Received: 7 May 2020 | Revised: 12 May 2020 | Accepted: 20 May 2020 | First published online: 09 Jun 2020
DOI: 10.1002/ijgo.13236

Obstetrics

Update on clinical outcomes of women with COVID-19 during pregnancy

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Funding Information
National Key R&D Program of China; "Thirteenth Five-Year Plan" of the China Ministry of Science and Technology; National Natural Science Foundation of China

KEYWORDS: China; Clinical outcomes; Coronavirus; COVID-19; Pregnancy

1 | INTRODUCTION

Pregnant women have a disproportionately high risk of complications from other types of viral pneumonia; however, little is known about the full impact of coronavirus disease 2019 (COVID-19) in pregnancy. Pregnant women are uniquely susceptible to severe illnesses caused by viral infection, possibly due to the shift from cellular to humoral immunity during pregnancy and the puerperium.[1]

Evidence shows that the most common fetal complications in pregnant women with pneumonia include preterm birth (up to 44%), intrauterine growth restriction (up to 12%), intrauterine death (up to 3%), and neonatal death (up to 12%).[2] In 2003, a study from Hong Kong reported 10 pregnant women with severe acute respiratory syndrome (SARS), including four who required labor induction due to a deterioration in their health status.[3]

The present article reports what is currently known about pregnancy outcomes among women with COVID-19 infection at the time of publication. This information is likely to continue to evolve as the course of this novel disease unfolds.

We conducted a retrospective cohort study with ethics approval obtained from the ethics committee of Wuhan University, School of Health Sciences. A total of 16 pregnant women with COVID-19 were identified up until February 16, 2020 in one obstetric unit at Wuhan Union Hospital. All 16 patients returned positive results for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) on real-time reverse transcription polymerase chain reaction (RT-PRC) of respiratory specimens and showed ground-glass opacity on chest CT scan.

Mean age of the women was 31 ± 3.84 years (range, 25–40 years). Median gestational age of the neonates at delivery was 37^{+5} weeks and up (range, 34^{+3}–41^{+1} weeks). Most women (n=14, 87.5%) had pregnancy comorbidities and/or fetal complications. Average length of hospital stay was 5 days (range, 3–8 days). Six patients required low-flow supplemental oxygen, and one patient required high-flow supplemental oxygen. No patients required ventilatory support. Of the 16 patients, 12 women were delivered by cesarean, while four had a vaginal birth. There were no neonatal or maternal deaths. All neonates were tested for COVID-19, and all samples tested negative. Of 16 neonates, 12 were transferred to a children's hospital, mainly for preventive isolation (n=9, 56.2%). Detailed characteristics of the 16 patients are shown in Table 1.

Consistent with previous reports on nonpregnant adult patients with COVID-19 pneumonia,[4] the most common symptom at onset of COVID-19

pneumonia in pregnant women was fever, with the majority having one or more coexisting medical conditions. Fetal complications were also consistent with a previous study,[2] which found that pregnant women with COVID-19 pneumonia had a chance of preterm birth and intrauterine growth restriction. Because of this, these neonates were transferred to a children's hospital for further treatment and preventive isolation.

While the most recent study reported nine infants with COVID-19,[5] RT-PCR test results were negative for all neonates in the present study, indicating no intrauterine vertical transmission potential. As SARS-CoV-2 is a new virus, whether the possibility of intrauterine vertical transmission exists is worthy of further observation. In addition, whether contracting the virus during pregnancy could cause long-term health effects in infants and young children remains unknown.

