Regional Anesthesia Conversion to General Anesthesia during Cesarean Section of a Woman with Antepartum Hemorrhage due to Placenta Previa and Ovarian Cyst with Moderate Confirmed COVID-19: A

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Abstract

Physiological changes during pregnancy and COVID-19 may affect one another. This report presents a 37-year-old female G4P10021 with gestational age 37+2 weeks infected with COVID-19 in Dr. Moewardi Hospital Surakarta, Central Java, Indonesia. The patient was diagnosed with antepartum hemorrhage due to total placenta previa with low-risk Morbidly Adherent Placenta score, a history of cesarean section, and ovarian cyst. The patient underwent conversion from spinal anesthesia to general anesthesia. Within 40 min after spinal anesthesia, the patient complained shortness of breath, which then worsened into decreased consciousness and inadequate spontaneous breathing. This may be complicated by the COVID-19 infection which has several effects on pregnancy.

Introduction

Pregnant women complicated with infection by Coronaviruses Respiratory Syndrome e.g. Severe Acute Respiratory Syndrome (SARS), has led them being considered potentially vulnerable to severe SARS-CoV-2 infection.

Case Report

A 37-year-old female G4P10021 with gestational age 37 + 2 weeks was admitted to the emergency unit Dr. Moewardi Hospital Surakarta, Central Java, Indonesia, due to antepartum hemorrhage. The bleeding started 3 days before admission and the patient changed her pads about 1 pad per day. Fetal movements were still present. She denied any of labor signs such as contractions, bloody show, or amniotic fluid leakage.

During primary survey, the patient was in good clinical condition, with Mallampati score of 2, blood pressure 116/73 mmHg, heart rate 84 beats/min (bpm), respiratory rate 28 times/min, body temperature 37.9°C, and SpO$_2$ 94–95% on room air improved to 98–99% with nasal cannula 3 liters/min (lpm). The STOPBANG score was 2 for snoring and neck circumference of 42 cm (>40 cm). Clinicians from the obstetric department proceeded to perform physical and supporting examinations including ultrasonography (USG). USG and cardiotocography revealed that the fetus was in normal condition. She was then diagnosed with antepartum hemorrhage due to total placenta previa with low-risk Morbidly Adherent Placenta score, a history of cesarean section 9 years ago, and ovarian cyst.

The patient was planned to undergo cesarean section and IUD insertion after 2 days administration of Dexamethasone 5 mg/12 h for lung maturation. As a part of the surgery preparation, a blood examination along

Table 1: Laboratory examination result of the patient

Parameter	Result	Unit	Value reference
Hematology			
Hemoglobin	**10.7**	g/dL	12.0–15.6
Hematocrit	**32**	%	33–45
Leukocyte	**12.1**	10³/μl	4.5–11.0
Thrombocyte	225	10³/μl	150–450
Erythrocyte	**3.82**	10⁶/μl	4.10–5.10
PT	11.7	seconds	10.0–15.0
APTT	32.7	seconds	20.0–40.0
INR	0.890		
GDS	83	mg/dl	60–140
SGOT	17	u/l	<31
SGPT	5	u/l	<34
Albumin	3.8	g/dl	3.5–5.2
Creatinine	0.6	mg/dl	0.6–1.2
Urea	9	mg/dl	<50
Procalcitonin	**0.11**	ng/mL	<2
D-dimer	**2230**	ng/ml	<500
HBsAg	Non-reactive		Non-reactive
SARS-CoV-2 antigen	**Positive**		Negative
hsCRP	**1.44**		
HIV Elisa	Non-reactive		Non-reactive
Sodium	**129**	mmol/L	132–146
Potassium	**3.0**	mmol/L	3.3–5.1
Chloride	**96**	mmol/L	98–106

