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Pregnancy and Childbirth During COVID-19 Pandemic: A Case Series and Review of Literature

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Abstract

Introduction: In March 2020, the World Health Organization introduced the Coronavirus disease 2019 (COVID-19) pandemic as a global health concern and predicted that without any changes in the transmission process, the disease would reach its peak in April. Hence, it was not unreasonable to expect the referral of pregnant women in all trimesters. Since respiratory illnesses can increase the risk of infectious diseases and maternal mortality, it is justifiable to consider COVID-19-positive cases as high-risk pregnancies.

Case presentation: The present study introduced six pregnant women with COVID-19 and discussed the points to consider in managing these patients.

Conclusions: Pregnant women are at increased risk in all epidemics of infectious diseases due to their physiological and immunological changes. Moreover, the safety of the fetus is another important issue to consider.

Key words: COVID-19; Pandemics; Parturition; Pregnancy

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Introduction

Coronavirus disease 2019 (COVID-19), which started in Wuhan, China in late 2019, has rapidly spread all around the world, and thousands of cases and deaths associated with the virus have been reported worldwide (1, 2).

Pregnancy is a distinctive issue during this pandemic, which needs special considerations. Since respiratory diseases can increase the chances of morbidity and mortality in pregnant women, COVID-19-positive cases should be considered high-risk pregnancies. During the previous severe acute respiratory syndrome (SARS) viral epidemic, pregnant women had more serious complications than others. Accordingly, the need for mechanical ventilation and hospitalization in the intensive care unit (ICU) and even death in pregnant women was significantly higher than others (3-5). Moreover, physiological changes during pregnancy can hide many symptoms and delay diagnosis (6, 7). Our knowledge about COVID-19 is still limited, and it is even more limited regarding its effects on different aspects of pregnancy. By reporting the cases, the researchers have tried to share their experience in this regard. However, in this case series, we also aimed to present the clinical findings and pregnancy outcomes of some pregnant women with COVID-19 and elaborate on the considerable points in their management.

Case Presentation

This article presents the clinical findings and pregnancy outcomes of six pregnant women with COVID-19 who referred to a hospital in Bojnourd, Iran, from March 2020 to July 2020. The details of each pregnancy are presented in table 1.

All the pregnant women had respiratory signs and symptoms on admission. Three women were also febrile, and two had respiratory distress. One of them presented with premature rupture of membrane, and two had referred due to abnormal sonographic findings. It should be mentioned that none of the pregnant women had a preexisting chronic condition or any underlying disease.

All the pregnant women were tested for COVID-19, using reverse transcription polymerase chain reaction (RT-PCR), on the day of admission, the results of which were positive in five out of the six cases. All six neonates were also tested for COVID-19 using throat swabs right after birth, and one of the test results was positive. Interestingly, the positive RT-PCR belonged to the neonate whose mother's RT-PCR was reported negative.

Table 1: Characteristics of Six Pregnant Women with COVID-19 and their neonates

Variable	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Maternal age (yrs.)	15	38	25	22	27	33
Gravity	G1	G4	G4	G2	G5	G3
Gestational age at delivery (weeks)	39	40	37	38	14	31
Respiratory rate (/min)	23	25	19	16	19	21
O2 saturation on admission (%)	94	92	96	96	96	94
Body temperature (°C)	37.9	38.1	38.2	37.1	37	36.5
Chief complaint of mother	Cough and dyspnea	Dyspnea/fever	Dyspnea/fever	Dyspnea/fever	Dyspnea	Dyspnea/ chest discomfort
Maternal PCR for SARS-CoV-2	Positive	Positive	Positive	Positive	Positive	Negative
Lung HRCT findings	Less than 10% involvement	Between 10-30% involvement	Not significant involvement	Between 10-30% involvement	Less than 10% involvement	Less than 10% involvement
Comorbidity	PROM	Fetal distress	-	-	Abnormal sonography	Reduced fetal movements
Symptom-to-delivery interval (Day)	3	7	10	12	11	9
Delivery type	NVD	CS	NVD	NVD	NVD	NVD
Birth weight (g)	2140	3210	2730	3170	300	1090
Apgar scores at 1 min	7	6	9	8	Death	Death
Apgar scores at 5 min	9	10	10	10	Death	Death
Neonatal/ fetus PCR for SARS-CoV-2	Negative	Negative	Negative	Negative	Negative	Positive
Delivery related complications	-	Uterine Atony	-	Uterine Atony	-	-

