Shock and dyselectrolytemia in a neonate with late-onset COVID-19 infection

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SUMMARY

Most reports of COVID-19 in neonates suggest that they are infected postnatally and present with gastrointestinal or respiratory symptoms. We describe a neonate who had community-acquired COVID-19, and presented with late-onset sepsis and developed dyselectrolytemia. The 26-day-old male baby had fever, feed refusal and shock. Rapid antigen test for SARS-CoV-2 by nasopharyngeal swab was positive and levels of circulating inflammatory markers were high. The baby was supported with antibiotics, and inotropic and vasopressor drugs. He had seizures and bradycardia due to dyselectrolytemia on day 2 of admission. On day 3, he had respiratory distress, with non-specific chest radiographic findings, and was managed with non-invasive support for 24 hours. The baby was discharged after 8 days. On serial follow-up, he was breastfeeding well and gaining weight appropriately with no morbidity. Our report highlights a unique presentation of COVID-19, with late-onset infection and shock-like features along with dyselectrolytemia and seizures.

BACKGROUND

While our knowledge of COVID-19 has developed at a rapid pace, we still lack adequate information regarding COVID-19 in neonates, leading to diagnostic and therapeutic challenges. The risk of horizontal transmission of COVID-19 in neonates through contact with an infected individual seems to be the same compared with the general population.[1] Vertical transmission of the disease from infected mothers occurs at a low rate, similar to that for other congenital infections.[2] Most reports of COVID-19 in neonates suggest that they are infected postnatally and present with gastrointestinal or respiratory symptoms. We describe a neonate who had community-acquired COVID-19, and presented with late-onset sepsis with shock and developed dyselectrolytemia.

CASE PRESENTATION

A 26-day-old male baby, who had been successfully treated for early-onset sepsis and intestinal perforation at day 3 of life, was brought with a history of fever and reduced feeding of 1-day duration. The baby had been born to a 25-year-old gravida 2, para 1 and living 1 mother through emergency caesarean section for uteroplacental insufficiency at 37+1 weeks of gestation, with birth weight of 2915 g and 1 min and 5 min APGAR scores of 7 and 9, respectively. From 24 hours of life onwards, the baby had multiple episodes of bilious vomiting with abdominal distension, and early-onset *Enterococcus faecium* sepsis with intestinal perforation at 40 hours of life. These were managed with a course of antibiotics and ileal resection with anastomosis on day 3 of life. The postoperative period was uneventful. After successful breastfeeding establishment, the baby had been discharged on day 16 of life without any morbidity.

On his second admission to the hospital, at 26 days of life, the baby had temperature of 36°C, heart rate of 176 beats per minute, blood pressure of 63/35 mm Hg, respiration of 66 breaths per minute and oxygen saturation of 95% in room air. Perfusion was poor, with prolonged capillary refilling time and feeble pulses. White cell count was 10 x 10^9/L, with 82% neutrophils. Inflammatory markers were elevated in serum: 69.7 mg/dL C reactive protein (CRP), 424.7 pg/mL brain natriuretic peptide (BNP), 279 IU/L lactate dehydrogenase, 1090.6 ng/mL ferritin and 1319 ng/mL d-dimer. Cerebrospinal fluid and urine examinations were normal, as were serum levels of sodium (138 mEq/L), potassium (5 mEq/L), ionised calcium (1.12 mmol/L) and creatinine (0.5 mg/dL). Nasopharyngeal swab was reactive for SARS-CoV-2 in a rapid antigen test. Radiography of the chest was normal.

The baby was managed with two crystalloid fluid boluses at 10 mL/kg body weight followed by dobutamine infusion as functional echocardiography showed poor cardiac contractility, and intravenous fluids. In view of persistent hypotension with peripheral vasodilatation, epinephrine infusion was given. Cefotaxime was started after sending blood culture. Parents were asymptomatic and their nasopharyngeal swabs were negative for SARS-CoV-2 in reverse transcription (RT) PCR test. Other household members did not have any symptoms of viral infection and were not tested for the virus as they refused.

