



Warrior Mother: A Report of a Pregnancy Complicated with Severe COVID19- Pneumonia and Severe Mitral Stenosis in a Supposedly Healthy Woman

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ABSTRACT

Coronavirus disease 2019 (COVID-19) is a rapidly growing health concern, claiming over six million lives as of April 2022. Some evidence revealed that pregnancy increases the risk of severe illness with Coronavirus infection. COVID-19 also complicates the pregnancy results, such as the number of cesarean deliveries and premature births. Mitral stenosis (MS) is a structural heart disease that endangers the patient and their newborn, accompanied by serious morbidity and mortality. The present patient, 40 years old gravida 2 para 1 at 37 weeks presented to the Emergency Department with progressive dyspnea following fever and malaise for a week. SARS-CoV-2 testing was positive, and ergo appropriate treatment was administered. The CT scan showed severe COVID-19 pneumonia with a severity index of 23. Due to respiratory distress, the patient was readily admitted to the Intensive Care Unit (ICU). The patient was supported with non-invasive ventilation (NIV). Nevertheless, NIV was insufficient with signs of respiratory fatigue; therefore, the patient was intubated. Despite the subsidence of fever and stable clinical condition, the patient remained tachycardic, which promoted us to perform echocardiography, revealing severe MS. This report contains our experience and suggestions regarding this rare concurrence. The paucity of data is significant regarding the management of concurrent structural heart disease and COVID-19 in pregnancy. The importance of maintaining routine care and screening during the pandemic should be emphasized, which can be catastrophic if missed.

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Introduction

Coronavirus disease is a well-researched yet still serious health threat, with 504.4 million confirmed cases and over 6.2 million related deaths as of April 2022, according to the reports published by the World Health Organization (1). Center for Disease Control claims pregnancy increases the risk of severe illness in COVID-19 patients. In the United States, there have been a

total of 219,451 confirmed COVID-19 cases and 296 deaths in pregnant women as of June 2022 (2, 3). The COVID-19 infection in pregnancy is associated with a higher number of cesarean deliveries and premature births compared to non-infected women. Pregnant women are also at a higher risk of ICU admission and ventilation due to COVID-19 infection than non-pregnant women (4-6).

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Coronavirus complicates the management of structural heart disease by delaying treatment and necessary hospital visits due to the pandemic state (7). Mitral stenosis (MS) is a structural heart disease that can complicate pregnancy outcomes, especially in the peripartum period. Mitral stenosis significantly increases the risk of maternal mortality and morbidity, such as pulmonary congestion, especially in severe cases (8, 9). Furthermore, fetal complications such as low birth weight, low APGAR score, and intra-uterine fetal death are of more prominence in mothers with MS (10).

In this report, we aimed to present our experience of a challenging case in May 2022, in which a pregnant woman with severe COVID-19 pulmonary disease and severe unmanaged MS was referred to us, and the way we approached this intricate situation and its outcome are discussed.

Case report

The patient, identifying as female, 40 years old gravida 2 para 1 at 37 weeks with no known past medical history, presented with progressive shortness of breath and fever from two days ago and had been feeling unwell for a week before she visited the ED with general arthralgia and myalgia. She mentioned no contact with the sick or recent travel. She did not take any medications at home. She was not a smoker and did not ingest alcohol reportedly, but occasionally used opium. She accidentally became aware of her pregnancy during a check-up, and her gestation was uneventful with normal prenatal testing. Considering her previous delivery via cesarean operation, she was scheduled for an elective C-section delivery.

The initial vital signs on admission were as follows: respiratory rate (RR) of 30/min, oxygen saturation of 80% on room air, temperature of 38.5°C orally, blood pressure (BP) of 129/78 mmHg, heart rate (HR) of 135/min, and fetal

heart rate (FHR) of 155/min. She appeared to be in respiratory distress with diffuse crackles in both her lungs on auscultation and was using accessory muscles for ventilation. Her lower limbs were edematous (grade 2) but did not differ in size. Samples were sent out for COVID-19 and influenza PCR, which was positive for SARS-CoV-2. Initial tests revealed lymphopenia and high inflammatory markers. Laboratory values are shown in tables 1 and 2. Chest x-ray showed bilateral infiltrations and multifocal consolidations (Figure 1). A chest CT scan done at this point showed bilateral ground glass opacities and consolidation, which are most prominent in lower lobes and overall severe COVID-19 involvement (23 on COVID-19 CT severity score) (Figure 2). Considering her unstable condition, the patient was admitted to the respiratory ICU.

