

A Case of 2019 Novel Coronavirus in a Pregnant Woman With Preterm Delivery

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We present a case of a 30-week pregnant woman with the 2019 novel coronavirus (COVID-19) delivering a healthy infant with no evidence of COVID-19.

Keywords. SARS-CoV-2; pregnant woman; preterm delivery.

Since December 2019, an epidemic caused by the novel coronavirus (severe acute respiratory syndrome coronavirus 2 [SARS-CoV-2]) infection has spread rapidly from Wuhan to different areas of China and other parts of the world [1]. As of 13 February 2020, over 59 000 confirmed cases of the 2019 novel coronavirus infection (COVID-19) in China have been reported, and more than 440 cases in many other countries, with an approximately 2% mortality rate [2]. Evidence pointing to the person-to-person transmission in hospital and family settings has been accumulating, but the modes of transmission are incompletely defined, with no effective treatments or vaccines until now [3–5].

According to previous studies [6–9], pregnant women are at high risk of developing viral infection, such as influenza-A, H1N1, SARS-CoV, Middle East Respiratory Syndrome coronavirus (MERS-CoV), and Ebola virus, and appear to have worse clinical outcomes, including maternal mortality, stillbirth, spontaneous abortion, and preterm delivery, compared with non-pregnant women. However, there are only limited data about the clinical features of COVID-19 during pregnancy. In this study, we report a case of a 30-week pregnant woman

with COVID-19 who gave birth to an infant with no evidence of COVID-19.

Case Report

On 2 February 2020, a 28-year-old female, who was 30 weeks pregnant, presented to a fever clinic of Suzhou Municipal Hospital with intermittent fever for 1 week. She disclosed that she had returned to Suzhou on 24 January after traveling to visit family in Wuhan 3 weeks previously. Given the patient's travel history and fever, 2 throat-swab samples were collected and tested negative for SARS-CoV-2 with the Chinese Center for Disease Control and Prevention–recommended kit (BioGerm, Shanghai, China), following World Health Organization guidelines for quantitative RT-PCR. Chest computed tomography (CT) scan on 4 February demonstrated left-sided subpleural patchy consolidation and right-sided ground-glass opacities (Figure 1A). The patient then went into isolation at that hospital. On 6 February the second SARS-CoV-2 RT-PCR results of her sputum came back positive, so she was then transferred to the intensive care unit (ICU) in a negative-pressure isolation room of the Affiliated Infectious Hospital of Soochow University, the designated medical center for COVID-19 in Suzhou.

On admission, the physical examination revealed a body temperature of 36.2°C, blood pressure of 95/64 mm Hg, pulse of 92 beats per minute, respiratory rate of 22 breaths per minute, and oxygen saturation of 97% with a facial mask at 5 L per minute of oxygen. Other laboratory findings included a leukocyte count of $10.60 \times 10^9/L$, neutrophils of $9.14 \times 10^9/L$, lymphocytes of $0.86 \times 10^9/L$, albumin of 24.6 g/L, C-reactive protein of 19.6 mg/L, D-dimer of 840 µg/L, procalcitonin (PCT) of 0.288 ng/mL, lactate dehydrogenase (LDH) of 544 U/L, and N-terminal probrain natriuretic peptide (NT-proBNP) of 318 pg/mL. Levels of creatinine and aminotransferase were within normal limits. A fetal ultrasound revealed a normal intrauterine fetus with normal anatomy of approximately 30 weeks of gestational age.

Since SARS-CoV-2 is a newly identified virus, it remains unknown whether viral shedding during delivery occurs or vertical transmission exists. Several multidisciplinary consultations were performed, concluding that given the current situation, in particular the CT scan and low levels of lymphocytes and albumin, the patient's condition might deteriorate at any time, and she was at risk of preterm birth. After emergency scenarios for the patient, treatment with Arbidol tablets (Suzhou Pharmaceutical Factory) (0.2 g administered orally every 8 hours), lopinavir and ritonavir tablets (400/100 mg administered orally every 8 hours), cefoperazone sodium and sulbactam sodium (3.0 g administered intravenously every 8

Received 12 February 2020; editorial decision 21 February 2020; accepted 26 February 2020; published online February 28, 2020.

