

Case Report:

Premature Neonate With Subclinical Myocarditis Born to a Mother With COVID-19 Infection: A Case Report



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ABSTRACT

Background: In December 2019, COVID-19 caused by the SARS-CoV-2 appeared in China and then spread to many countries. Like many other medical conditions, infection with SARS CoV-2 would cause complications during pregnancy and severe illness in pregnant women.

Case Report: We reported a premature neonate (31 weeks gestational age, weight 1700 g) with subclinical myocarditis born to a mother with COVID-19. Her mother had no symptoms and confirmed infection with SARS CoV-2 during pregnancy. Four days after delivery, the mother was diagnosed with COVID-19 infection. The neonate had positive C-Reactive Protein (CRP), elevated cardiac enzymes, and lymphopenia but negative real-time Polymerase Chain Reaction assays (real-time PCR). Her subclinical myocarditis was treated with Intravenous Immunoglobulin (IVIG) and inotrope. We did not use antiviral therapy in medical treatment. The neonate was discharged 3 weeks after admission with normal cardiac biomarkers enzyme levels and cardiac function in echocardiography. Her follow-up chest x-ray after two weeks was also normal.

Conclusion: It seems that subclinical myocarditis can be a complication of COVID-19 in neonates, and this infection could also cause preterm labor in infected pregnant women. Since clinical data on COVID-19 in newborns are still very limited, it is essential to check all the potential complications for pregnant women and their newborns, including cardiac complications.

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1. Introduction

In December 2019, COVID-19 caused by the SARS-CoV-2 appeared in China and then spread worldwide. Like many other medical conditions, infection with SARS CoV-2 would cause complications during pregnancy and severe illness in pregnant women. It is therefore essential to follow up pregnant women with COVID-19 to detect any potential complications in them and their infants. Unfortunately, no scientifically proven information about the effect of COVID-19 on the fetus is available, for instance, the probability of vertical transmission and the complications for a fetus [1]. Perinatal COVID-19 might cause fetal distress, premature labor, respiratory distress, thrombocytopenia accompanied by abnormal liver function, and even death [2]. Currently, there is no confirmed antiviral drug for COVID-19. But, early intravenous injection of immunoglobulin might reduce the severity and mortality. Gamma globulin could also be effective in severe cases [3].

Subclinical myocarditis, without specific symptoms, may be inferred by transient increases in biomarkers of cardiac damage (troponin T and I, C, and NT-proBNP) or ST-segment elevation on his Electrocardiogram (ECG), or mild to slightly left ventricular dysfunction (ejection fraction) with or without left side heart valvulopathy in the echocardiogram. The risk of these patients developing heart failure or arrhythmias is not known.

The most probable etiology of myocarditis is viral infections such as Coxsackievirus group B (an enterovirus), human herpesvirus 6, and parvovirus B19. Other causes are autoimmune diseases, drug reactions, vaccinations, and other conditions that stimulate the immune system. No specific symptoms can be seen in subclinical myocarditis; it is usually diagnosed by laboratory and cardiac tests, such as troponin level, ECG, and echocardiography.

Subclinical myocarditis can be presented with poor feeding, dyspnea, vomiting, and pallor in neonates. Sepsis, severe dehydration, or anemia should be considered diagnostic possibilities in the ill neonate [4].

We report a premature neonate with subclinical myocarditis born to a mother with COVID-19 with pharyngeal swabs Real-Time Polymerase Chain Reaction (RT-PCR) negative, but lymphopenia, positive C-Reactive Protein (CRP), and elevated cardiac enzymes.

2. Case Report

The mother was a 27-year-old pregnant (Gravid1, Para 1) woman with no symptoms and confirmed infection with SARS CoV-2 during pregnancy. She had a positive past medical history of hypothyroidism for 15 years and had received oral treatment. The mother was under treatment due to hypothyroid by levothyroxine (1 tablet/day). Cardiac function and other systems such as liver and hematology were normal. The fetal ultrasound scan of the third trimester was normal, and no apparent abnormalities were detected.

At 31 weeks of gestation, she was admitted to a gynecology and obstetrics hospital due to vaginal bleeding and lower abdominal pain (Iran, Markazi Province, Arak, Taleghani Hospital). She had premature labor after a few hours, which lead to preterm birth. She delivered a baby girl with a weight of 1700 g, head circumference of 28 cm, and a height of 45 cm. Her Apgar scores were 8 at the first minute and 9 at the fifth minute. Clear amniotic fluid and normal volume fluid were also reported. The premature neonate was admitted to the Neonatal Intensive Care Unit (NICU) due to respiratory distress syndrome. Firstly, Neopuff was used for resuscitation, and unfortunately, she did not respond and had an O₂ saturation of 80%. Therefore, she was intubated immediately, and surfactant therapy was started (Figure 1). Nasal continuous positive airway pressure was used for the neonate, and she successfully responded to the treatment. Fetal heart rate was 146 beats/minute, and no abnormalities in heart monitoring.

