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Case report

The effects of Cesarean section on pulmonary parameters in a pregnant patient with COVID-19: A case report

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Abstract

The case report: The coexistence of physiological changes during pregnancy and infection can sometimes create challenges in the management of these patients. In this report, a term pregnant woman with coronavirus 2019 (COVID-19) infection was admitted to the ICU and underwent cesarean section (C-section) under intrathecal anesthesia according to the patient's condition. Severe respiratory distress occurred to the patient on the first day after C-section, and the patient's pulmonary parameters were measured with a non-invasive ventilation monitor. It gradually improved during the four days after the C-section. The C-section reduced the lung performance for 24 hours in a patient with COVID-19 infection, but eventually the lung symptoms improved.

Keywords: COVID-19, C-Section, Pulmonary function test, Pregnancy

Introduction

Following the outbreak of coronavirus 2019 (COVID-19) due to virus (SARS-CoV-2) in China on January 30 January 2020, a public health emergency has been announced (1). Despite lower mortality, SARS-CoV-2 killed more people than SARS and MERS, and the number continues to rise (2).

Mortality is lower in women than in men, and the need for hospitalization or intensive care is lower (ICU), either. In fact, women of childbearing age are 60% less likely to be admitted to the intensive care unit than their male counterparts (3). Pregnant women do not appear to be prone to infection or more serious complications, but available data are still limited (4-6). But we suspect that, given the physiological changes that occur during pregnancy in the cardiovascular, respiratory, and coagulation systems, it may cause more complications. Therefore, complications of COVID-19 during pregnancy should be identified and treated early. In pregnant women with COVID-19, without very severe symptoms, whether by spontaneous onset of childbirth or by induction based on the available indications, the delivery process type is decided based on the indication and condition of the fetus (7).

Therefore, cesarean section (C-section) in this group of patients should be based on the indications for C-section. The potential risk of vertical transmission is not a reason to have a C-section.

Based on limited data, there is no evidence of the presence of virus in genital fluid, urine, amniotic fluid, or breast milk (8). Mild viremia is found in the mother in this type of infection and placental seeding is also rare (9). However, most data on vertical transmission are based on women who became infected in the third trimester and there is no information on vertical transmission in early pregnancy. Reported cases of neonatal infection may be due to horizontal transmission.

In pregnant women, due to weak immune system and physiological changes of the respiratory system (decreased diaphragm height, increased oxygen consumption, mucosal edema of the respiratory tract), the tolerance to hypoxia is reduced, which can increase respiratory problems in pregnant women with COVID-19 (8). But studies have shown that the clinical symptoms of pregnant women are not different from those of non-pregnant women in COVID-19 (8, 10, 11). In addition, respiratory distress has not been reported in studies examining the maternal outcomes of patients with COVID-19 (8, 12). In this report, we

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examine the effects of C-section on pulmonary parameters in a pregnant woman with Covid-19.

The case report

A 31-year-old woman, gravida 2, para 1, and Live 1 at 38 weeks gestation with a positive polymerase chain reaction (RT-PCR) for Covid-19 was transferred to an internal intensive care unit (ICU) due to an acute case of respiratory distress syndrome (ARDS). At the time of admission to the hospital, the oxygen saturation rate with room air, oxygen mask, mask and reserve bag, and non-invasive ventilation (NIV) were: 72%, 85%, 94%, 60%, and 96%, respectively. The woman was complaining about cough and severe shortness of breath. Respiratory rate, heart rate, and the temperature were: 34 per minute, 116 per minute, and 38.8 °C, respectively. The systolic/ diastolic blood pressure was 110/76 mm Hg. The use of 24-hour of ICU care was provided for the patient. On the second day of hospitalization, it was decided to terminate the pregnancy by C-section. The C-section was conducted for the patient under intrathecal anesthesia with 12.5 mg intrathecal bupivacaine in a sitting position, and the newborn baby had Apgar score of 9-10. The patient received 2 liters of lactated Ringer's solution during the C-section. Intraoperative bleeding of the patient was 800 cc. During the C-section, the systolic/ diastolic blood pressure and heart rate was 120/80 mm Hg and 86 beats per minute, respectively. During the C-section, the patient was subjected to optimum continuous positive airway pressure (CPAP) (oxygen flow = 8 liters per minute).

N-terminal pro brain natriuretic peptide (NT-proBNP) was 172 pg/ml, D-dimers was 3827 ng/mL (high), Interleukin (IL)-6 was 17.7 pg/mL (high), procalcitonin (PCT) was 0.201 ng/mL, Lactate dehydrogenase (LDH) was 561 U/L (high), and C-reactive protein (CRP) was 79 mg/L (high) . Numerous routine laboratory examinations were performed before the surgery, after the surgery, and on the day of discharge from the hospital (Table 1).

