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A case report of COVID-19 infection and management during pregnancy

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Abstract

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) which started in Wuhan, Hubei Province, China, and progressed to a pandemic affecting over 210 countries and territories including the United States. The severity of symptoms range from mild to critical disease involving multi-organ failure; however, many pregnant COVID-19 patients have mild symptoms. The understanding of COVID-19 is evolving and there is limited data about its effects in pregnancy. This case series features two pregnant patients with COVID-19 with a range of symptoms, including fever, non-productive cough, headache, and worsening dyspnea. Both patients had chest x-ray findings notable for lung opacities, and lymphopenia was a consistent abnormal laboratory finding. Both of the patients had hypoxia which was treated with hydroxychloroquine and lopinavir-ritonavir with significant improvement in clinical symptoms and prolongation of pregnancy.

Keywords

COVID-19, coronavirus, SARS-CoV-2, COVID-19 in pregnancy, infectious disease

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Introduction

A novel coronavirus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was identified in Wuhan, Hubei Province, China, in December 2019 and it rapidly spread, resulting in a pandemic. Coronavirus disease 2019 (COVID-19) is the infection caused by SARS-CoV-2.[1] Over 15,932,116 cases and 296,818 total deaths have been reported throughout the United States as of 13 December 2020.[2] The Centers for Disease Control and Prevention (CDC) recently reported a total of 44,183 cases and 57 deaths of pregnant women with COVID-19 in the United States.[3] An initial summary report of cases in China showed that symptoms ranged from mild to critical and manifestations, included fever, dry cough, myalgia, dyspnea, and fatigue.[4]

SARS-CoV-2 is spread by direct person-to-person contact via respiratory droplets. The infection spreads when someone is exposed to viral particles contained in the respiratory droplets of an infected person through inhalation or contact of mucous membranes.[5] Treatment options are dependent on disease severity. Current investigational drugs for the treatment of severe to critical disease include remdesivir, convalescent plasma therapy, and monoclonal antibodies. Data regarding the management of pregnant women with COVID-19 infection continue to emerge. The purpose of this case report is to discuss the clinical presentation and management of 2 patients out of the 40 pregnant women with COVID-19 infection using early treatment medications, specifically hydroxychloroquine and lopinavir-ritonavir. Both patients were treated during the initial wave of COVID-19 cases in March to April 2020.

Case presentations

Patient 1

A 29-year-old gravida 1 para 0 at 34 and 0/7 weeks with a history of chronic hypertension, gestational diabetes, and hypothyroidism initially presented with 3 days of non-productive cough, worsening shortness of breath, and fever of 38.7°C. She

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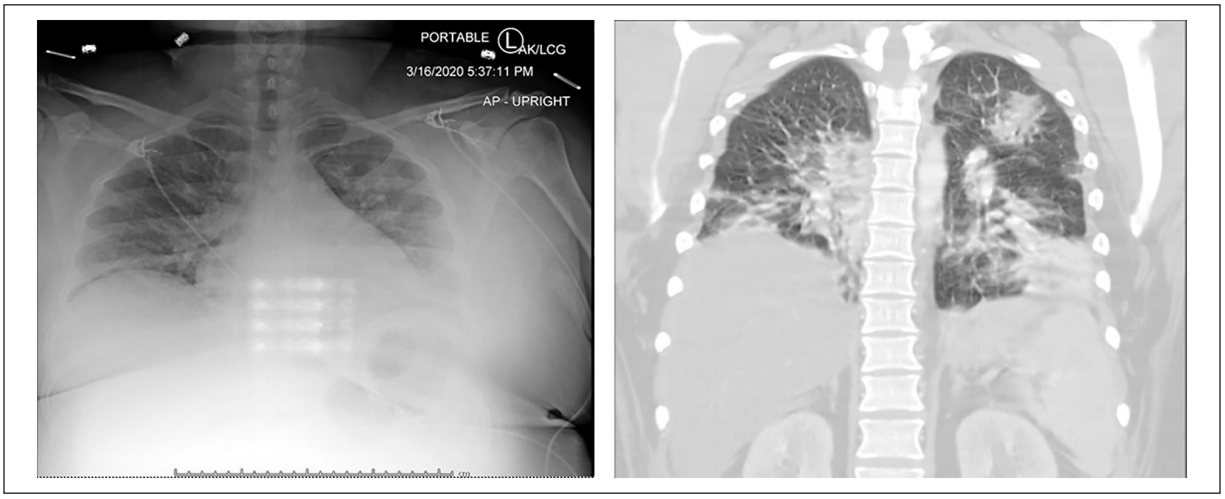

Figure 1. Left: chest x-ray of patient 1 with hazy opacities of the left lung base. Right: CT scan of patient 1 with diffuse ground glass, patchy opacities.

