

## A 900-Gram Preterm Infant with Coronavirus (COVID-19) Infection: A Case Report

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### ABSTRACT

Coronavirus disease (COVID-19) causes acute respiratory syndrome, it became widespread in China at first in December 2019, and then was spread in other countries. Pregnant women are considered to be more susceptible to the coronavirus disease (COVID-19) complications. We report a case of a neonate born with COVID-19, believed to be due to a vertical transmission from mother to her baby. The case also reports a preterm labour which may be related to COVID-19 infection during pregnancy.

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### Introduction

A pneumonia called Coronavirus disease (Covid-19) emerged in Wuhan, China in December 2019. Covid-19 is A-ranked disease in China (1). Corona viruses are members of a large family of viruses which cause shared diseases between human and animals and consequently lead to a wide range of respiratory diseases including mild, cold to SARS and MERS. COVID-19 disease is considered as the newest identified disease resulted from coronaviruses. However, it was

found through human genome sequencing that COVID-19 is a beta coronavirus already existed in a SARS subset and bats' coronavirus; also, the related process of viral entry occurs through the same receptor (2). Coronaviruses and Acute Respiratory Syndromes (COVID-19, MERS, and SARS) are related to the beta-coronavirus genus. In the last 20 years, SARS and MERS have infected more than 10,000 people worldwide. The mortality rate of SARS infection is 10%, while the SARS infection in pregnant women is

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25%, and of MERS infection is in 37% (3–6). Coronaviruses are large enveloped positive-strand RNA viruses that cause disease in a many different of animal species including cattle, pigs, cats, rabbits, poultry, mice, rats, humans, and nonhuman primates (7, 8). The first coronavirus disease was reported in late 2019 in Wuhan City of China. Since then, more than a million affected cases have been reported across the world (9). The incubation period is between 2-14 days after contracting the virus. In most cases, the incubation period is reported to be five days after the contraction (2, 10). It was reported that 230 children under the age of 19 have had covid-19 from January 20, 2020 to February 6, 2020 (11). The rapid spread of COVID-19 in children indicates that it has a strong transmission capacity in infants and neonates. The effects of COVID-19 infection can range from asymptomatic infections to severe respiratory distress in neonates and infants. The rapid outspread disease of covid-19 in children shows that covid-19 can spread through newborns the same as in adults. In children with severe disabilities, respiratory diseases typically occur. Covid-19 occurs more in patients with background diseases and/or disabilities. The clinical course of COVID-19 may be milder in children than adults. The most common clinical symptoms of COVID-19 are fever and dry cough [11]. Epidemiological studies have shown that the general population is prone to covid-19 (12). Clinical manifestations among newborns infected with the new coronavirus have not fully been determined. Specifically, an accurate monitoring procedure should be carried out for premature infants with suspected respiratory symptoms, gastrointestinal symptoms, and vital signs. The instability of body temperature is observed in the form of fever or hypothermia, also respiratory and cardiovascular symptoms including tachypnea, respiratory sub-muscles' retraction, apnea, coughs, and tachycardia have been reported. Other symptoms include unwillingness to drink milk, drowsiness, vomiting, and diarrhea. Laboratory findings include normal or decreased leukocyte, mild thrombocytopenia, and increase of creatine kinase enzymes and ALP, ALT, AST, and LDH. Observing the virus in secretions of upper and lower respiratory

tracts, blood, and feces is recommended (it has to be seen in at least two samples). Regarding the radiological findings, the symptoms of the disease are observed as pneumonia in the lung CT scans, CXR, or abdominal ultrasonography (13).

