Standard preterm care was given as child was premature and very low birth weight. Infant was discharged from the hospital after a total duration of 1-month NICU stay after routine screening tests as per our center protocol.

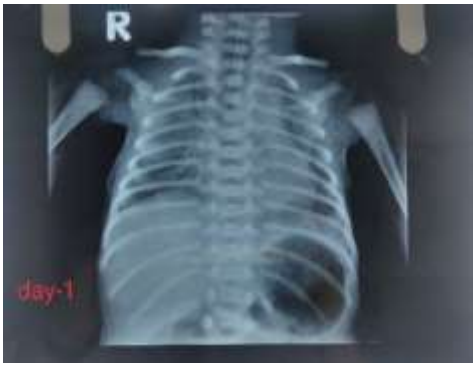

Figure 1: Day-1.

Figure 2: Day-2.

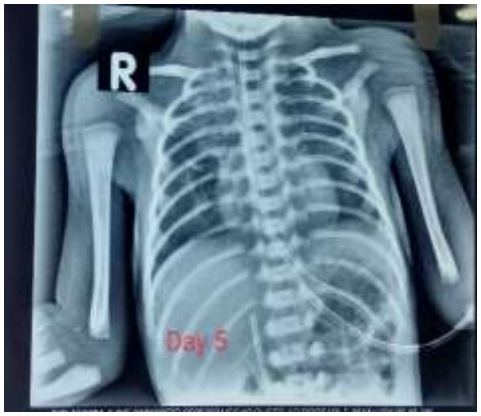

Figure 3: Day-5.

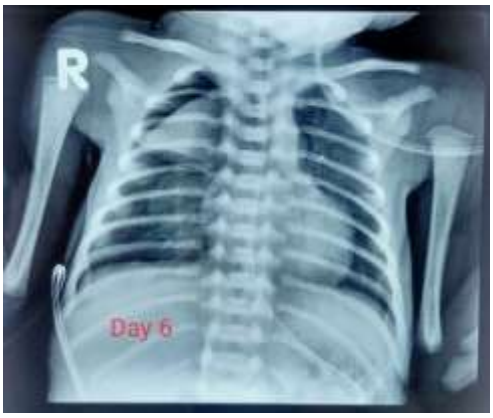

Figure 4: Day-6.

Table 1: Inflammatory markers.

Marker	Day-4	Day-7	Day-10
LDH (u/l)	1002.3	505	595
Procalcitonin (ng/ml)	11.66	0.272	0.165
D dimer (ng/ml)	475	251.9	470
Pro BNP (pg/ml)	2543	2284	907
Ferritin (ng/ml)	234	Not repeated	

Table 2: Other investigations.

Parameters	Day -1	Day -3	Day -5	Day-10	Day-29
Hemoglobin (gm/dl)	18	13	15	12	11
TLC	14k	4	15	15.9	8
Neutrophils (%)	48	70	59	50	41
Lymphocytes (%)	42	18	29	37	43
Platelets (k)	229	138	168	242	435
CRP (mg/l)	1.1	2.3	1.6	0.9	0.6

TLC: total leukocyte count, CRP: c reactive protein

Table 3: Other investigations.

LFT	Range	RFT	Range
A/G ratio	1.95	Blood urea (mg/dl)	39
Alkaline phosphatase (u/l)	171	Creatinine (mg/dl)	0.89
Albumin (g/dl)	3.70	Potassium (mmol/l)	4.49
Globulin (g/dl)	1.90	Chloride (mmol/l)	109.7
S. bilirubin (mg/dl)	4.37	Sodium (mmol/l)	134.8
SGOT (U/l)	30		
SGPT (U/l)	49		

DISCUSSION

The worldwide pandemic of COVID-19 caused by SARS-CoV-2 is a single-stranded ribonucleic acid (RNA) virus. The first case of COVID-19 in India was reported on 30 January 2020. India currently has the largest number of confirmed cases in Asia.[4] As of 23 May 2021, India has the second-highest number of confirmed cases in the world (after the United States) with 26.7 million reported cases of COVID-19 infection and the third-highest number of COVID-19 deaths (after the United States and Brazil) at 307,231 deaths. This virus is transmitted across humans, primarily through respiratory droplets and contact. There is no clear cut evidence of vertical transmission but a recent report has demonstrated the transplacental transmission of SARS-CoV-2 with clinical manifestation in the neonate as in this case, which confirms that mother-to-infant transmission is possible.[5,6] Here neonate was born by emergency caesarean with the premature rupture of the membrane and with airborne transmission precautions. No umbilical cord or placenta tests were performed, so whether the SARS-CoV-2 infection was acquired by intrauterine transmission cannot be confirmed, but nosocomial infection can be ruled out as nasopharyngeal and oropharyngeal swabs samples taken immediately after birth tested positive for SARS-CoV-2, suggesting intrauterine vertical transmission. Data on serological testing from larger cohorts will give more insight into the transmission patterns. The immature immune system, immaturity of angiotensin-converting-enzyme 2 receptors, principal target of SARS-CoV-2 virus, and passive transfer of IgG antibodies may result in less inflammation. Milder illness, and hastened recovery in neonates and infants compared to adults. In a systemic review, most of the infected were either asymptomatic or had mild symptoms such as rhinorrhoea, cough, and fever. Moderate to severe symptoms like respiratory distress, clinical evidence of multiorgan failure have been observed as well. Unlike children, most COVID-positive neonates were symptomatic and required intensive care.[7] It remains unclear whether the laboratory parameters like leukopenia, lymphopenia, thrombocytopenia, and elevated inflammatory markers used to monitor severity of COVID-19 disease in adults can be applicable in neonates as well.[8] In our case we monitored these parameters which were abnormal as mentioned in Table 1. Thus, based on the limited data available so far, we postulate these parameters can be monitored to determine severity of covid-19 diseases in neonates. Limited articles are available regarding the use of computed tomography (CT) scan for diagnosis and progression of disease. In our case monitored with serial chest X-ray.

