



SARS-CoV-2-Infected Pregnant Woman Requiring 38 Days of Extracorporeal Membrane Oxygenation Experiences Rectal Ulcer Bleeding: A Case Report

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Pregnancy has been shown to be associated with an adverse clinical course and symptomatic patients with severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) infection. Extracorporeal membrane oxygenation (ECMO) is rarely used in pregnant or postpartum women with severe coronavirus disease 2019 (COVID-19). Here, we report the rare case of a pregnant woman diagnosed with SARS-CoV-2 infection placed on ECMO postpartum who subsequently received treatment for active rectal ulcer bleeding. Despite being placed on ECMO for 38 days and receiving a massive transfusion of 95 packs of red blood cells, she recovered and was discharged on hospital day 112. ECMO can be used in most patients with severe COVID-19, including pregnant patients, although potential coagulopathy complications must be considered.

Key Words: Pregnancy, COVID-19, respiratory distress syndrome, extracorporeal membrane oxygenation

INTRODUCTION

Pregnant women infected with severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) face many potential complications that have garnered much attention.^{1,2} However, the notion that pregnancy increases the susceptibility to SARS-CoV-2 infection is being disproved, although symptomatic pregnant patients do indeed exhibit a higher risk of death than those who are not pregnant.³⁻⁶

During the 2009 H1N1 influenza pandemic, extracorporeal membrane oxygenation (ECMO) was found to reduce hospital stay.⁷ Although ECMO is effective in pregnant women, it remains controversial, and physicians must be aware of potential

complications.^{8,9} Coagulopathy-related complications are particularly a concern because bleeding and thrombotic events are the leading causes of death in patients receiving ECMO.¹⁰

However, only 0.8% of pregnant women with SARS-CoV-2 infection receive ECMO, and corresponding data are limited.⁴ Accordingly, we report the survival of a pregnant patient with SARS-CoV-2 infection receiving ECMO postpartum and treatment for active gastrointestinal bleeding. The patient provided patient informed consent to publish relevant data in our manuscript.

CASE REPORT

A 38-year-old gravida 2, para 1 married Korean female patient with a history of cesarean delivery was admitted to our institution after the onset of fever, productive cough, and a positive SARS-CoV-2 reverse transcription-polymerase chain reaction test result at 34 weeks gestation. An initial chest X-ray revealed extensive multi-lobe pneumonia in both lungs (Fig. 1A). C-reactive protein levels were elevated to 14.08 mg/dL; other laboratory test results were unremarkable. The hospital course was as follows:

Day 1: Intravenous ceftriaxone (2 g/day) and oral acetamin-

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open (650 mg) were initiated. Desaturation to 93% oxygen saturation (SpO₂) at room air was noted, and oxygen was administered via the nasal cannula at 3 L/minute.

Day 2: Initiation of a 5-day course of treatment with intravenous dexamethasone (6 mg/day) with remdesivir (200 mg/day) and subcutaneous enoxaparin (40 mg/day) due to increased oxygen requirements.

Day 8: Transfer to the intensive care unit due to suspected acute respiratory distress syndrome (ARDS) and administration of high-flow nasal cannula (fraction of inspired oxygen 80% at 40 L/minute). Follow-up chest X-ray scans revealed worsening of pneumonia.

Day 11: Spontaneous preterm labor began, and an emergency cesarean section was performed. At 35 weeks and 6 days, a living male neonate weighing 2250 g with Apgar scores of 5 and 8 at 1 and 5 minutes, respectively, was delivered.

Postoperative day (POD) 1: Worsening pneumonia on chest X-ray and persistent hypoxemia were noted.

POD 2: Venovenous ECMO was initiated (Fig. 1B).

POD 7: Hypotension with decreased hemoglobin (Hb) to 8.8 g/dL was noted. A systemic bleeding evaluation was per-

formed, but yielded significant results. Despite maintaining the target Hb level at >10 g/dL, inotropes were required.

POD 9: After increasing the target Hb level to >12 g/dL, the patient was weaned from inotropes.

POD 10–21: Three to five packs of red blood cells were administered daily to maintain the abovementioned Hb level. Systemic bleeding evaluations were repeated, but nothing was identified.