Table 1. Admission laboratory values.

Laboratory variable	Reference range	Patient 1	Patient 2
White cell count $\times 10^9$/L	3.5–10	7.0	5.7
Hemoglobin g/L	12–16	13.6	10.9
Hematocrit %	35–46	42.3	33.1
Platelet count $\times 10^9$/L	150–400	181	195
Lymphs%	20–40	14.8	16.6
C-reactive protein (CRP) mg/L	0–8	–	58.2
Aspartate aminotransferase (AST) U/L	10–50	65	46
Alanine aminotransferase (ALT) U/L	10–55	31	41

reported no recent travel or contact with anyone with COVID-19. Her home medications included Metformin 500 mg daily, glyburide 5 mg daily, and Levothyroxine 150 mcg daily. Her initial prenatal labs were within normal limits. Her vital signs on admission to the hospital showed respiratory rate (RR) of 24/min, oxygen saturation of 94% on room air, temperature of 37.6°C, blood pressure (BP) of 150/74 mm Hg, heart rate (HR) of 122/min, and fetal heart rate (FHR) of 150/min. Chest x-ray (Figure 1) showed hazy opacities of the left lung base. Computed tomography (CT) chest angiography (Figure 1) was performed to rule out pulmonary embolism (PE), which showed bilateral ground glass perihilar and peripheral opacities and no evidence of PE. (Figure 1). Laboratory values were significant for elevated AST of 65 U/L and lymphopenia of 14.8% (Table 1). Azithromycin and ceftriaxone were initially given for superimposed pneumonia. Testing for SARS-CoV-2 was performed using polymerase chain reaction of nasopharyngeal swab. Due to worsening dyspnea and hypoxia requiring oxygen at 5 L via nasal cannula, hydroxychloroquine 400 mg daily and lopinavir-ritonavir 200-50 mg two tablets twice daily were started. Daily fetal non-stress tests (NSTs) were performed and were reactive. Following antiviral therapy, the patient improved clinically and was able to be titrated off oxygen after 5 days. She was discharged home in stable condition with a 10-day course of hydroxychloroquine and azithromycin. Since discharge, the patient reported resolution of symptoms and no recurrence of fever.

Patient 2

A 33-year-old gravida 3 para 2-0-0-2 at 34 and 5/7 weeks with no pertinent medical history presents with dyspnea, abdominal pain, headache, generalized malaise, loss of smell and taste, and fever for 5 days. She noted that her husband had similar symptoms and his COVID-19 testing results was unknown at the time. Her pregnancy course was otherwise uncomplicated. On presentation, she appeared to be in mild respiratory distress, vitals consisted of RR 18/min, oxygen saturation of 98% on room air, temperature 38°C, BP 119/70 mm Hg, HR 112/min, and FHR 160/min. Similar to patient 1, chest x-ray showed right middle to lower lung opacity (Figure 2) and lymphopenia of 16.6%. Her C-reactive protein (CRP) level was elevated at 58.2 mg/L. SARS-CoV-2 test was positive. Initially, she was saturating well on room air; however, she became hypoxic shortly after admission requiring 2 L of oxygen via nasal cannula. Hydroxychloroquine and lopinavir-ritonavir were started due to worsening dyspnea especially when speaking. Over the course of 8 days, her hypoxia persisted requiring up to 6 L of oxygen. She noted irregular uterine contractions which improved with intravenous hydration and NSTs were reactive with improvement in fetal tachycardia. Following treatment, her clinical status improved and she was discharged on hospital day 10 after completing 8 days of antiviral therapy. On follow-up, a few weeks after discharge, she also noted resolution of symptoms.

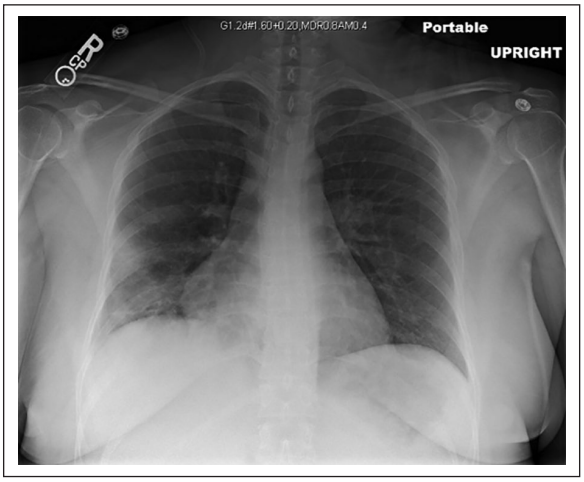

Figure 2. Chest x-ray of patient 2 with right middle to lower lung opacity.