In contrast to a previous report,[6] the present study's findings showed that 4 (25.0%) patients had a vaginal birth, indicating that vaginal birth remains a viable delivery option and cesarean delivery may

TABLE 1 Characteristics of obstetric patients with COVID-19 (n = 16)

Variables	Mean ± SD or median	Range	No.	%
Maternal age, y	31 ± 3.84	25–40		
Primipara			9	56.3
Gestational age at diagnosis, wk	37	34–41		
Gestational age at delivery, wk	37^{+5}	34^{+3}–41^{+1}		
Pregnancy comorbidities/fetal complications				
Premature rupture of membranes			3	18.8
Preterm birth			3	18.8
Cardiac disease in pregnancy			2	12.5
Hypothyroidism			2	12.5
Polyhydramnios			1	6.3
Thalassemia			1	6.3
Intrauterine growth restriction			1	6.3
Fetal macrosomia			1	6.3
Link to Wuhan			16	100.0
Vital signs and symptoms at admission				
Fever			11	68.8
Cough			10	62.5
Chest CT scan with ground-glass opacity			9	56.3
Signs of labor, such as contractions and spotting, bleeding			1	6.3
Vaginal discharge			1	6.3
No symptoms			2	12.5
Treatment				
Antibiotic treatment			16	100.0
Antiviral therapy			16	100.0
Glucocorticoid therapy			6	37.5
Oxygen therapy			7	43.8
Supportive therapy based on symptoms			10	62.5
Mode of delivery				
Cesarean			12	75.0
Vaginal birth			4	25.0
Birth weight, g	3175.37 ± 478.58	2450–4100		
Apgar score within 1 minute	7.93 ± 0.25	7–8		
Apgar score within 5 minutes	8.87 ± 0.62	7–10		
Neonates with COVID-19			0	0.0
Neonates transferred to children's hospital			12	75.0
Reason for transfer				
Preventive isolation			9	56.3
Preterm birth			3	18.8

not be necessary in all women. There is no clear benefit of delivery via cesarean in women with COVID-19.

The limitations of our study include a small sample size of 16 pregnant women from a single obstetric unit and a retrospective design; however, our results suggest that COVID-19 is not an indication for pregnancy termination, and decisions regarding delivery timing must be individualized. Most women with COVID-19 delivered at or beyond the late preterm period, and most who delivered prematurely had other medical indications for preterm birth other than COVID-19. Therefore, choice of delivery method should be based on the usual obstetric indications.

AUTHOR CONTRIBUTIONS

YZ drafted the manuscript. LL, QY, and BXY designed the study. WW, RH, and FH collected the data and conducted data analysis. DC made essential revisions.

ACKNOWLEDGMENTS

This study was funded by the National Key R&D Program of China (2016YFC1000400 & 2016YFC1000405); Major Project of the "Thirteenth Five-Year Plan" of the China Ministry of Science and Technology (2017YFC1001402); National Natural Science Foundation of China (81830045).

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

REFERENCES

1. Kourtis AP, Read JS, Jamieson DJ. Pregnancy and infection. *N Engl J Med*. 2014;370:2211–2218.
2. Chen YH, Keller J, Wang IT, et al. Pneumonia and pregnancy outcomes: a nationwide population-based study. *Am J Obstet Gynecol*. 2012;207:288.e1–288.e7.
3. Wong SF, Chow KM, de Swiet M. Severe acute respiratory syndrome and pregnancy. *BJOG*. 2003;110:641–642.
4. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan. *JAMA*. 2020;323:1061–1069.
5. Wei M, Yuan J, Liu Y, et al. Novel coronavirus infection in hospitalized infants under 1 year of age in China. *JAMA*. 2020;323:1313–1314.
6. Chen H, Guo J, Wang C, et al. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. *Lancet*. 2020;395:809–815.

Received: 20 May 2020 | Accepted: 27 May 2020 | First published online: 16 Jun 2020
DOI: 10.1002/ijgo.13250

Obstetrics

Maternal mortality from COVID-19 in Mexico

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KEYWORDS: COVID-19; Maternal mortality

COVID-19, the illness caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is the deadliest pandemic to occur in this century. Common symptoms of COVID-19 include cough, myalgia, fever, chest pain, and headache. However, its clinical presentation ranges from completely asymptomatic to acute respiratory distress syndrome.[1] Pregnant women are susceptible to community spread of COVID-19 because they cannot postpone interactions with healthcare professionals and other women receiving obstetric care.[1]