CASE REPORT

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# Cardiac Arrest in a 31 Weeks Severe Preeclampsia Patient with SARS-CoV-2 Infection

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**ABSTRACT** Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), a new type of enveloped RNA coronavirus, causes a wide spectrum of clinical conditions. According to the current data, severity of the clinical course of coronavirus disease-2019 (COVID-19) infection cannot be fully predicted in pregnancy. The case is presented to point out that the clinical consequences of preeclampsia with COVID-19 pneumonia can be dramatic and etiologically related. Infections especially of viruses are suggested as one of the etiologic factors in preeclampsia. A 34-years-old, multiparous pregnant at her 31th gestational week with COVID-19 pneumonia and severe preeclampsia was presented in this report. We speculated that there could be a relationship between the SARS-CoV-2 and preeclampsia and should be revealed by large studies.

**Keywords:** Pre-eclampsia; severe acute respiratory syndrome coronavirus 2; cardiac arrest

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), a new type of enveloped RNA coronavirus, causes a wide spectrum of clinical conditions.[1] Especially in those of severe cases, inflammation, lymphopenia, and cytokine storm are suggested to play a role in the mechanism of SARS-CoV-2.[2,3]

According to data obtained from a limited number of patients in the literature, clinical picture of COVID-19 in pregnant women ranges from asymptomatic to severe.[1,2] However, still less is known about its clinical course in patients with severe preeclampsia. In this report, a case of severe preeclampsia patient at her 31th gestational weeks with reverse transcriptase-polymerase chain reaction (RT-PCR) confirmed severe SARS-CoV-2 infection was presented.

## CASE REPORT

A 34-years-old, multiparous pregnant woman at her 31th gestational week with symptoms of cough, hypertension and headache was referred to our clinic.

Her initial examination revealed tachypnea (28 breaths/min), hypertension (160/110 mmHg) and dyspnea with peripheric oxygen saturation (SPO2) of 91%. She was not in labour and her obstetric examination was unremarkable. Urine analysis revealed proteinuria (++).

Considering the hypertension and proteinuria, magnesium sulphate infusion and single dose antenatal corticosteroid were initiated. Cardiotocographic findings revealed fetal distress and an urgent cesarean section (Category 2) was successfully performed.

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A 1,560 g female baby was delivered with a 1st and 5th minutes APGAR scores of 5 and 7 who was then intubated and taken into the neonatal intensive care unit (ICU) with a clinical picture attributed to the prematurity. Her two consecutive RT-PCR tests for SARS-CoV-2 was found negative and no sign or symptom attributed to COVID-19 (including chest X-ray) was observed.

On the following day of delivery, the mother's body temperature, blood pressure and heart rate were elevated (38.2 °C, 210/100 mmHg and 145 beats/minute, respectively). Her chest computer tomography scan was found to be consistent with SARS-CoV-2 infection (Figure 1). Her RT-PCR test that had been taken two days prior to the admission was received as positive for SARS-CoV-2, and oseltamivir, hydroxychloroquine, azithromycin and tromboprophylaxis with enoxaparin sodium (0.6 IU/day) were added to the treatment.

On the second postoperative day, she was transferred to the ICU because of deterioration of her signs, her blood pressure (BP) was severely elevated (190/110 mmHg). She also had fever (38.5 °C), tachycardia (120/min), dyspnea and decreased $sPO_2$ (93%, at nasal $O_2$ of 5 L/min.). Her troponine-I level was further increased to the extent of three times and her blood count revealed lymphopenia (0.35 $10^3$/uL) and increased neutrophil to lymphocyte ratio (NLR) of 20.

Lopinavir/ritonavir, linezolid and high dose vitamin C infusion were added to the medication. Her laboratory findings were as follows: fibrinojen: 641 mg/dl, procalcitonin: 0.15 ng/mL, albumin: 2.6, 2.2, g/dL, CRP: 13.2 mg/dL, uric acid: 7, 5.3 mg/dL and PLT: 55,90 $10^3$µL. Other laboratory parameters were given in detail in Figure 2.

She was treated in the ICU for three more days under oxygen replacement with nasal cannula. During this period, two units of fresh frozen plasma, one unit of erytrocyte pack and one packed albumin were transfused. In addition, tocilizumab and favipiravir were given.

At postoperative 7th day, the patient was transferred to the inpatient COVID-19 clinic. Here she received favipiravir, antihypertensives, anticoagulants and prophylactic ceftriaxone. At postoperative 13th day, widespread maculopapular lesions were observed, she could not tolerate the room air, her BP was fluctiated and her dyspnea was worsened with $SPO_2$ of 50% and thus, she was transferred back to the ICU again.

