

Severe form of COVID-19 in a neonate with resuscitated cardio-respiratory arrest - Case presentation

Gheorghita Jugulete^{1,2}, Andreea Madalina Panciu^{1,2}, Mihaela Safta², Bianca Borcos²,
Luminita Marin^{1,2}, Elena Gheorghe², Luciana Zah², Delia Negrea²,
Madalina Maria Merisescu^{1,2}

¹“Carol Davila” University of Medicine and Pharmacy, Bucharest, Romania

²“Prof. Dr. Matei Bals” National Institute for Infectious Diseases, Bucharest, Romania

ABSTRACT

SARS-CoV-2 infection is usually a self-limiting viral infection in healthy children. Still, its effects on the neonatal population remain largely unknown. There has been evidence of adverse events on neonates, mostly consisting in case reports of patients with severe forms of COVID-19 and also recent cohort studies of the pediatric population including the neonatal subgroup. The clinical presentation appears different in the neonatal patients in contrast with older children, and may manifest also as a life-threatening respiratory infection with systemic complications. In this paper we present a clinical case of a premature boy with a corrected age of 40 weeks at admission to the Pediatric Infectious Diseases Clinical Department IX of the National Institute of Infectious Diseases “Prof. Dr. Matei Bals” with the diagnosis of SARS-CoV-2 infection. The positive diagnosis was established on suggestive clinical picture (fever, dry cough, rhinorrhea, loose stools and inappetence) and confirmed by SARS-CoV-2 rapid antigen test. Laboratory investigations at admission showed only moderate to severe anemia, mild inflammatory syndrome and a mild neonatal hyperbilirubinemia, with normal leukocyte count, normal glycaemia, ionogram and blood gases. Chest x-ray showed moderate interstitial pneumonia. In the second day of admission, after 24h of favorable evolution, with no fever and present appetite, he suddenly presented during defecation a presumptive vasovagal syndrome, with general hypotonia and a short period of desaturation. Laboratory investigations made during the episode showed normal glycaemia, normal ionogram, normal blood gases, moderate-severe anemia and important metabolic acidosis. A new chest x-ray showed evolution of the interstitial pneumonia. We did a blood transfusion and continued antiviral treatment, antibiotic treatment and perfusions. He maintained normal pulmonary and cardiac function for another 6 hours, after which he presented a tonic-clonic seizure and after administration of intrarectal benzodiazepines he presented cardio-pulmonary arrest. He was resuscitated, intubated and sedated and transfer to a children ICU. 2 weeks later after admission in the ICU he was discharged with favorable outcome. The case presented shows that although SARS-CoV-2 infection is often a mild condition in children, COVID-19 in neonates can have an unpredicted course. Rapid evolution to severe forms can be a possible disease outcome. Preterm birth with associated complications like bronchodysplasia or anemia, can predispose to severe evolution of the disease, and this child must be kept safe. There is also a neurotropic potential of the SARS-CoV-2 virus that has to be followed.

Keywords: COVID -19, neonate, severe form, cardio-respiratory arrest

INTRODUCTION

Most neonates infected with SARS-CoV-2 are asymptomatic or develop mild illness without need for respiratory support [1-4]. Newborn infants typi-

cally acquire illness through perinatal transmission or through horizontal transmission following contact with family members, healthcare workers and visitors [5].

Corresponding author:

Gheorghita Jugulete

E-mail: gheorghita.jugulete@umfcd.ro

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The clinical presentation appears different from older children, usually associating poor feeding and gastrointestinal signs, and may manifest as a life-threatening respiratory infection with systemic complications [2-4]. Still, several cases of severe neonatal disease, including perinatal asphyxia, respiratory failure, multiorgan dysfunction, brain damage and death, have been reported [6-9]. In a recent study, severe COVID-19 made up 8% of cases among neonates aged less than 28 days. A greater proportion of severe cases were seen in male patients compared to female patients. The median age at admission to hospital was 11 days for regular cases and 15 days for severe cases. Low birth weight in neonates was more likely to lead to severe COVID-19 than non-severe COVID-19 and about 47% of severe cases were comorbidity [1].