As the patient became tachypneic and did not saturate sufficiently with a non-rebreather mask of 15 L/min, the NIV was provided with peak inspiratory pressure of 8 cm H₂O and peak end-expiratory pressure of 4 cm H₂O. Remdesivir 200 mg stat followed by 100 mg daily, Dexamethasone 8 mg daily, and Heparin 5000IU every 8 hours were ordered as an initial treatment regimen for COVID-19 pneumonia. Furosemide 20 mg was given every 12 hours regarding signs of hypervolemia and pulmonary congestion. Fentanyl 20 µg/h infusion was started as sedation. The next day, things took a turn for the worse for both the mother and the fetus. Daily NST was non-reassuring with a drop in baseline. Thus, the best emergency course of action was to terminate the pregnancy. As for the mother, she was not saturating as effectively on NIV and was showing signs of fatigue. Moreover, her overall condition was deemed critical; consequently, she was intubated and sent to the operating room for an emergency C-section. A 2,650 gr newborn with an APGAR score of 7 was delivered and sent to the neonatal ICU (NICU) due to hypoxia. The mother was re-admitted to the ICU after a rather difficult surgery.

Over the first post-operative day, the fever subsided, and her clinical picture looked more desirable following supportive therapy; however, she remained tachycardic, which prompted us to

Table 1. Initial laboratory values

Laboratory variable	Normal range	Results
Whit cell count*10 ⁹ /L	3.5-10	6.9
Hemoglobin g/L	12-15	11.5
%Lymphocyte	20-40	10
CRP mg/L	0-8	55
ESR	1-20	40
D-dimer ng/mL	0-250	4247
Ph	7.35-7.45	7.38
PCO ₂ mEq/L	35-45	33
HCO ₃ mEq/L	22-26	20
Lactate dehydrogenase IU/L	105-333	571

CRP: C-reactive protein / ESR: Erythrocyte Sedimentation Rate

Table 2. Complementary laboratory values

Laboratory variable	Normal range	Results
Blood culture	-	Negative
Urine culture	-	Negative
Procalcitonin ng/ml	0-0.25	0.2
Albumin g/dl	3.5-5.5	2.5
Total protein g/dl	6-8.3	4.3

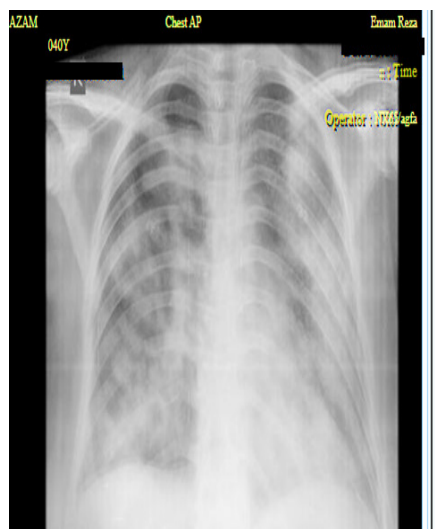


Figure 1. Chest x-ray showing multifocal consolidations

request an echocardiography. This imaging made us realize the next bump in the road: ejection fraction of 50%, pulmonary arterial pressure of 40 mmHg, and mitral valve surface area of 1 cm². With this new information coming to light, although mitral valvoplasty was recommended, it was not possible due to the patient's unstable condition. Hence, Carvedilol 3.125 mg was added every 12 hours to the current treatment. After three days of PRVC mechanical ventilation, treatment for COVID-19 pneumonia, and supportive care, the patient showed improvement; therefore, it was possible to gradually decrease her sedation, ultimately extubate her after four days, and resume her spontaneous respiration.

Continuing the more tailored approach, her clinical status slowly improved over a week. Against the odds described in the literature,

she was eventually discharged with low-dose prednisolone. The patient was scheduled for mitral valvoplasty three months after the discharge, considering the COVID-19 pulmonary involvement and severe ARDS. On follow-up, she noted the resolution of symptoms and no recurrence of fever. Her newborn was also discharged after two days stay in NICU care, had no problems, and showed normal growth and development.

