



Extracorporeal membrane oxygenation use in a 26-week pregnant female with a severe COVID-19 infection: case report

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Background: The SARS-COV-19 (COVID-19) pandemic has been an unprecedented global health crisis that has had far reaching implications and has exposed various susceptible patient populations including pregnant women. The effect of COVID-19 on pregnant women is an area of current research, with many studies focusing on maternal and fetal outcomes and maternal-fetal transmission of the virus. Current research suggests that COVID-19 presents similarly in both non-pregnant and pregnant women. Although COVID-19 is rarely vertically transmitted, it is currently unclear whether or not COVID-19 has an effect on the incidence of IUFD in pregnant patients.

Case Description: Here, we report the case of a 23-year-old female approximately 26 weeks pregnant, recently diagnosed with COVID-19. The patient required intubation during evaluation in the emergency department (ED) and ultimately was placed on extracorporeal membrane oxygenation (ECMO) while in the intensive care unit (ICU). During the ICU stay intrauterine fetal demise (IUFD) was diagnosed and a spontaneous en caul vaginal delivery occurred.

Conclusions: Currently, there is limited data available regarding the effect, or complications, of COVID-19 on the three trimesters of pregnancy. There is also limited data on the use of ECMO in pregnant patients with a COVID-19 infection. The case reported here is further evidence of the necessity of further research into the effects of COVID-19 on pregnant patients and the utilization of ECMO in these cases.

Keywords: COVID-19; pregnancy; intrauterine fetal demise (IUFD); extracorporeal membrane oxygenation (ECMO); case report

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Introduction

The SARS-COV-19 (COVID-19) pandemic has been a global crisis that has affected society as a whole in an unprecedented way. One population of particular interest has been pregnant women. Pregnant women have historically been at higher risk of infection with other coronaviruses and preliminary studies indicate that pregnancy may be a risk factor in the development of severe COVID-19 (1,2). Indeed, pregnant women with COVID-19 face higher rates of severe infection,

preeclampsia/eclampsia, preterm delivery, and maternal and infant mortality (3). Mother-to-child transmission of COVID-19 has also been documented previously in the literature (4). We present a case of a profoundly hypoxic COVID-19 positive woman presenting at our emergency department (ED) at ~26 weeks 2 days (26w2d) gestation that required venovenous extracorporeal membrane oxygenation (VV ECMO) leading to preterm intrauterine fetal demise (IUFD) and a spontaneous en caul vaginal delivery. We present the following article in accordance with the CARE reporting checklist (available at <https://jccm.amegroups.com>).

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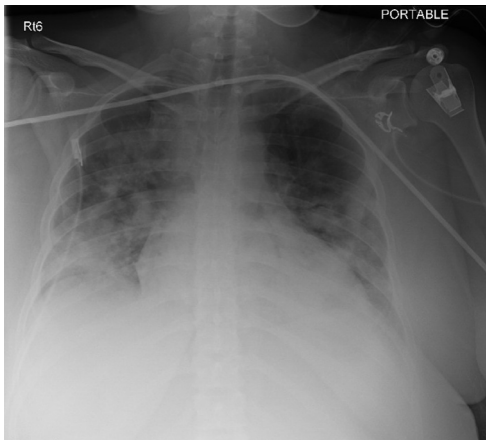


Figure 1 Patient's chest X-ray. Diffuse bilateral patchy interstitial infiltrates consistent with COVID-19.

com/article/view/10.21037/jeccm-22-11/rc).

Case presentation

History of present illness (HPI)

The patient is a 23-year-old female, G5P1AB4, at ~26w2d gestation with no significant past medical history who presented to the ED via Emergency Medical Services (EMS) complaining of profoundly worsening shortness of breath. She was diagnosed with COVID-19 10 days prior to presentation and states that her symptoms severely worsened about 2 to 3 days prior to calling EMS. Furthermore, the patient stated that she was unvaccinated against COVID-19.