POD 22: Gross hematochezia occurred. An emergency vigorous diagnostic approach with esophagogastroduodenoscopy and sigmoidoscopy revealed a solitary rectal ulcer with active bleeding (Fig. 2A). However, the bleeding ceased after injection with epinephrine (Fig. 2B).

POD 27: Heparinization was restarted.

POD 39: The patient was decannulated from ECMO (Fig. 1C).

POD 42: The patient was slowly weaned off the ventilator.

POD 53: The patient was transferred to the general ward and received pulmonary rehabilitation.

POD 98: CT revealed no gross residual pneumonia. However, both lungs had extensive postinfectious pulmonary interstitial fibrosis (Fig. 3A).

POD 101: Finally, the patient was discharged in moderate

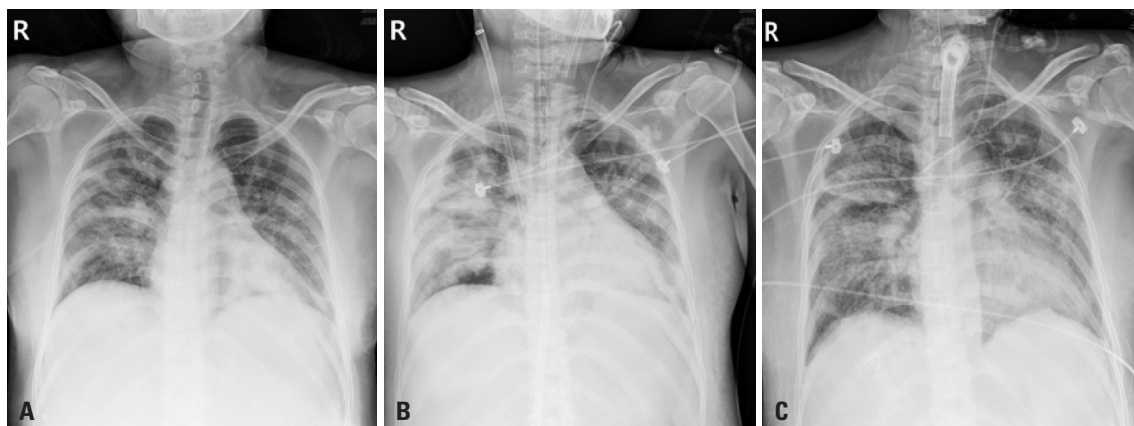


Fig. 1. Chest X-ray images of the patient. (A) On admission. (B) On day 13, post-ECMO cannulation. (C) On day 50, post-ECMO decannulation.

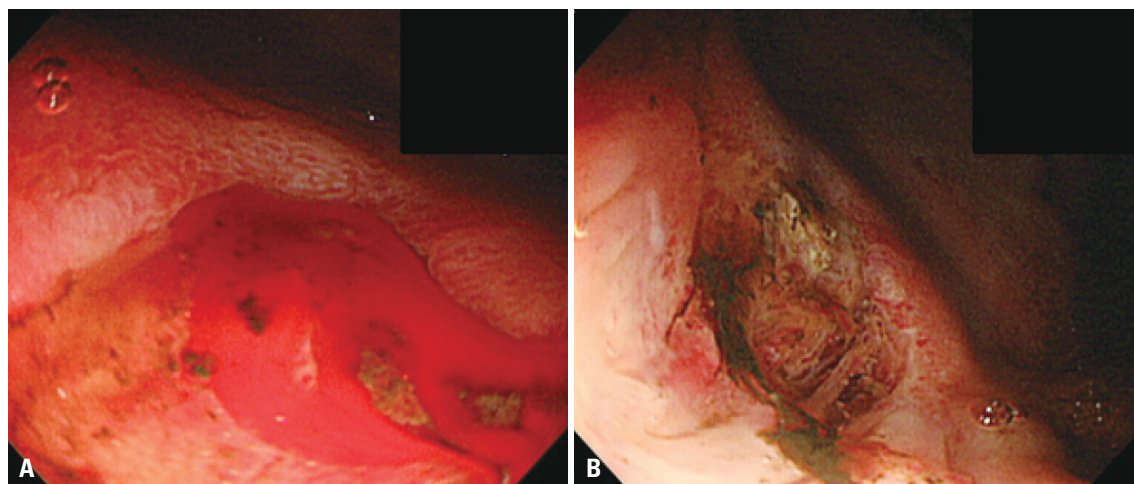


Fig. 2. Sigmoidoscopy. (A) A solitary rectal ulcer with active bleeding. (B) Cessation of bleeding.

health.