The newborn was admitted to the isolate neonatal intensive-care unit (NICU). After birth, the patient's baby was fully healthy, and the PCR was negative.

The pattern of lung involvement of the patient on computed tomography of the chest (Chest CT Scan) and chest X-ray confirmed COVID-19 (Figure 1). The first day of hospitalization, surgery day, and after C-section, the patient received 3 litter, 4 litter, and 4 litter isotonic solutions for fluid volume, respectively. Then the patient's reception of intravenous fluids gradually decreased to one liter. Oral feeding started 48 hours after the C-section. From the second day after the C-section, the patient sat on the side of the bed once a day and then in a room on the chair with oxygen once a day and gradually walked. NIV was done on the first day for half an hour and was gradually reduced to 5 minutes per hour. Its settings, initial parameters were; expiratory positive airway pressure (EPAP): 6 cm H2O, inspiratory positive airway pressure (IPAP): 12 cm H2O, and the fraction of inspired oxygen (FiO2): 0.6 cm H2O.

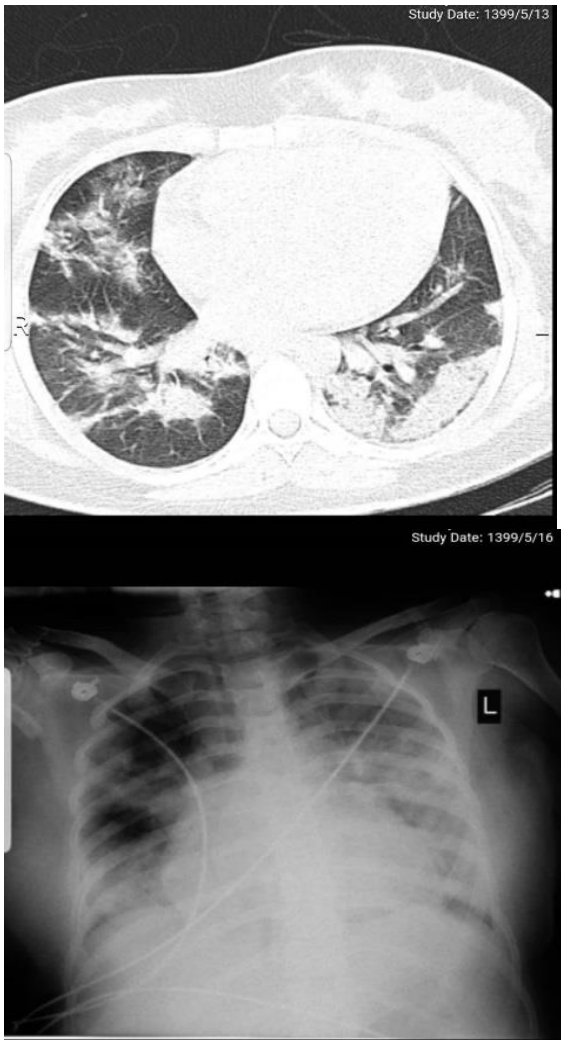

Figure 1. Chest CT Scan of the patient's lung on the first day of hospitalization and the chest x-ray on the fourth day of hospitalization

On the first day after the surgery, a severe respiratory distress occurred to the patient, which gradually improved with NIV and intravenous administration of 20 mg furosemide. From the fourth day of hospitalization, the patient's respiratory distress improved, and the patient was discharged on the tenth day. The patient was followed up at home for a month and no particular problem was detected. The respiratory parameters were measured with a NIV monitor. Pressure support ventilation (PSV) was 12 cm H2O and positive end expiratory pressure (PEEP) was 6 cm H2O on ICU admission days and the discharge day (Table 2).

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Table 1. Lab test results for a pregnant woman with COVID-19 infection