ED course

On arrival to the ED, exam revealed an anxious appearing, diaphoretic female in moderate respiratory distress with oxygen saturations of 75% on 15-L of oxygen via a non-rebreather (NRB). The patient was started on high flow nasal cannula (HFNC) with semi-proning attempted; however, despite maximum settings, her oxygen saturation did not exceed 85%. Bilevel positive airway pressure (BiPAP) was attempted, but the patient was unable to tolerate it. Ultimately, patient was intubated and her oxygen saturation did not exceed 89% despite maximum vent settings [positive end-expiratory pressure (PEEP) 18, tidal volume (TV) 400, respiratory rate (RR) 24, fraction of inspired oxygen (FiO_2) 100%]. Computed tomography (CT) pulmonary

embolism (PE) was negative for a PE and her lung imaging was consistent with multifocal pneumonia/COVID-19. Obstetrics/gynecology (OB/GYN) and the ECMO teams were consulted during her stay in the ED and the patient was admitted to the medical intensive care unit (MICU) (Figure 1).

Hospital course

Day 1 (16:00): patient cannulated for VV ECMO via right internal jugular approach;

Day 2 (04:00): labor and deliver nurse unable to detect fetal heart tones on tocometry—determined to be an IUFD. OB/GYN discussed possible induction;

Day 2 (10:15): spontaneous en caul vaginal delivery in the MICU;

Day 4: patient's clinical status improved and she was decannulated from ECMO;

Day 7: developed post-partum pre-eclampsia and started on a magnesium drip;

Day 9: patient extubated without difficulty;

Day 10: downgraded out of the ICU to the OB/GYN service;

Day 14: patient left against medical advice.

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). The patient and her family were unable to be contacted after being discharged despite multiple attempts so informed consent was not obtained. All means were taken to protect the identity of this patient and all patient identifiers were removed from the report.

Discussion

We describe a patient with COVID-19 related hypoxia at 26 weeks gestation, who experienced IUFD after VV ECMO cannulation and post-partum pre-eclampsia but ultimately recovered from infection. COVID-19 infection can cause a drop in O_2 saturation, and VV ECMO may be needed to treat the unstable oxygen levels (5). VV ECMO is often used when the lungs need transient respiratory support to facilitate lung healing, but is rarely prescribed in pregnancy (6). The outcomes of VV ECMO in pregnancy tend to be very positive, with one systematic review concluding that 91% of mothers and 78% of newborns survived following VV ECMO (7). However, it is important to note that existing literature focuses on

the use of VV ECMO in the setting of pregnancy induced acute respiratory distress syndrome (ARDS) rather than respiratory complications due to COVID-19 pneumonia.

The relationship between COVID-19 and IUFD is still up for debate. Curi *et al.* found that in a population of 33 COVID-19 positive patients in the Bronx, 2 patients experienced IUFD (8). However, this study did not calculate statistics about whether there was a statistically significant relationship between COVID-19 and IUFD. Nayak *et al.* conducted a study about the relative effect of COVID-19 on pregnancy by comparing outcomes in COVID-19 negative patients with COVID-19 positive patients (9). This study found that 2.23% [3] of COVID-19 positive patients experienced IUFD while 3.79% [31] COVID-19 negative patients experienced IUFD (9). This study also did not calculate whether or not there was a statistically significant difference in the rates of IUFD between COVID-19 positive and negative patients. Jessie *et al.* also attempted to determine whether or not there is a relationship between COVID-19 positivity in pregnant patients and IUFD by retrospectively testing for COVID-19 in mothers who experienced IUFD (10). A total of 55% of the 20 included patients refused to participate, and of those who did participate 88.9% of patients were COVID-19 negative at the time of IUFD (10). At this time, there is very little definitive information about the relationship between COVID-19 and IUFD, however COVID-19 is very rarely found in the newborn, suggesting that COVID-19 likely has minimal (if any) effects on the fetus (11). The third trimester presents the highest risk for vertical transmission of COVID-19, which is coincidentally when most pregnant women are admitted with severe cases of COVID-19 (12). In this case, no signs of fetal distress were observed in response to poor O₂ saturation.

As highlighted in our case, this patient's oxygen saturation dramatically improved with VV ECMO use. Early detection of IUFD was critical to protect this patient from complications such as septicemia, acute renal failure, and disseminated intravascular coagulation (DIC), which could have further complicated this patient's recovery (13).

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Footnote

Reporting Checklist: The authors have completed the CARE

reporting checklist. Available at <https://jeccm.amegroups.com/article/view/10.21037/jeccm-22-11/rc>

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <https://jeccm.amegroups.com/article/view/10.21037/jeccm-22-11/coif>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). The patient and her family were unable to be contacted after being discharged despite multiple attempts so informed consent was not obtained. All means were taken to protect the identity of this patient and all patient identifiers were removed from the report.

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