During her 1-month outpatient follow-up, she reported dyspnea upon exertion with a modified medical research council dyspnea scale grade of 2; however, she was only to perform daily activities, such as caring for her newborn. Follow-up chest CT at 5 months post-discharge revealed improvement (Fig. 3B).

DISCUSSION

SARS-CoV-2 infection results in a hypercoagulable state by causing systemic inflammation; however, bleeding episodes have been reported.¹¹ Pregnant patients with COVID-19 form a special group that is already hypercoagulable due to pregnancy.¹²

A previous systemic report based on a German national mul-

ticenter registry reported a thromboembolic complication rate of 40% in pregnant patients receiving ECMO.^{13,14} Hemorrhagic complications have also been reported in 6% of patients with COVID-19 in an international cohort study that included both sexes and did not consider gestational state.¹⁵ Patients with SARS-CoV-2 infection who are undergoing cesarean section delivery face a higher risk of complications, such as infection, bleeding, and thromboembolic disorders, than those undergoing vaginal birth.^{15,16}

Gastrointestinal bleeding is rare among the hemorrhagic events in pregnant patients with COVID-19 receiving ECMO, with only two cases reported to date (Table 1).¹⁷⁻²⁵ Our case uniquely exhibited active rectal ulcer bleeding. However, it was difficult to determine the bleeding focus due to the challenge of performing CT during ECMO. Additionally, radiography and digital rectal examination were inconclusive since the co-