bold value indicates abnormal result
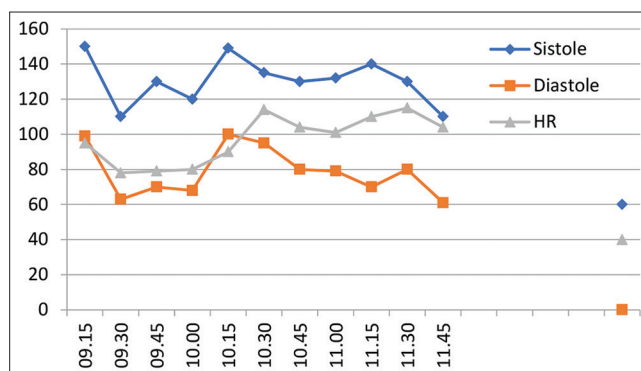

Figure 1: Hemodynamic changes during surgery

with COVID-19 antigen test was performed (Table 1), and it came back positive with a D-dimer value of 2230 ng/mL. The patient was consulted to the pulmonology department and was diagnosed with moderate COVID-19. She was then given azithromycin 500 mg/24 h per oral, remdesivir 100 mg/24 h as the antiviral agent intravenously, enoxaparin sodium 0.4 mg/12 h as anticoagulant intravenously, N-Acetylcysteine 6 ml/24 h intravenously (each mL solutions contains 200 mg N-Acetylcysteine), colchicine 0.5 mg/12 h orally, Vitamin D 1000IU/12 jam per oral, and Vitamin C 1000 mg/day intravenously.

Our anesthesiology department started to perform pre-operative management and diagnosed the patient with an ASA score of II. The plan was regional anesthesia-subarachnoid block. Four packs of each: Packed red cells (PRC), whole blood, thrombocyte concentrate, and fresh frozen plasma were prepared before surgery. During the surgery, the patient was positioned supine with 30° head up. We used levobupivacaine 0.5% 10 mg as the spinal agent and fentanyl 25 mcg as the adjuvant agent. An oxygen of 4 lpm with nasal cannula was delivered. The maintenance drugs given intravenously were tranexamic acid 1 g, paracetamol 1 g, ondansetron 8 mg, and ephedrine 10 mg. After 30 min of surgery, a healthy baby girl was born. Oxytocin 1 IU and methergine 0.2 mg were then administered through intravenous line along with a pack of PRC for a 500 mL bleeding. The intraoperative fluid balance is shown in Table 2. Ten min later, the placenta was delivered and the patient was hemodynamically stable, as shown in Figure 1.

However, within 40 min after spinal anesthesia, the patient complained shortness of breath with a respiratory rate of 28–30 times/min. We were still administering 4 lpm oxygen. The clinical condition then worsened into severe COVID-19 with decreased consciousness Glasgow coma score (GCS) of

E3V4M5. The fluid output was 100 ml of urine and 900 ml of bleeding. We increased the oxygen to 5 lpm and administered a pack of PRC (second pack). 15 min later, the GCS decreased to E2V2M3 and spontaneous breathing was inadequate. Two other packs of PRC were given along with assisted ventilation of 8–10 lpm oxygen through Non-Rebreathing Mask (NRM). The respiratory rate dropped to 12 times/min with minimal chest expansion and SpO$_2$ remained on 89–94% with 8–10 lpm NRM. To manage the difficulty of breathing, we intubated the patient using kinking endotracheal tube number 7.0 with 18 cm insertion level. Induction was performed with intravenous propofol 50 mg, fentanyl 100 mcg, and atracurium 30 mg. Maintenance with fresh gas flows 2 lpm oxygen and 2 lpm air bar (60.5% FiO$_2$) with Sevoflurane 1.5–2.0 vol%/%. Fentanyl 25 mcg and atracurium 10 mg intravenous were given intermittently. After the surgery, the patient was admitted to ICU and observed to improve her clinical condition.