### Case Presentation

The mother was a 34-year-old pregnant woman,  $G_3L_2Ab_0$ , with two other healthy children. She had the experience of high blood pressure during pregnancy and was under treatment by a gynecologist, taking oral drugs. There were no history of diabetes or other disease in mother. She was hospitalized at the Umm-al-Banin Hospital of Mashhad on 9 March 2020 and had headache,  $Bp: 150/100$  and  $G/E$  symptoms with the primary diagnosis of pre-eclampsia. She received magnesium sulfate and one dose of betamethasone. The performed tests are as the following:

**Table 1.** Serum biochemical factors in mother

Test	Value
WBC	9.5
lymph	11.6
plt	144
Hb	12.8
ESR	34

She was transported to the Imam Reza Hospital because of coughs, respiratory symptoms, and pulmonary involvement in CXR, and as blood tests revealed lymphopenia. The mother's symptoms were suspected to be coronavirus symptoms while her family had no confirmed or suspected cases of COVID-19. She was discharged unfortunately due to her own request. But on 27 March 2020, she returned suffering from epigastric pains and consequently, became a C/S candidate considering the non-reactive NST and AF decrease seen in the ultrasonography. At 5:00 AM of the same day, the neonate was born by caesarian section with birth weight of 900 gr, at 28 weeks gestation. The Apgar scores at 1 and 5 minutes were 2 and 5 respectively, then 8 after 10 minutes of birth. The newborn was isolated with no contact by own mother and was transferred to NICU immediately after birth for close observations.

The mother was also transferred to the women's section for isolation after surgery. Because of prematurity, low Apgar score, and respiratory distress with T-piece, the newborn was hospitalized with the primary diagnosis of asphyxia and prematurity. She was transported to the incubator and left isolated. The vital sign was identified upon the arrival to NICU: HR: 140; RR: 63;  $SpO_2$ : 96%; T: 36.8; BP: 70/35. Clear murmurs were not heard at the medical examinations. As RDS score was 5, the CPAP treatment with  $fio_2$  of 30% was applied, and surfactants was not utilized. Also, the primary VGB results were  $HCO_3$ : 16.1;  $fCO_2$ : 34.7;  $pO_2$ : 19.9; and pH: 7.27. The primary CBC results were WBC: 13.4, lymph: 92.4, Hb: 15.2, Plt: 37, and CRP: 2.8.

The RT-PCR was obtained from the newborn's nasopharyngeal secretions at 12 PM of the birthday. Early chest X-ray was in favor of TTN (Transient Tachypnea of the Newborn). Intravenous Ampicillin and Gentamycin and vitamin K1 (1mg intravenously) were given as antibiotic prophylaxis and to prevent coagulopathy. Also, TPN was performed, and prophylaxis regular phototherapy was conducted. Also, oxygen therapy with oxy hood was carried out on the second day due to the remission of tachypnea, and the formula was started. We recommended the mother not to breastfeed and to extract the breast milk in order to avoid mastitis. The newborn's vital signs were stable with the blood oxygen saturation maintained higher than 90%, without any problem such as apnea. The result of pharyngeal swab for COVID-19 was positive at 36 hours after the birth. This was the first positive RT-PCR test report in our NICU. Therefore, the chance of sample contamination was very low. No signs were observed in the chest x-ray (Figure 1). The following lab test in day 3 were normal (Table 2).

The antibiotic was changed to cefotaxime, also vancomycin and azithromycin were tried. However, the effect of the drugs was not tangible. Then, platelet transfusion was performed. Feeding the newborn has gradually been continued thanks to the improvement of respiratory status, and lactose intolerance has not been reported. Lungs CT scan was not carried out due to the newborn's stable status and good general condition.

Brain and abdominal ultrasonography was normal. The newborn's second sample of RT-PCR was taken on 4 April 2020, which was negative. The mother was discharged due to her own request and consent, and her RT-PCR test was reported negative on 27 March 2020. She is currently at home and has no symptoms.



**Figure 1.** Chest radiograph of the newborn, taken on 30 March 2020.

## Discussion

The probability of disease transmission from mother to embryo, and the risk of possible vulnerabilities in embryos and newborns of mothers with COVID-19 are not exactly determined [2]. An investigation was published by Lancet in Feb. 2020 in which the intrauterine transmission of disease was not observed during the third trimester of pregnancy; however, no information is available regarding the intra-uterine disease transmission during the first and second trimester (14).