After 4 days, the mother complained of fever and dry cough, while she was not febrile and symptomatic on the day of birth. Owing to the COVID-19 pandemic, the RT-PCR test was taken from her pharyngeal swab sample, which came back positive. She was quarantined and treated at home and stopped breastfeeding her baby. She had lymphopenia, neutrophilia, and positive CRP in laboratory tests. Her vital signs were as follows: temperature, 38.3°C; blood pressure, 125/85 mm Hg; heart rate, 88 beats/minute; and respiratory rate, 22 breaths/minute.

In her chest Computed Tomography (CT), ground-glass opacities in the left lung were found. Right after the positive result of the mother's test, RT-PCR was performed for the neonate (the age of 7 days old), which was negative. However, in follow-up one month later, serology evaluation of IgG and IgM was performed in the newborn and detected positive IgM and negative IgG. The neonate's O₂ saturation was upper than 85% during the first week of admission and more than 94% with no

supplemental oxygen after the first week in the NICU. She was treated with antibiotics and oxygen due to her respiratory distress syndrome, and no antiviral drug was added to her treatment after her mother's positive test. Both her chest x-rays, before and after the diagnosis of her mother's viral infection, were normal (Figures 1 and 2). The neonate's laboratory tests indicated neutrophilia (13.97×10^9 cells/L), leucopenia (3.81×10^9 cells/L), lymphopenia (0.84×10^9 cells/L), and increased Troponin I (cTnI) (65.492 ng/mL/134 ng/mL), while liver function tests (Alanine aminotransferase [ALT=41 U/L] and Aspartate aminotransferase [AST= 45 U/L]), platelet count ($230 \times 10^3/\mu\text{L}$), hemoglobin (18 g/dL), renal function (BUN=15 mg/dL, Cr=0.6 mg/dL) and total and indirect bilirubin were normal. Her lumbar puncture sample was also examined and was negative for the SARS CoV-2 infection. To detect any other bacterial and viral infections (including influenza A and B virus and respiratory syncytial virus), we performed laboratory tests for the neonate, and all of them were negative.

From the eighth day, the neonate experienced tachycardia attacks (Heart Rate [HR]=190-210 beats/minute) with no premature ventricular contraction, ventricular tachycardia, and congestive heart failure. Furthermore, no significant abnormality was found in her serial ECGs. Based on her echocardiography, resaved Ejection Fraction (EF) was 45%-50% with trivial aortic insufficiency; mild mitral regurgitation was detected without chamber elevation and cardiomegaly. Subclinical myocarditis was diagnosed, and medical therapy with Intravenous Immunoglobulin (IVIG) and inotrope (milrinone) and diuretic (Furosemide) started. We did not use antiviral therapy in medical treatment.

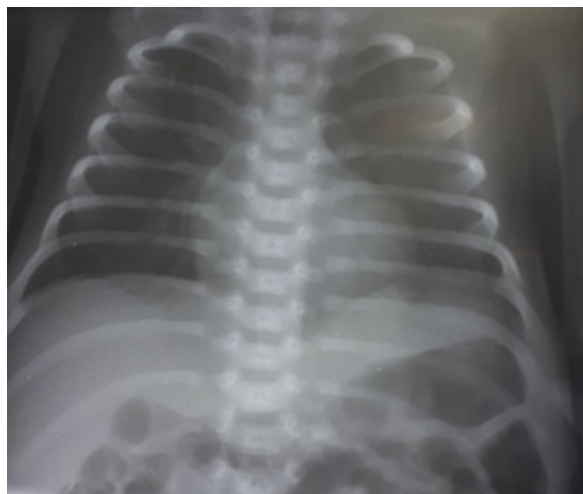


Figure 1. Chest X-ray showing slightly involvement in right pulmonary with cardiac size after surfactant therapy

The neonate was discharged 3 weeks after admission with normal cardiac biomarkers enzyme levels, cardiac function in echocardiography (EF=67%), and suitable weight gain (2000 g). Her follow-up chest x-ray after two weeks was also normal (Figure 2). She was followed up, and no cough, fever, gastrointestinal symptoms, and sepsis signs were reported.

3. Discussion

We reported a premature neonate with subclinical myocarditis born to a mother with COVID-19 (confirmed by RT-PCR test from pharyngeal swabs sample) in Iran. While many studies have been conducted on the clinical characteristics, imaging findings, and treatment of COVID-19, few studies have focused on the risk factors and complications in mothers and infants.