Tests	Before C-section	Postoperative days	4 days after C-section	7 days after C-section	14 days after C-section
White blood cells (WBC)	7800	9100	8300	8400	10300
Lymphocyte (µL)	620	610	830	1680	1600
Hemoglobin concentration (Hb) (gr/dL)	10.6	10.3	11.6	13.2	12.5
Hematocrit (HCT) (%)	32.3	31.5	36.7	39.7	37.9
Platelet count (per µL)	215,000	256,000	420,000	410,000	407,000
Erythrocyte sedimentation rate test (ESR test) (mm/hr)	32	30	28	25	15
Blood sugar(gr/dL)	90	106	110	95	100
Blood Urea Nitrogen (BUN) (mg/dL)	7	15	13	20	25
Creatinine (mg/dL)	0.6	0.7	0.5	0.8	0.8
Serum Kalum (K)(meq/L)	3.8	4.4	4.1	4.1	5
Serum sodium (NA) (meq/L)	140	138	137	138	138
Serum calcium (mg/dL)	-	-	8.2	9.1	9.7
Serum potassium (meq/L)	3.5	4.9	3.7	4.5	3.9
Total bilirubin (mg/dL)	0.9	0.6	0.5	0.4	0.5
Serum albumin (mg/dL)	-	-	3.1	3.8	3.4
magnesium (mg/dL)	1.9	1.8	2.3	2.2	2.5
Serum Glutamic Oxaloacetic Transaminase (SGOT) (IU/L)	42	56	31	20	31
Serum Glutamic Pyruvic Transaminase (SGPT) (IU/L)	30	48	52	55	57
Alkaline phosphatase (ALP) (IU/L)	469	424	322	243	229
Prothrombin time (PT) (seconds)	12	12	12	12	381
International normalized ratio (INR) (seconds)	1	1	1	1	8
Partial thromboplastin time (PTT)	-	39	31	29	12

Table 2. Respiratory parameters measured with non-invasive ventilation monitor

Pulmonary parameters	before C-section	Post C-section	4 after C-section	7 after C-section	14 days after C-section
Tidal volume (cc)	250	220	360	480	510
Number of breaths (per minute)	28	32	24	20	14
Respiratory compliance (ml/Lcm H2O)	22	18	28	32	38
Airway resistance (cmH2O)	10	10	8	7	5
Oxygen saturation (SpO2)	92	87	94	96	98

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Discussion

The results of this report, through which the respiratory parameters of a patient with COVID-19 were measured with a NIV, showed decreased lung function for 24 hours after the surgery. This decrease in pulmonary function could be due to respiratory edema, which is also present in patients with COVID-19 (13). Pulmonary edema in normal pregnancy has been reported in 0.05% of cases, and the complication of preeclampsia occurs to 2.9% of cases. Despite the low prevalence of this kind complication in pregnancy, it can be associated with a disproportionate mortality rate (14).

In addition to the possibilities for pulmonary edema, one of the causes of pulmonary edema could be iatrogenic. Iatrogenic pulmonary edema in surgery can have different causes: arrhythmia (cyclopropane, halothane), the redistribution of blood from the periphery (vascular contractions, central stimulation), pressure negative airway (obstruction, bronchospasm), circulatory overload (blood, fluids, etc.) and damage to the alveolar membrane by harmful inhalations and aspiration of stomach contents in an attempt to empty the stomach in cases of poisoning. In this patient, the volume of fluid solation received by the patient during the surgery or laryngospasm due to pain from the surgery could have been the major cause of iatrogenic pulmonary edema (15).

Decreased lung function for 24 hours after the surgery in this pregnant patient with COVID-19 might have been due to a systemic inflammatory response to the disease, which is one of the causes of primary acute lung injury, although systemic inflammatory response could also be due to surgical reasons (16).

Numerous other factors can play a role in predicting lung injury. Factors such as preoperative chronic obstructive pulmonary disease (COPD), severe diabetes, gastroesophageal reflux disease (GERD), alcohol consumption, and genetic factors are serious predictors of postoperative lung injury (17). The role of genetic factors is undeniable, however.

This case report from the pregnant patient with COVID-19 who underwent C-section due to severe respiratory disorders revealed that the delivery may improve the clinical condition of patients with COVID-19, and when the patient does not have enough respiratory reserve to tolerate vaginal delivery, the delivery method should be cesarean section (18). Given the decrease in lung function during the first day after the surgery in this report, it can be postulated that the clinical consequences of COVID-19 in pregnancy and childbirth are still unknown.

In general, the treatment of this disease is more supportive with oxygen therapy and invasive and non-invasive mechanical ventilation, which is the most important therapeutic intervention of this disease. If the patient has dyspnea and shortness of breath, NIV is used, and if there is no improvement within 2 to 3 hours, the patient is intubated (19). In this patient, NIV improved pulmonary function well.

Conclusion

One-day reduction in lung function due to cesarean section in a patient with COVID-19 infection and the ultimate improvement of pulmonary symptoms in this patient revealed that NIV was effective in improving the impaired lung function of this patient and the possibility of significant pulmonary problems in delivery in pregnant women with COVID-19.

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Conflicts of Interest

The authors have no conflicts of interest relevant to this article

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