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Clinical Infectious Diseases® 2020;71(15):844–6

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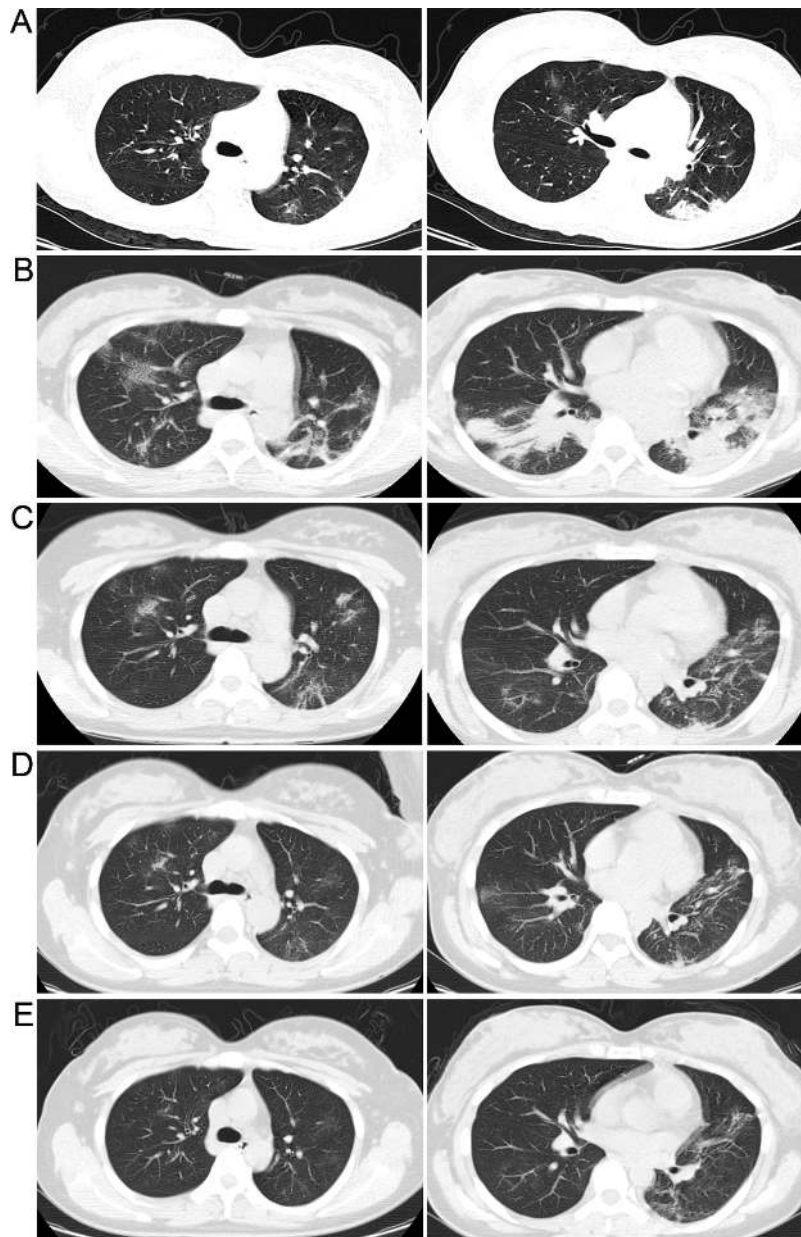


Figure 1. Chest computed tomography scans (transverse plane) of the mother. *A*, 4 February 2020 (2 days before hospitalization). Left-sided subpleural patchy consolidation and right-sided ground-glass opacities. *B*, 8 February 2020 (hospital day 3, morning). Obvious bilateral multiple ground-glass opacities. *C*, 12 February 2020 (hospital day 7, postoperative day 4). Bilateral multiple ground-glass opacities, with resolution of infiltrates of both lung fields compared with [Figure 1B](#). *D*, 15 February 2020 (hospital day 10, postoperative day 7). Bilateral multiple ground-glass opacities. *E*, 18 February 2020 (hospital day 13, postoperative day 10). Bilateral ground-glass opacities, with resolution compared with panel *D*.

hours), and human serum albumin (20 g administered intravenously every day) were initiated; dexamethasone and magnesium sulfate as prophylaxis for the fetus were given; and an emergency cesarean section was prepared. On hospital day 3 morning (8 February), a repeated chest CT scan showed bilateral multiple ground-glass opacities ([Figure 1B](#)), a finding consistent with severe atypical pneumonia. In the afternoon, fetal movement and variability in fetal heart rate monitoring were

not detected, and no improvement was shown on noninvasive ventilation for 4 hours.