This case demonstrates severe form of COVID-19 infection and rapid progression to hyperinflammation (MIS-N) within three to four days after onset of symptoms. Management of COVID-19 positive neonates is mostly symptomatic and remains supportive including supplemental oxygen, respiratory support, fluid resuscitation, temperature control. Currently, use of remdisivir, tocilizumab in neonatal COVID-19 disease is under trial. Rarely a novel condition of severe COVID-19 – MIS-N, characterized by, elevated inflammatory markers and high pro and anti-inflammatory cytokines has been reported. These cases were treated with steroids, which hasten recovery.[9,10]

Further study in neonates and infants is needed to elucidate the mode of transmission, risk factors for developing MIS-C and disease severity.

CONCLUSION

Clinical data on COVID-19 in new-born more so in preterm is still limited especially in locations of limited resources like India. Till now very few cases suggestive of MIS-N associated with infection by SARS-CoV-2 were reported. This case report documents the occurrence of hyper-inflammation and multisystem involvement in neonates (as respiratory/cardiogenic shock/lymphopenia in our case) as well recommends screening all neonates with the severe COVID-19 infection to rule out hyper-inflammation and identifying the subset of patients for whom should be treated. Pre-emptive anticipation for increased requirement of surfactant dose, conservative ventilator and HFNC setting, using chest X-ray for monitoring, vigilant for pneumothorax and vigilant use of enoxaparin appears to be key. Currently, there is limited information about risk factors, pathogenesis, clinical course, and treatment of MIS-N. Therefore, it is suggested to report such cases to improve our knowledge. Finally, it is important to understand that these conclusions are based on limited data and our understanding will continue to evolve.

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REFERENCES

1. Wang W, Xu Y, Gao R, Lu R, Han K, Wu G, Tan W. Detection of SARS-CoV-2 in Different Types of Clinical Specimens. JAMA. 2020;323(18):1843-4.
2. Singh SS. Premature baby weighing just 1.3 kg overcomes COVID-19 after 30-day fight. Available at: https://www.thehindu.com/news/national/other-states/premature-baby-weighing-just-13-kg-overcomes-covid-19-after-30-day-fight/article32576847.ece. Accessed on 12 February 2021.
3. McCarty KL, Tucker M, Lee G, Pandey V. Fetal Inflammatory Response Syndrome Associated With Maternal SARS-CoV-2 Infection. Pediatrics. 2021;147(4):e2020010132.
4. India Fights Corona COVID-19. MyGov.in. Govt of India. Available at: https://www.mygov.in/covid-19. Accessed on 12 February 2021.
5. Vivanti AJ, Vauloup-Fellous C, Prevot S, Zupan V, Suffee C, Do Cao J, Benachi A, De Luca D. Transplacental transmission of SARS-CoV-2 infection. Nat Commun. 2020;11(1):3572.
6. Kotlyar AM, Grechukhina O, Chen A, Popkhadze S, Grimshaw A, Tal O, Taylor HS, Tal R. Vertical transmission of coronavirus disease 2019: a systematic review and meta-analysis. Am J Obstet Gynecol. 2021;224(1):35-53.
7. Dhir SK, Kumar J, Meena J, Kumar P. Clinical Features and Outcome of SARS-CoV-2 Infection in Neonates: A Systematic Review. J Trop Pediatr. 2020;59.
8. Zeng F, Huang Y, Guo Y, Yin M, Chen X, Xiao L, et al. Association of inflammatory markers with the severity of COVID-19: A meta-analysis. Int J Infect Dis. 2020;96:467-74.
9. Farias ECF, Justino MCA, Mello M. Multisystem inflammatory syndrome in a child associated with coronavirus disease 19 in the Brazilian Amazon: fatal outcome in an infant. Rev Paul Pediatr. 2020;38:e2020165.
10. Khaund Borkotoky R, Banerjee Barua P, Paul SP, Heaton PA. COVID-19-related potential multisystem inflammatory syndrome in childhood in a neonate presenting as persistent pulmonary hypertension of the newborn. Pediatr Infect Dis J. 2021;40(4):162-4.

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