On day 2 of admission, dobutamine and epinephrine infusions were tapered and stopped. On the same day, the baby had an episode of multifocal clonic seizures with no recurrence. At this timepoint, serum levels of sodium, potassium, magnesium and CRP, respectively, were 120 mEq/L, 9.8 mEq/L, 1.96 mg/dL and 42 mg/L (figure 1). The hyponatraemia was managed with an infusion of 3% sodium chloride. Hyperkalaemia was managed with sodium bicarbonate, calcium gluconate and insulin dextrose along with potassium binders. The baby developed bradycardia on day 2 of admission, which settled during the course of hyperkalaemia management. Potassium and sodium levels normalised in the next 2 days. Respiratory distress was observed on day 3 of admission, with X-ray of

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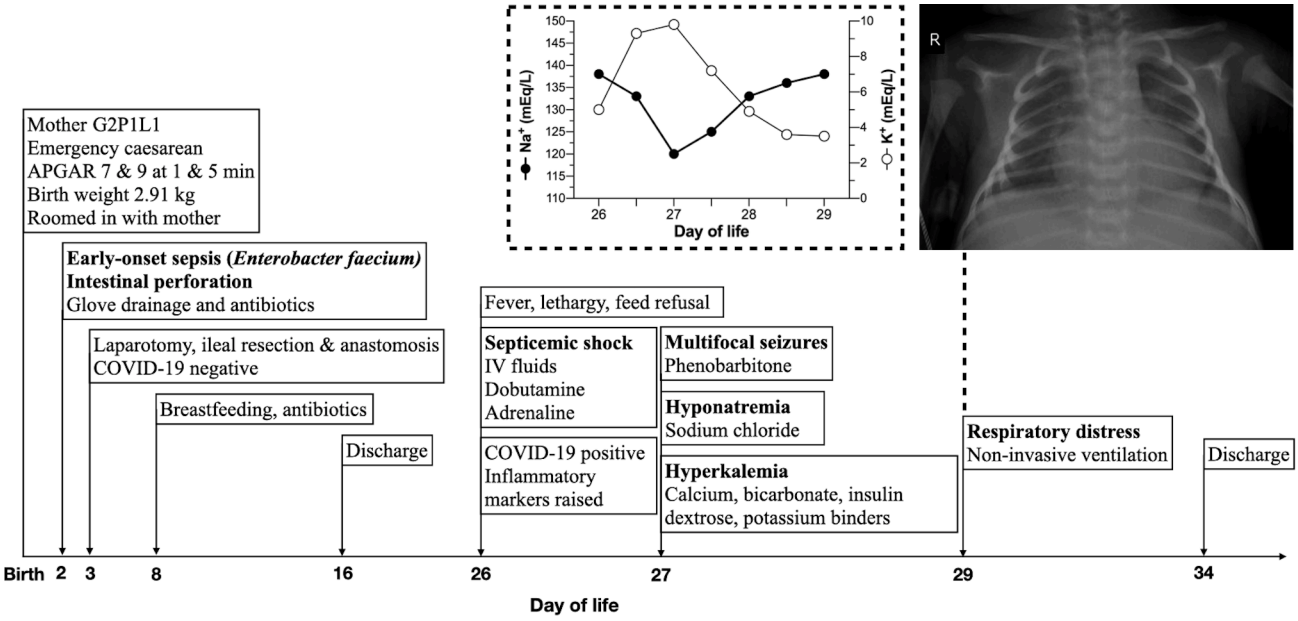

Figure 1 Clinical course of the neonate. Insets show serum sodium and potassium levels during days 26–29 of life, and X-ray of the chest at day 29.

the chest showing minimal bilateral infiltrates in the perihilar areas with low lung volume (figure 1), and was managed with non-invasive respiratory support for a day. Antibiotics were stopped after 5 days as blood cultures remained sterile. His cranial and renal ultrasound were normal.