She was intubated and had a resuscitation because of cardiac arrest. Her follow-up chest CT revealed a progression of lung paranchymal lesions but regression of the plevral effusion (Figure 3). Troponine-I and pro-brain natriuretic peptide (PRO-BNP) levels were found as 152.7 pg/mL and 197.5 pg/mL, respectively. Her echocardiography was unremarkable, revealed an ejection fraction of 55%, moderate tricuspid insufficiency (Grade 2) and systolic pulmonary artery pressure of 35 mmHg. On her blood culture, candida albicans growth was observed and caspofungin, piperacilin-tazobactam were given and hemodiafiltration and hemadsorption treatments were

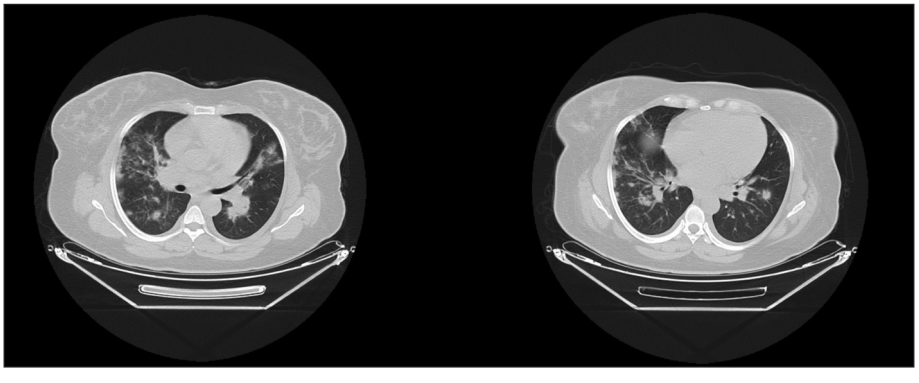

**FIGURE 1:** Initial chest computed tomography scan on the postoperative first day.
Patcy-shaped ground glass opacities were observed in bilateral lung zones. 15 mm and 10 mm pleural effusion was observed in right and left lungs, respectively.

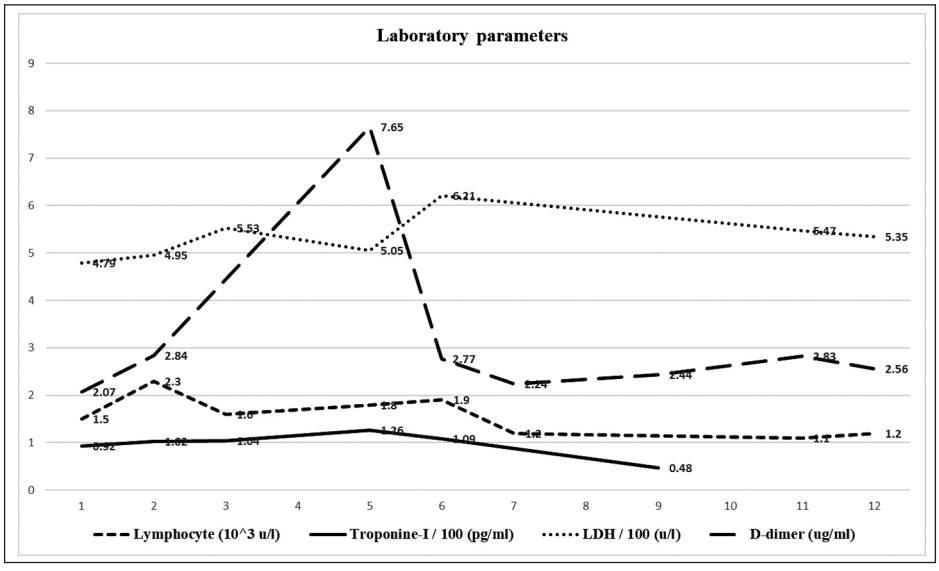


**FIGURE 2:** The changes in laboratory parameters during the management of the patient.

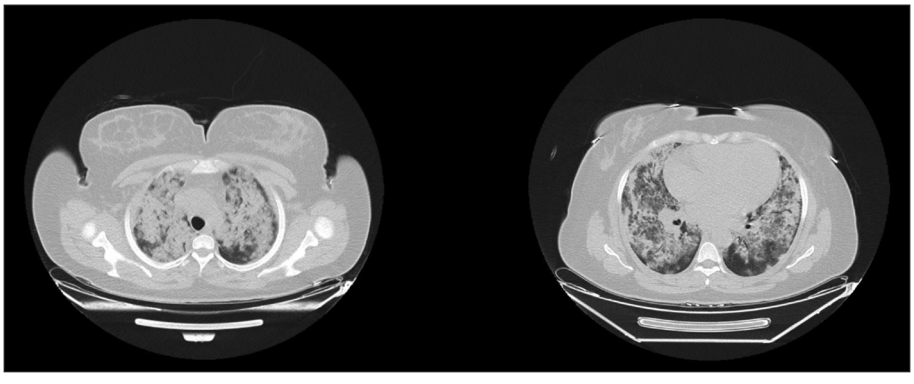

**FIGURE 3:** Follow-up chest computed tomography scan on the 13th postoperative day.
Extensive consolidations and ground glass opacities accompanying to interlobular septal thickenings (crazy paving image). Regression in pleural effusion was observed when compared to the initial CT scan, however, minimal pericardial effusion was observed.