Discussion

The Society of Maternal-Fetal Medicine (SMFM) recently defined the severity scale of COVID-19 infection which includes asymptomatic, mild, moderate, severe, and critical disease.[6] Mild disease consists of flu-like symptoms without dyspnea. Moderate disease consists of dyspnea, pneumonia, and fever. Severe disease includes hypoxia with oxygen saturation less than 93%, and greater than 50% of lung involvement on imaging. Critical disease includes multi-organ failure. A report by Zambrano et al. revealed that pregnancy does not increase susceptibility of contracting COVID-19 infection; however, pregnant women are likely to have severe illness compared to non-pregnant women.[7] Maternal and fetal outcomes are limited; however, some studies reported increased preterm birth and cesarean delivery rates.[8,9] Furthermore, newborns have overall good outcomes.[8,9]

Our cases represent two pregnant women who presented antenatally with moderate to severe symptoms and successfully managed with antiviral therapy. Both patients noted fever as a shared symptom which is similar to other reported cases.[10] Another common finding in both of the patients is lymphopenia. The etiology of lymphopenia is unclear; proposed mechanisms include direct viral infection of lymphocytes or lymphocyte apoptosis by inflammatory cytokines.[11] Chest x-rays and CT showed opacities, consistent with findings seen on chest imaging in prior studies; however, the utility as a diagnostic tool is controversial.[12]

Treatment for COVID-19 is primarily supportive therapy especially for mild to moderate illness. However, antiviral therapy can be considered for severe to critical disease. Recently, the US Food and Drug Administration (FDA) approved remdesivir for treatment of COVID-19. Pregnant patients were not included in clinical trials for remdesivir. However, a study of compassionate use of remdesivir in pregnant women with COVID-19 showed high recovery rates and low rate of adverse reactions.[13] Other therapies include convalescent plasma, bamlanivimab, and tocilizumab. Oxygen therapy via high flow nasal cannula or face mask can be used for patients with oxygen saturation less than or equal to 95% on room air.[6]

At the time of our study, remdesivir and monoclonal antibodies were not discovered for use of COVID-19. Instead, both patients were started on hydroxychloroquine and lopinavir-ritonavir with significant improvement in dyspnea and hypoxia. Hydroxychloroquine and lopinavir-ritonavir were used prior to the recent recommendation to avoid use unless used in a clinical trial because the efficacy is unclear at this time and also due to adverse effects of arrhythmia. Limited data has shown that hydroxychloroquine and lopinavir-ritonavir inhibit SARS-CoV-2 in vitro.[14] The efficacy of hydroxychloroquine with or without lopinavir-ritonavir is unclear for COVID-19 infection. The optimal dose and duration of treatment with antivirals have not been established yet due to ongoing clinical trials.[14] Some of the concerns for the antiviral use include fetal and cardiac effects; however, lopinavir-ritonavir is not shown to increase teratogenicity. Hydroxychloroquine has been widely used as an antimalarial in pregnant women with no known fetal effects.[15] Fortunately, fetal monitoring of both patients showed reassuring fetal status throughout their hospital course. Furthermore, combining hydroxychloroquine and azithromycin is reported to cause QT prolongation; however, no cardiac events or electrocardiogram (EKG) changes were noted in the patients. Based on our cases, the pregnancies were prolonged for the two women who presented preterm using antiviral treatment and supportive measures.

Conclusion

Data on COVID-19 in pregnant women is evolving. This case report summarizes our experience with treating two pregnant patients with COVID-19 who had positive outcomes. Although we're limited by our sample size, the use of hydroxychloroquine and lopinavir-ritonavir was found to prevent progression of illness and no adverse effects were noted. Of note, one of the studies which reported lack of benefit using hydroxychloroquine was retracted due to inconsistencies in data collection. Future efforts are needed to understand the long-term effects of COVID-19 in pregnancy. In addition, comprehensive studies are needed to examine the efficacy and safety of investigational drugs in pregnant women—a special population that has been excluded from many COVID-19-related drug trials.

Declaration of conflicting interests

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Ethical approval

Ethical approval to report this case series was obtained from Biomedical Research Alliance of New York Institutional Review Board #20-705.

Informed consent

Written informed consent was obtained from the patient(s) for their anonymized information to be published in this article.

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