OUTCOME AND FOLLOW-UP

The baby was discharged on oral feeds after 8 days of admission on oral feeds and followed up daily for a week over telephone. We did not retest the neonate prior to discharge to confirm normalisation of d-dimer and BNP, since the baby had full clinical recovery and was breastfeeding well. At subsequent follow-up in person at 6 weeks and 10 weeks of age, the baby was accepting breast feeds, had gained weight and had partial head holding with social smile, and had no sign of delayed development. Clinical course of the neonate is depicted in figure 1.

DISCUSSION

This report highlights a case of severe neonatal COVID-19 infection presenting with shock and dyselectrolytemia. Detection of the SARS-CoV-2 virus in nasopharyngeal swab by RT-PCR is diagnostic of virus infection. This and additional detection of the virus in the same sample by antigen test in our case is supportive of COVID-19 as the infective aetiology of the neonate's condition. Postnatally acquired virus is usually from contact with caregivers. As per a recent review,[3] one out of three neonates admitted with the infection were from home, as was the case for our baby. In a case series from India, there was no identifiable contact source for half of infected neonates.[4] In our case too, none of the household contacts (nine adults and a child) were symptomatic and parents were negative for the virus in RT-PCR test of nasopharyngeal swabs. Though presentation with fever and shock in the fourth week of life, as in our case, can also occur due to bacterial or fungal infection, blood, cerebrospinal fluid and urine cultures of our case were sterile.

Although a quarter of neonates infected with SARS-CoV-2 are asymptomatic, while most of the others present with symptoms typical of an acute respiratory infection, such as fever and cough or gastrointestinal symptoms.[5 6] The presentation of our case was archetypal of septicaemic shock rather than a respiratory infection. Inflammatory markers were significantly elevated, whereas lungs in X-ray of the chest were unremarkable.

Seizures that the neonate had have been described in other neonatal COVID-19 reports.[7 8] Although, in our case, seizures can be attributed to hyponatraemia, viral encephalitis cannot be ruled out as viral cultures were not performed. We could not conduct electrophysiological and brain imaging studies of the infant due to resource limitation in the COVID-19 care area. While the baby may have had seizure because of a structural abnormality in the brain, we think it is unlikely because there was only one episode of seizure and there was no recurrence including during follow-up after discharge. The baby also has not shown any sign of delayed development. In a published case series of 18 infected neonates, 2 had metabolic seizures.[4]

Hyperkalaemia has never been reported for neonatal COVID-19 but we could not find any other cause for it in our case. There was no recurrence of hyperkalaemia beyond those 48 hours and baby responded to medical management. The baby also had cardiac involvement. Only a few cases of cardiac involvement in neonatal COVID-19 have been documented till date.[9 10]

Regarding neonatal COVID-19 management, various guidelines have been developed.[11] There are anecdotal reports of usage of remdesivir, steroids, azithromycin and hydroxychloroquine.[12 13] In our case, baby responded to supportive medical management including pumped breast milk during his stay in the intensive care unit and thereafter breast feeding. Overall prognosis of neonates with COVID-19 is good, and they have a reported median hospital stay of 10 days.[3 4] Although our case presented with shock, had hyperkalaemia, hyponatraemia and seizures, with good supportive care, the baby recovered well and was discharged after 8 days.

Knowledge on neonatal COVID-19 is still accumulating. Although most cases are asymptomatic and serious cases present with pneumonia, atypical presentations such as shock with dyselectrolytemia can also occur. Clinicians should have a high degree of suspicion in such scenarios and manage promptly.

Learning points

- A neonate with COVID-19 may present with atypical signs and symptoms such as shock, seizures and dyselectrolytemia instead of the more common respiratory and gastrointestinal symptoms.
- Prompt supportive management of neonates with COVID-19 may lead to quick and full recovery.
- Neonates can acquire COVID-19 from sources other than their parents.

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