Also, multiple reports in both adults and children have associated COVID-19 with a variety of central and peripheral neurological insults, ranging from mild symptoms such as headache and anosmia, to severe manifestations like stroke, seizure, and encephalopathy. Neurological manifestations are not rare in children suffering from COVID-19 [11].

MATERIAL AND METHOD

In this article we present a neonatal case with a severe form of COVID-19 complicated with resuscitated cardio-respiratory arrest, admitted to the Clinical Department IX of Infectious Diseases-Pediatrics of the National Institute of Infectious Diseases “Prof. Dr. Matei Bals” Bucharest.

The patient was a premature boy, born at 34 weeks of gestation, with a weight of 1450 g, with intrauterine restriction of growth of unknown cause and a corrected age of 40 weeks at admission. He was hospitalized for 3 weeks after delivery, and discharged in good clinical state. He was exclusively breastfed. His medical history showed a hospital visit one week before admission, for neonatal follow-up, where laboratory investigations marked an anemia of 9,3 g/dl for which he received supplemental oral iron. Two days before admission into our clinic, he started presenting fever (max. 38,7 degrees Celsius), dry cough, rhinorrhea, loose stools and poor feeding.

Hereditary history: parents without chronic diseases, mother not vaccinated against COVID-19 and no past history of the disease. Mother and other family members did not present any symptoms and she was negative at SARS-CoV-2 rapid test.

RESULTS

On presentation to our clinic, emergency room, the neonate was in poor general condition, afebrile,

with a weight of 3420 g, he was slightly dehydrated, asthenic, presenting with nasal obstruction and dry cough, without eruptive elements, cardio-respiratory balanced, normal peripheral O₂ saturation, normal blood pressure and heart rate, lung without rales, thin abdomen, skin fold with a tendency to persist, loose stools, oligo-anuric. Rapid SARS-CoV-2 antigen test performed urgently in the emergency room was positive, for which he was admitted.

Laboratory investigations performed at admission show:

- Leukocyte count and leukocyte formula within normal limits.
- Hypochromic moderate-severe anemia, intracellular microcytic but also deficiency Hb=7,4 g/dl.
- Normal platelet count.
- Inflammatory tests – fibrinemia – in normal range, protein C-reactive – 7,03 mg/l, procalcitonin – 1,05 ng/ml.
- Coagulo-gram normal.
- Biochemistry samples: total bilirubin – 3,6 mg/dl, indirect bilirubin – 3,2 mg/dl, the rest were within normal limits.
- Normal glycaemia, ionogram and blood gases.
- Cardiopulmonary chest X-ray – moderate interstitial pneumonia.

Treatment is instituted:

- Symptomatic: antipyretics.
- Hydro-electrolyte and acid-base rebalancing (glucose, saline).
- Antiviral: remdesivir, dose 5 mg/kgc on first day, then 2.5 mg/kgc/day the second day.
- Antibiotic: Ceftriaxone, dose 100 mg/kgc for 2 days.

In the second day of admission, after a favorable evolution, with no more fever and a good appetite, he suddenly presented during defecation a presumptive vasovagal syndrome, with general hypotonia and a short period of desaturation, with quick response after O₂ administration on cephalic tent and start of perfusion with glucose 10%, with normal peripheral blood oxygenation and cardiac frequency after 3-5 minutes, with no more supplemental oxygenation needed.

Laboratory tests are collected: CBC and arterial blood gases.

The results of laboratory investigations show:

- metabolic acidosis – pH = 7,21; lactate = 11 mmol/l
- anemia (Hb = 7.4 g/dl)
- normal glycaemia
- normal ionogram
- normal blood gases
- platelet counts within normal limits
- leukocyte count and leukocyte formula within normal limits.