performed for the treatment of sepsis. Her serum viral analysis was negative for SARS-CoV-2, Corona V. 229E, HKU1, NL63, OC43, Middle East respiratory syndrome-coronavirus, Adeno virus, Human metapneumovirus, Chlamidia pneumonia and Bordetella pertusis. Her laboratory findings were reported as ferritin: 3,785 mg/L, N-terminal PRO-BNP: 2,543 pg/mL, fibrinogen: 149 mg/dL and creatinine: 0.81.

She was recovered completely and discharged from the hospital on her postoperative 26th day. At her outpatient visits, all laboratory and clinical findings and lung ultrasound were found as normal. Written informed consent form for publication of this case report was obtained from the patient.

## DISCUSSION

Pregnancy necessitates adaptation in biochemical, hormonal, vascular and immune systems. This may result a couple of changes in the clinical courses of a wide range of conditions including some infectious and autoimmune diseases.[4,5] In normal pregnancy, immune system becomes proinflammatory in the first, then anti-inflammatory in the second and proinflammatory again in the third trimesters.[5] Immun system adaptation to pregnancy may be abnormal in preeclampsia.[6]

Preeclampsia is a multifactorial disease characterized by proteinuria and hypertension in pregnancy.

Episodes of placental hypoxia and reperfusion result in oxidative stress, subsequent disruption of syncytial architecture and release of various components from the intervillous space into the maternal circulation, stimulating production of inflammatory cytokines and finally a generalized hyperinflammatory state.[7-9] On the other hand, infections especially of viruses are suggested as one of the etiologic factors in preeclampsia.[10,11]

As the onset of preeclampsia in this report was two days after receiving the COVID-19 sample, which then was found as positive, one can suggest a possible role of COVID-19 in the onset or in the clinical course of severe preeclampsia.

On the other hand, severe preeclampsia might also aggrevate the clinic of SARS-CoV-2 infection. Generalized inflammatory state and elevated cytokines levels, which is charecteristic of severe preeclampsia and was also seen in our case, result in the endothelial damage of the blood vessels, increased permeability and leakage into the intercellular space, contracted intravascular volume and deteriorated blood circulation resulting generalized acidosis and impaired defence against infections.[12,13]

However, considering the etiology of preeclampsia, the main reason of the elevated cytokines is the placenta itself, so, after the extraction of placenta, clinical severity is supposed to be relieved progressively. In our case, the levels of cytokines and the other laboratory parameters were worsened after the birth in parallel to her clinical course. In the presented case, uncontrollable hypertension, acidosis, cardiac arrest, leukopenia, lymphopenia and eventually candida sepsis were observed.

We suggest that, as the troponin and LDH levels were remained elevated along the course of the disease progressively, the cardiac arrest that was observed in the patient's 13$^{th}$ postpartum day could be the result of a myocarditis related to the COVID-19 infection. However, the direct effect of cardiotoxic drugs used in the treatment and a generalized deterioration of the cardiovascular system due to the sepsis could also be causative.

According to the current data, severity of the clinical course of COVID-19 infection can not be fully predicted in pregnancy. Debate still exists whether it differs from those of nonpregnant patients. It is also not known whether COVID-19 infection can cause or excacerbate the preeclampsia.[14,15]

Considering the above mentioned facts and the atypical clinical course of both preeclampsia and the COVID-19 infection in this case suggests an interaction or overlap of the events that take place in the pathogenesis of these two diseases. The possible relationship between the SARS-CoV-2 and preeclampsia should be clarified by large studies.

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### *Conflict of Interest*

*No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.*

### *Authorship Contributions*

***Idea/Concept:*** *Niyazi Tuğ, Murat Yassa, Arzu Bilge Tekin;* ***Design:*** *Murat Yassa, Cihangir Yirmibeş;* ***Control/Supervision:*** *Arzu Bilge Tekin, Niyazi Tuğ;* ***Data Collection and/or Processing:*** *Pınar Birol, Cihangir Yirmibeş, Arzu Bilge Tekin;* ***Analysis and/or Interpretation:*** *Niyazi Tuğ, Arzu Bilge Tekin, Murat Yassa;* ***Literature Review:*** *Arzu Bilge Tekin, Niyazi Tuğ; Murat Yassa;* ***Writing the Article:*** *Niyazi Tuğ, Arzu Bilge Tekin, Murat Yassa;* ***Critical Review:*** *Niyazi Tuğ, Murat Yassa;* ***References and Fundings:*** *Pınar Birol, Cihangir Yirmibeş;* ***Materials:****Pınar Birol, Cihangir Yirmibeş.*

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