After a multidisciplinary consultation was performed and informed consent was obtained, an emergency cesarean section under combined spinal-epidural anesthesia was performed, with an estimated blood loss of 200 mL, in a designated negative-pressure isolation room; all personnel involved wore protective gear, including gown, a N95 mask, eye protection, and gloves.

A preterm male infant weighing 1.83 kg was delivered uneventfully, with Apgar scores of 9 and 10 at 1 and 5 minutes, respectively. He was kept in the isolation ICU of the neonatal nursery for observation without any contact with his mother after birth. The newborn was given formula instead of breast milk. During the delivery, samples of amniotic fluid, placenta, umbilical cord blood, gastric juice, and throat swabs of the infant were obtained for SARS-CoV-2 RT-PCR tests, and all results were negative. On day 3 after cesarean section (11 February), RT-PCR analyses of the neonatal throat swab and stool samples were negative. On 15 and 17 February, throat-swab RT-PCR tests of the mother and the infant were negative. Three chest CT scans of the mother on 12, 15, and 18, respectively, demonstrated resolution of infiltrates of both lung fields (Figure 1D, E). All healthcare workers in contact with the infant during his delivery and subsequent care remained asymptomatic. The patient and her infant had an uneventful postpartum and neonatal course.

DISCUSSION

SARS-CoV-2 is a newly identified virus, spreading quickly from Wuhan to different parts of China and the world. Respiratory droplet transmission is the main route of SARS-CoV-2, and it can also be transmitted through contact [3]. Several studies [6–9] revealed that pregnant women with different viral respiratory illness were at high risk of developing obstetric complications and perinatal adverse outcomes compared with non-pregnant women due to changes in immune responses [10]. According to a previous report of 10 pregnant patients with SARS in Hong Kong [11], SARS-CoV infection could be associated with poor pregnancy outcomes, including critical maternal illness, spontaneous abortion, maternal death, or preterm birth.

In this case, we report that a mother with COVID-19 gave birth to a healthy infant with no evidence of COVID-19 after her 30-week pregnancy. Our case ended up with an uneventful postpartum and neonatal course. The RT-PCR tests were all negative, suggesting that the infant was unaffected by COVID-19, and all healthcare workers taking care of him remained asymptomatic.

Several reasons might have contributed to the uneventful perinatal course. First, this patient was a healthy young woman without a special medical history, and regular follow-ups in the obstetrics clinic revealed that she and the fetus were healthy before this infection. And early detection of COVID-19 and the late stage of gestation were also essential. Second, our medical center was a designated hospital for COVID-19 in Suzhou since the virus outbreak in China, and all of the healthcare workers received systemic training for strict isolation and protection measures, such as the use of protective equipment, hand hygiene, safe waste management, environmental cleaning, and sterilization of medical equipment, and followed the correct procedures during medical practice. Much experience has been

accumulating in the past few weeks from dozens of patients infected by SARS-CoV-2, including a 19-month-old boy, the youngest patient in Suzhou to date. The patient in our case was ideally cared for by a multidisciplinary medical team, including obstetrics, pediatrics, infectious diseases, anesthesia, ICU, a nosocomial infection-control expert, and administrative staff. Timely and effective consultations were obtained to discuss her case. Last, careful transmission precautions with the infant, including contact, droplet, and airborne precautions, seem to be of great significance. Given the high infectivity and undefined transmission mode, some infection-control protocols applicable for the operating room were developed for patients with confirmed or suspected COVID-19. Some infected cases in China demonstrated viral shedding in feces, suggesting that SARS-CoV-2 might be present in other body parts, so those precautions during delivery were necessary in case transmission during delivery exists.

Our case provides an initial view of the outcome associated with pregnancy-related COVID-19 and several effective strategies for managing pregnant women with COVID-19. Comprehensive data on larger numbers of pregnant women with COVID-19 are required to better understand the overall impact of SARS-CoV-2 on maternal and birth outcomes.

Notes

Authors' contributions. X. W. and Z. Z.: drafting or revision of the submitted article. J. Z. and Y. T.: healthcare providers of the patient. F. Z. and X. S.: design of the study and revision of the submitted article.

Financial support. This work was supported by the People's Livelihood Science and Technology Project of Suzhou (grant number SS201711).

Potential conflicts of interest. The authors: No reported conflicts of interest. All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest.

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