Discussion

The most commonly reported symptoms of COVID-19 infection in pregnant women are fever, cough, chest pain, shortness of breath, and fatigue. Cesarean delivery and premature birth are significantly higher with Coronavirus infection. Fetal distress, low APGAR, and NICU admission are among neonatal outcome complications related to COVID-19 (4, 11). This data is in agreement with our observations regarding our patient.

Our case represents a pregnancy complicated by both severe COVID-19 and severe MS successfully managed with intensive care and ventilation, antiviral therapy, and termination of pregnancy. Although mild to moderate cases of COVID-19 are generally managed with supportive therapy, antiviral treatment is indicated in severe cases. Although pregnant women were initially omitted from trials investigating the effect of Remdesivir on COVID-19 outcomes (12), according to compassionate trials and the society for maternal-fetal medicine, this drug is associated with no known fetal toxicity and can be recommended for compassionate use in severe cases (13, 14).

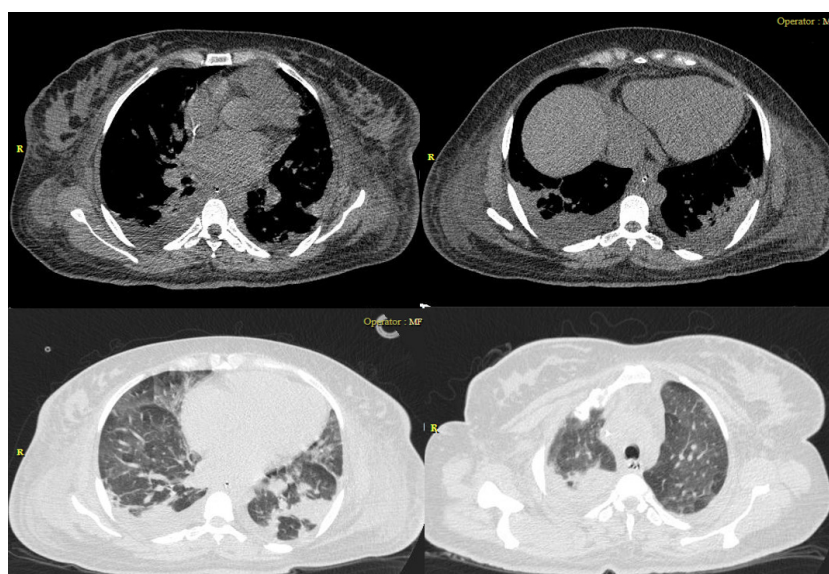


Figure 2. Bilateral ground glass opacities and consolidation

Dexamethasone is considered to decrease mortality in COVID-19 cases requiring ventilation (15). Monoclonal antibodies for COVID-19, which are approved by the FDA, are not available in our setting.

Pulmonary edema in our patient was managed with diuretics, anesthetic therapy, and beta-blocker. Anticoagulants were prescribed considering the increased risk of thrombotic events in both MS and Coronavirus infections. Although this medical and supportive care was adequate at the time, surgery opted as the definitive therapy. It is noteworthy to mention that autotransfusion and an increase in preload after delivery can exacerbate pulmonary edema, and intensive care is a wise choice in this case (8). Fortunately, we were able to maintain a stable hemodynamic status before and after the delivery. Furthermore, although initially intubated, despite the severity of the lung involvement, we were able to extubate the patient, and oxygen saturation improved over the following days.

Furthermore, it is important to consider MS treatment options in severe cases. In fact, our current knowledge represents that managing

congenital severe MS medically is challenging and is associated with notable levels of morbidity and mortality. When medical treatments are ineffective for congenital MS, interventional therapies, such as percutaneous transcatheter balloon mitral valvuloplasty (BMVP), surgical mitral valvuloplasty (SMVP), and mitral valve replacement (MVR) are considered; however, loop diuretics plus potassium-sparing diuretics, Digoxin which may improve right ventricular function in the setting of pulmonary hypertension, and anticoagulant therapy could be considered for these patients(16, 17).

Conclusion

Data concerning COVID-19 in pregnant women are lacking but in the process of evolving. This paucity is even greater regarding the management of concurrent structural heart disease and COVID-19. Of note, it is important to establish a strong body of evidence for the use of Remdesivir in pregnancy. We also emphasize the importance of maintaining routine care and screening during the pandemic, which can be catastrophic if missed, as seen in our case.

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