The clinical characteristics of COVID-19 pneumonia in pregnant women were similar to those reported for non-pregnant adult patients [5]; however, pregnant women with viral pneumonia are more likely to have complications [6]. It is still unclear if intrauterine fetal distress is directly related to 2019-nCoV infection in mothers. It is suggested that 2019-nCoV infection in mothers would cause hypoxemia and increase the risk of perinatal complications such as birth asphyxia and premature birth. The maternal, fetal, and neonatal outcomes in women infected with SARS CoV-2 in late pregnancy have not been severe [7]. If there are risk factors, including prenatal and

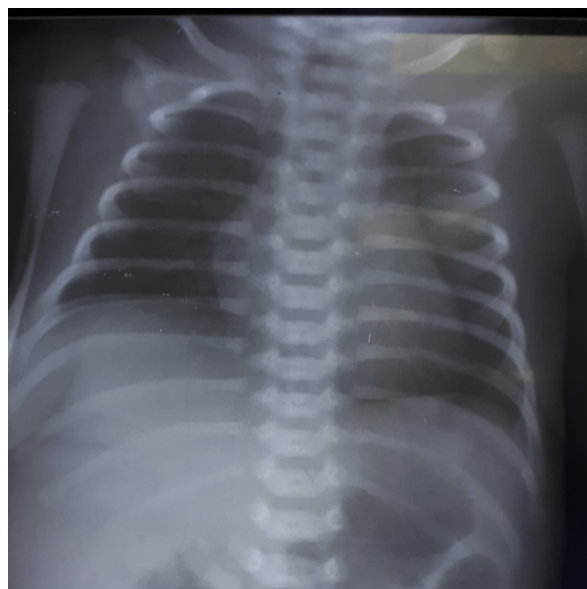


Figure 2. Cardiac and pulmonary without any pathology after diagnosing mother with COVID-19 positive test

postnatal fever in mothers, twins, premature rupture of membranes, premature birth, and low birth weight, it is recommended that the neonate should be admitted into NICU as soon as possible. Also, clinical decisions should be made based on chest radiographic findings, Nucleic Acid Testing (NAT) results, and symptoms.

Several studies have shown the intrauterine vertical transmission of SARS-CoV-2 and the effects on newborns [2, 5]. Most newborns to mothers with COVID-19 had negative RT-PCR test results [2]. Although myocarditis is reported in many adult cases of COVID-19, there has been no confirmed case of neonatal myocarditis due to the SARS CoV-2 infection.

In the reported case, laboratory tests, elevated cardiac enzymes, and echocardiography confirmed the diagnosis of subclinical myocarditis resulting from a viral infection with SARS CoV-2. Because there are infant cases of COVID-19 with negative RT-PCR test in other studies, this neonate could be affected by the coronavirus despite her negative test. Subclinical myocarditis can also happen in infants with negative viral tests. Besides, since there were no other reasons for the premature birth, in this case, SARS CoV-2 might be the reason for premature delivery in the mother, while the neonate was not IUGR.

In a study by Huaping Zhu et al. [2], all the neonates born to mothers with COVID-19 had negative RT-PCR tests. However, some of them were symptomatic. The most common symptoms in neonates were respiratory distress, gastrointestinal symptoms, fever, and increased heart rate. Moreover, intrauterine fetal distress was reported in 6 cases. Our patient had respiratory distress due to premature birth and experienced tachycardia after one week.

A study in Hong Kong in 2004 showed that SARS infections during pregnancy were associated with spontaneous miscarriage, preterm delivery, and intrauterine growth restriction [8]. Another study also indicated that pregnant women with pneumonia were at the risk of having low birth weight infants, preterm births, and restricted fetal growth. The study showed the 5-minute Apgar score of <7 in the infants of women with pneumonia [9].

Chen Y et al. reported four neonates born to mothers with COVID-19, and one of them had a positive RT-PCR for the infection. None of the infants had severe clinical symptoms of the infection. Rash was seen in two of them, which spontaneously disappeared. One of them had mild dyspnea, suffered from Transient Tachypnea of the Newborn (TTN), and supported by non-invasive mechanical ventilation for 3 days [10].

Suliman Khan et al. reported three neonates with COVID-19, and one of them had a premature birth. The preterm neonate had Apgar scores of 8 and 9 at 1 and 5 minutes, respectively, the weight of 2890 g and the height of 48 cm. The newborn's test was negative for the coronavirus infection [11].

In this case, the results of nucleic acid detection of cord blood and placenta were negative, which did not support the diagnosis of intrauterine transmission. However, the possibility of vertical intrauterine transmission of SARS-CoV-2 has not been ruled out.

4. Conclusions

It seems that subclinical myocarditis can be a complication of COVID-19 in neonates, and this infection could also cause preterm labor in infected pregnant women. Since clinical data on COVID-19 in newborns are still very limited, it is essential to check all the potential complications for pregnant women and their newborns, including cardiac complications.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethical Committee of Arak University of Medical Sciences.

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Authors' contributions

All authors equally contributed to preparing this article.

Conflict of interest

The authors declared no conflict of interest.

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