PCR: polymerase chain reaction, SARS: severe acute respiratory syndrome, COV: Coronavirus, HRCT: high-resolution computed tomography, PROM: premature rupture of membrane, NVD: normal vaginal delivery, CS: cesarean section

Two of the cases had fetal death, probably due to prematurity. Their gestational ages were 14 and 31 weeks. The result of RT-PCR for COVID-19 was reported positive in one of the two fetal deaths. Their mothers did not mention any problem or risk factors before or during pregnancy; however, the pregnancy in both cases had to be terminated due to fetal death. One of them was referred due to abnormal sonography findings (gestational sac without fetal pole) and the other one visited due to reduced fetal movements.

The fourth case's neonate developed respiratory distress and decreased arterial blood oxygen saturation right after delivery. He recovered after nasal oxygen therapy for 2 hours without further interventions.

The mothers underwent high-resolution lung computed tomography (CT) scan after delivery and pulmonary involvement was obvious in all of them. Although clinical manifestation and lung CT scan were suggestive of COVID-19 in all cases, the RT-PCR test result of one of the mothers was negative for SARS-CoV-2. This was the case whose neonate was stillborn, and of course the neonate's PCR test was positive, unlike the mother.

None of our patients received antiviral therapies, but all of them became symptom-free soon after the birth and were followed up only for complications. It is noteworthy that none of the survived neonates required mechanical ventilation. Cases number three and four were discharged after 3 and 7 days, respectively; the longer hospital stay was due to poor feeding. The first two neonates and their mothers were discharged the day after the birth. All

mothers and survived neonates received supportive care and were discharged from the hospital without any important complications.
In the four surviving cases discussed in this article, the newborns were healthy and breastfeeding was not associated with an increased risk for the infants. Neonates were followed up for 28 days after the birth and none of them developed COVID-19-related signs and symptoms.

Discussion

With its rapid outbreak, COVID-19 has significantly affected public health and medical infrastructure. In this regard, the transmission of the disease and its diagnosis in pregnant women and their fetuses as well as their safety are matters of concern. Recent studies have shown that mortality in pregnant patients with COVID-19 is less than 1%, which is much lower than that of SARS and Middle East respiratory syndrome (MERS); but it is still considerable in comparison with non-pregnant women in the same age (8). Based on the World Health Organization (WHO) reports, there is an increased risk of developing severe COVID-19 in older or overweight pregnant women (3). Moreover, it is estimated that pregnant women with severe COVID-19 more frequently need ICU admission in comparison with non-pregnant ones (3). Among the normal components of pregnancy, there are physiological and immunological changes which can raise the risk of complication due to infection. Changes in lung capacity, oxygen consumption, and stroke volume as well as immunologic adaptations during pregnancy allow the mother to tolerate a fetus with distinct antigenic components (4-6).
In a recently published review on COVID-19 during pregnancy, it was suggested that the majority of the cases experienced mild to moderate symptoms, fatigue and fever were the most common complaints (2). It should be mentioned that three of our patients had a fever at the time of admission and the others had experienced it in the previous week. All of them complained of shortness of breath, which can also be explained by the pregnancy.
There is evidence of renin-angiotensin-aldosterone system and coagulation abnormalities, endothelial malfunctions, and complement activation in COVID-19 patients, which is a mimic of preeclamptic pregnancies (2). Furthermore, cytokine storm caused by tissue injury in COVID-19 might be significantly modified in pregnancy due to changes in immune responses, which may affect laboratory and clinical characteristics of the disease during pregnancy (2, 3).
The current diagnostic standard test for COVID-19 is quantitative RT-PCR (9). Interestingly, in one of our cases, RT-PCR of the mother for COVID-19 was negative, while her fetus tested positive. We considered two hypotheses to explain it. First, the mother's test was a false negative one and the virus was transmitted from the mother to the fetus during pregnancy. Possibility of vertical transmission of the virus from mother to infant has also been suggested in the literature, although the risk is very low due to the absence of the virus in amniotic fluid, umbilical cord, breast milk, and neonatal swabs (10, 11). Second, it may be transmitted via vaginal contact with father's semen during intercourse. The published data about sexual transmission of SARS-CoV-2 indicates the unlikely that its transmission through semen is unlikely (12). We could not have access to the screening test of her husband; therefore, we cannot confidently suggest if the test of the mother was false negative or it was sexually transmitted. Moreover, it is not fully determined whether the virus can be transmitted to the fetus during pregnancy or delivery (2).
In the cases reported in this paper, lung High-resolution computed tomography (HRCT) was performed after delivery and all six cases had some degree of pulmonary involvement. We preferred to postpone performing CT scan to after delivery since all cases were at the delivery phase and there was no emergent need for the diagnosis of pulmonary involvement. There is always the possibility of teratogenicity of radiation during pregnancy, although it is very low. According to the available statistics, performing a lung CT scan at 0.03 mGy is not associated with an increased risk of fetal anomalies and pregnancy complications (13, 14).
It should be noted that there is a risk of developing postpartum respiratory symptoms in mothers. In one of our cases, respiratory symptoms appeared after delivery, which could be suggestive of other differential diagnoses, such as amniotic fluid embolism, in addition to COVID-19. As in any other case, viral pulmonary involvement is associated with an increased risk of bacterial infections; hence, progressive manifestation is justifiable. Therefore, careful examination of suspected patients is necessary to reduce diagnostic and therapeutic errors. Respiratory monitoring and follow-up are also recommended for a period after delivery in pregnant women with COVID-19 (8).
There is no complete consensus on the treatment of pregnant women with COVID-19. However,