**Table 2.** The results of serum chemical test of neonate on the third day

WBC	3.3	BiliD	0.4	BiliT	7.9	PT	15.7
Lymph	58%	BUN	19	pH	7.38	PTT	38.6
PMN	22%	Cr	0.6	Pco2	26.8	INR	1.3
Hb	20.2	Na	136	PO2	85	AIT	13
plt	35000	K	5.2	Hco3	15.9	AST	28
CRP	0.3	Ca	11.6	BE	-6.3	AIP	678
LDH	1026	P	2.9	Bs	80	B/C	Negative



So far, there has been no evidence for the higher risk of transmission of coronaviruses as a result of vaginal deliveries compared to cesarean deliveries. However, it is possible that the longer duration of vaginal delivery increases the risk of infections transmission. It is thus recommended that if a woman with labor pain is referred to the doctor, the vaginal delivery is allowed, and coronavirus disease should not be considered as an indication of performing cesarean delivery. Each pregnant woman has to be monitored and considered individually, and consequently, the time and type of parturition will get identified based on her conditions (15). Various factors including septic shock, hypothermia, acute organ dysfunctions, intrauterine growth restriction, and fetal distress are considered as indications of ending the pregnancy during coping with the coronavirus disease (2,15). According to a published report on 26 March 2020, an investigation was carried out on 33 pregnant women with COVID-19 in Wuhan, China. It became clarified, after the parturition and newborns monitoring, that three newborns were infected with coronavirus (9%) (16), they emphasized that the possibility of transmission during parturition was zero because of performing accurate controls and preventions (16).

Numerous studies have been conducted on the potential of vertical intrauterine transmission of SARS and the impacts on infants (14, 17), while all neonates of mothers infected with SARS had a negative nucleic acid test. However, one study showed that newborns with Covid-19 infected mothers could also be affected, resulting in fetal distress, premature laboratory, respiratory distress, and even death (17). The probability of coronavirus disease transmission through breast feeding is not confirmed yet. Pasteurization procedures kill other types of coronaviruses; however, there is no evidence regarding the new virus (18). It should be noted that there are disagreements regarding delayed umbilical clamping due to the probability of disease transmission (16). No

Specialized drug therapies for coronavirus disease for newborns have been reported yet (13).

### **Conclusion**

The Clinical picture of COVID-19 in newborns are still very limited. Therefore, pregnant women and their newborns should be examined and observed. The observations should include peripheral blood, pharyngeal swabs, postpartum placental tissue, amniotic fluid, umbilical cord blood, newborn pharyngeal swabs, and breast milk. Also continuous follow-up observations are recommended. Although several investigations emphasized on the improbability of intrauterine transmission of coronavirus disease, it seems that standard cautions are necessary considering the results of this case report and other reports newborns in Iran who had no contacts with their mothers but their tests were positive after parturition. Infected pregnant mothers should give birth in a neonatal intensive care unit. The principles of safety and separation of the mother and the neonate must be observed.

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### **Statement of Ethics**

The study was approved by the Ethics Committee of the Mashhad University of Medical Sciences. Also, an informed consent was obtained from the neonate's parents after being informed about all aspects of the case report.

### **Disclosure Statement**

The authors have no potential conflicts of interest to disclose.

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None.

### **Author Contributions**

Prof. A. Mohammadzadeh and Prof.R. Saeidi contributed to the study design and structure of the research work. They also commented on the treatment and drug administration. Dr. Saeedeh Eshkil and Dr.Molood Bolourian were in direct contact with the patient and gathered all clinical data. Along with Dr. Ahmadshah Farhat, these three authors analyzed the data and prepared the draft of the case report section. These three also did the literature survey and after being

confirmed by Prof. A. Mohammadzadeh and Prof.R. Saeidi, they developed the discussion section. All authors read, reviewed, revised and approved the final manuscript as submitted and agreed to be accountable for all aspects of the case study.

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