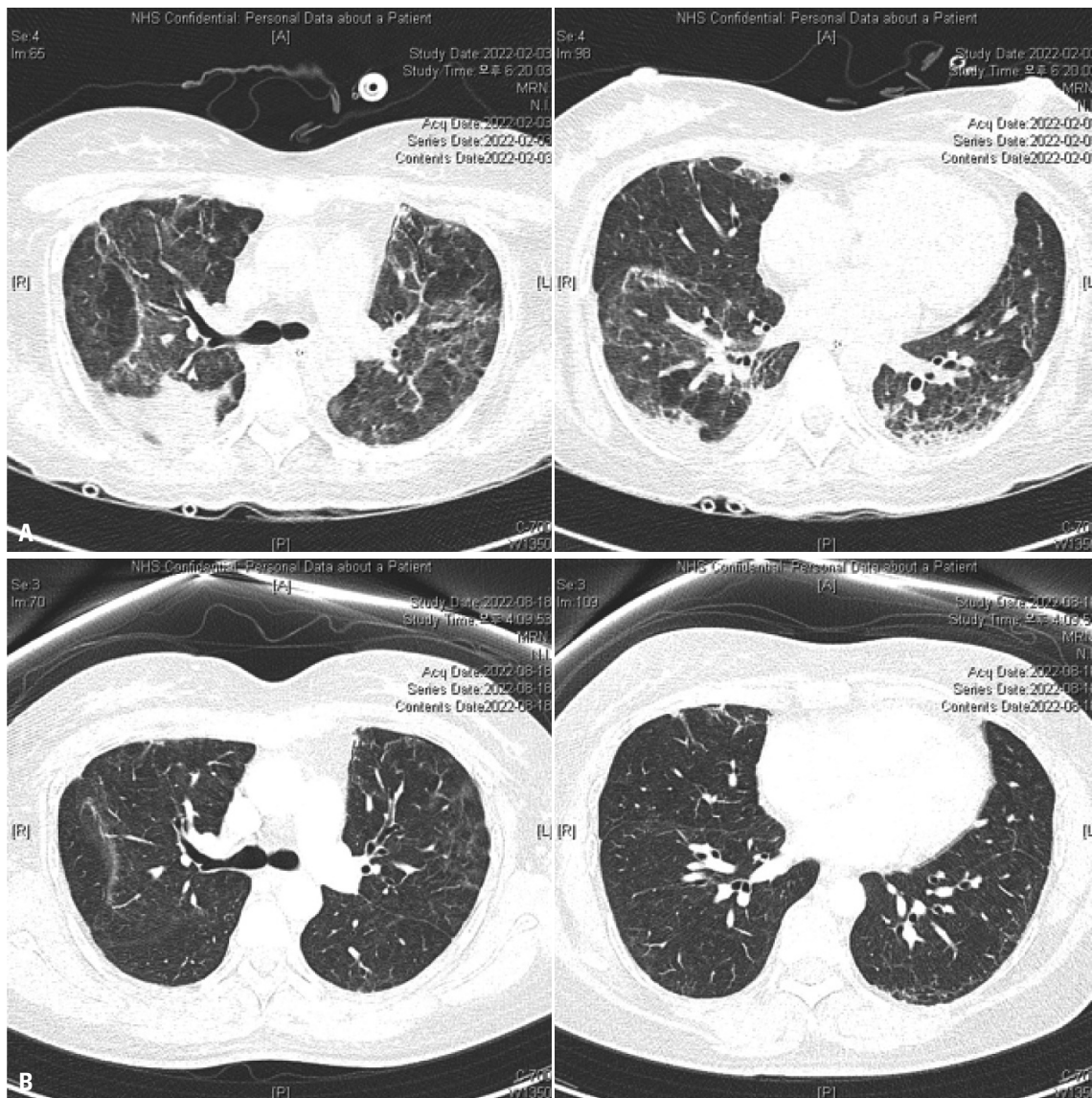


Fig. 3. Chest CT scan of the patient. (A) On day 63, before transfer to the general ward. (B) On day 259, 5 months after discharge.

Table 1. Summaries of Patients (n=21) Who Have Experienced Hemorrhagic Complications (n=26)

Hemorrhagic event	References
1 patient: Retroperitoneal hematoma	18
1 patient: Oral bleeding and thoracostomy site bleeding	19
1 patient: Hemoptysis	20
3 patients: Thrombocytopenia	21
2 patients: Rectus sheath hematomas	
4 patients: Other sites	
1 Chest tube site bleeding	
3 Tracheostomy site bleeding	
3 Vaginal bleeding	
1 patient: Disseminated intravascular coagulation	17
1 patient: Anterior rectus and uterine hematomas, delayed postpartum bleeding	
1 patient: Rectus hematoma, postpartum abdominal wash-out, and inferior epigastric embolization	
1 patient: Hemolytic anemia with thrombocytopenia	
1 patient: Intraabdominal hematoma	22
1 patient: Intratracheal bleeding	23
1 patient: Disseminated intravascular coagulation	24
1 patient: Minor vaginal bleeding	25
1 patient: Surgical site bleeding	

lon was packed with stool, and we did not initially suspect active rectal bleeding.

Our patient received ECMO for 38 days. She also received a massive transfusion during her stay, including 95 packs of red blood cells and 50 platelet concentrates. Unfortunately, we were unable to find a similar previous case report.

In conclusion, ECMO appears to be a viable life-saving treatment option in SARS-CoV-2-infected gravid patients with severe ARDS. Nevertheless, potential coagulopathy complications in the gastrointestinal tract, such as rectal bleeding, should be considered as a cause of bleeding in SARS-CoV-2 infected pregnant women on ECMO.

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AUTHOR CONTRIBUTIONS

Conceptualization: Eui Hyeok Kim. **Data curation:** all authors. **Formal analysis:** Hanna Moon. **Investigation:** Hanna Moon and Jung Mo Lee. **Methodology:** Hanna Moon and Eui Hyeok Kim. **Project administration:** Eui Hyeok Kim. **Supervision:** Eui Hyeok Kim. **Validation:** Eui Hyeok Kim. **Visualization:** Hanna Moon and Eui Hyeok Kim. **Writing—original draft:** Hanna Moon. **Writing—review & editing:** Eui Hyeok Kim. **Approval of final manuscript:** all authors.

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