WHO emphasizes the uselessness of systemic corticosteroids in these patients and does not recommend them except in cases of medical indication (3). Besides, corticosteroids can suppress the production of antibodies in the mother and increase the chances of infecting the fetus or infant (2, 15). Another medication that was previously administered to treat these cases was chloroquine phosphate. Although the medication and its metabolites pass through the placenta, no dangerous neonatal complication has been reported so far (16). Volume of distribution for chloroquine increases during pregnancy and its serum level decreases; hence, if administered, higher doses may be needed during this time (15). Quinolones are not presently recommended for treatment of COVID-19.

Prolonged maternal hypoxia can be associated with placental hypo-perfusion and fetal growth retardation. In the cases reported in this paper, the infants did not have developmental disorders, which can be explained by the infection of the mother in the late stages of pregnancy and the shorter period of the disease. It is generally recommended that pregnant women undergo at least one ultrasound to check for intrauterine growth disorder after recovery from COVID-19 (8). In our cases, two mothers experienced atony and post-partum hemorrhage, which were controlled via conservative treatments. It should be noted that maternal hypoxia might be associated with uterine atony. Preventive use of long-acting uterotonic agents is recommended to reduce the incidence of postpartum hemorrhage in COVID-19 cases (17).

The preferred method of delivery in critically ill patients is cesarean section. Common analgesia can be used in patients with a good general condition and stable symptoms. However, the use of nitrogen inhalation is not recommended due to the increased risk of infection (8, 17). Pregnant women who have tested positive for COVID-19 can try vaginal delivery without exacerbation of their disease or an increased risk for SARS-CoV-2 infection in their neonates (17).

In pregnant mothers with suspected COVID-19 who need adjuvant oxygen therapy with a nasal cannula, it is recommended that a surgical mask be placed on the cannula to reduce the risk of transmission (8). In the guideline regarding SARS, the Canadian Women's Foundation suggests that umbilical cord clamping should not be delayed and there should not be skin contact immediately after delivery (4). Nevertheless, the necessity of these measures has not been proven for COVID-19.

Breastfeeding is also ambiguous in cases of COVID-19 and is not recommended, and if the patient insists, the mother must have a mask. However, the milk of women with SARS has not been proven to have a significant viral load (8). Regarding the cases reported in this study, it was decided to allow the breastfeeding of neonates since the risk of death due to malnutrition was much higher than coronavirus-related death.

Conclusions

Pregnant women are at increased risk in all epidemics of infectious diseases due to their physiological and immunological changes. Moreover, the safety of the fetus is another important issue to be considered.

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Authors' contribution

All the authors met the standards of authorship based on the recommendations of the International Committee of Medical Journal Editors.

Conflict of interest

None declared.

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