Paraclinical:

- Cardiopulmonary X-ray - evolution of the interstitial pneumonia.

We administered erythrocyte mass transfusion - 50 ml in a 2h perfusion, for a moderate anemia with hemodynamic and respiratory instability during the above-mentioned episode, we continued the antibiotic treatment, the antiviral treatment, the symptomatic treatment (antipyretics) and hydro-electrolytic rebalancing infusions.

He maintained normal pulmonary and cardiac function for 6 hours, after which he suddenly presented a tonic-clonic seizure and after administration of intrarectal benzodiazepines he presented cardio-pulmonary arrest. He was resuscitated, intubated and sedated and transfer to a children ICU, from where 2 weeks later he was discharged with favourable outcome.

Thus, based on epidemiological, clinical, laboratory and paraclinical data, the diagnosis was established:

- Severe SARS-CoV-2 infection complicated by:
 - Resuscitated cardio-respiratory arrest;
 - Bilateral acute pneumonia;
 - Tónico-clonical seizures;
 - Metabolic acidosis;
 - Hypochromic, deficiency and intrainfectious moderate-severe anaemia;
 - Acute dehydration syndrome 8-10%;

DISCUSSIONS

In the neonatal population, there can be a congenital, perinatal and postnatal transmission of SARS-CoV-2 [2]. In our case the mother was SARS-CoV-2 negative during the admission in our clinic, as all of the family members the patient was in contact with. The acquisition of the infection in this case was postnatal and probably may be related to the hospital visit we mentioned one week before admission, for neonatal follow-up. The lack of vaccination of the mother, and therefore low transfer of protective antibodies during pregnancy to the patient may have increased the risk for sever neonatal COVID-19 [10].

Male sex, low birth weight, comorbidities (in our case - moderate anaemia, possible bronhodysplasia due to premature birth, unknown factors for the intrauterine growth restriction) are risk factors that have been associated in other studied with neonatal sever forms of COVID-19 [1,2]. Due to the risk factors present, our patient presented a rapid evolution of

the pulmonary involvement with association of neurologic manifestations and metabolic imbalance.

Children with COVID-19 can present with neurologic findings such as seizures, encephalopathy, cerebrovascular events as well as abnormal eye movements. The ongoing development of a child's nervous system, with differential expression of cell receptor targets over time, suggests that there are likely windows of susceptibility to the various infectious and post-infectious mechanisms of COVID-19-related neurological injury [11].

We emphasize once again the importance of complete and urgent clinical evaluation with correct and rapid establishment of the diagnosis, and institution of timely and correct specialist treatment. Healing in the present case occurred completely and without sequelae after 2 weeks of intensive care unit treatment, but the child requires long-term follow-up (possible distant sequelae).

CONCLUSIONS

The clinical case presented demonstrates that although SARS-CoV-2 infection in neonates usually evolves mildly, it can sometimes be complicated in the presence of some favoring factors. Preterm birth with associated complications like bronhodysplasia and anaemia can predispose to sever evolution of the disease, and this child must be kept safe.

There is also a neurotropic potential of the SARS-CoV-2 virus that has to be followed. Concerns regarding long-term effects of exposure to SARS-CoV-2 during foetal and neonatal period continue to remain.

Globally, there are still knowledge gaps in the epidemiology, clinical manifestations, and outcomes of SARS-CoV-2 infection among neonates. Research is currently focused on the short- and long-term consequences of COVID-19. Ongoing neurodevelopmental follow-up of antenatally and neonatally exposed infants is advisable in view of the neurotropic potential of the SARS-CoV-2 virus.

Maternal vaccination may protect the infant after an adequate interval from vaccination to delivery (of at least 4 weeks) and is advisable for the prevention of sever neonatal COVID-19 forms.

A better understanding of age-group-specific disease path mechanisms, treatment options, long-term outcomes and prevention of viral spread should be the topics of future research.

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