We made daily follow-up of patient's condition post-surgery. Within 2 days in the ICU, the patient's condition improved. The patient was hemodynamically stable, with blood pressure 105/75 mmHg, heart rate 120 bpm, and respiratory rate 28 times/min on ventilator SIMV-VC VT 400 mL, RR 14×/min, I: E 1:2, PEEP 5 cmH$_2$O, FiO$_2$ 50%. Responding to the condition, we extubated the patient on the 2nd day. The patient, then, was given oxygen supply using nasal cannula 5 lpm and the SpO$_2$ was 98%. We drew routine blood sample on the 1st day post-surgery and the parameter results also came back normal with hemoglobin 12.8 g/dl, hematocrit 37%, leukocyte 10.100/μl, thrombocyte 234.000/μl, and erythrocyte 4.45 × 10⁶/μl. The patient was stable and moved to high care unit on the 3rd day. Furthermore, she was admitted to the ward on the next day and isolated for the next 10th day for COVID-19 treatment before finally she was discharged.

Discussion

Neuraxial blocks may reduce the incidence of venous thrombosis and pulmonary embolism,

Table 2: Intraoperative fluid balance

Time	Crystalloid	Colloid	Transfusion	Bleeding	SO+M	Urine	Balance
09.15–10.15	500 mL RL	-	250 mL PRC	400 mL	414 mL	100 mL	−164 mL
10.16–11.16	200 mL RL	500 mL	250 mL PRC	500 mL	414 mL	50 mL	−14 mL
Total	700 mL	500 mL	500 mL	900 mL	828 mL	150 mL	−178 mL

pulmonary aspiration cardiac complications in high-risk patients, bleeding and transfusion requirements, vascular graft occlusion, and pneumonia and respiratory depression following upper abdominal or thoracic surgery in patients with chronic lung disease [1].

Clinical experience of pregnancies complicated with infection by other coronaviruses, for example, severe acute respiratory syndrome (SARS) and Middle Eastern respiratory syndrome, has led to pregnant woman being considered potentially vulnerable to severe SARS-CoV-2 infection. Physiological changes during pregnancy have a significant impact on the immune system, respiratory system, cardiovascular function, and coagulation [2].

Hereby, we present the anesthetic management of a patient undergoing cesarean section for antepartum bleeding due to placenta previa with an active moderate confirmed COVID-19 infection. Despite being hemodynamically stable during the surgery, the clinical condition of the patient progressed to shortness and difficulty of breathing, even requiring intubation.

Physiological alterations during pregnancy include all systems of the body, which absolutely implicate the anesthetic management in pregnant patients [3]. The immunological changes during pregnancy include shifting CD4 + T cell toward Th2 along with a decrease of NK cells and plasmacytoid dendritic cells. The innate immune system also alters in the pattern recognition of Toll-like receptors (TLRs), in which COVID-19 induces release of TLR ligands from host cells, enhancing further inflammation [2]. Our patient had an active SARS-CoV-2 infection, although she denied all screening questions on admission. However, the post-operative respiratory failure might be a complication of the COVID-19. This was in line with a study by Akbar *et al*., stating that pregnant women with have a greater risk of receiving intensive care compared to non-pregnant women [4].

The D-dimer value, considered as a marker hypercoagulable state, was 2230 ng/mL (N: <500 ng/mL). Hypercoagulability itself is a hematologic alteration in pregnancy, due to an increase of clotting factors, D-dimer, C-reactive protein, and fibrinogen along with an increase of inhibitors of the fibrinolytic pathway. SARS-CoV-2 causes endothelial injury, thrombus formation, and production of von Willebrand Factor and influences the Virchow's triad, leading to a hypercoagulable state [5]. Our patient was treated with enoxaparin 0.4 mg/12 h by the pulmonology department.

During pregnancy, functional residual capacity is decreased while oxygen consumption is increased. This can cause saturation drops quickly whenever an apnea occurs [3], [6]. This phenomenon was seen in our case. Our patient who was hemodynamically stable during surgery suddenly complained severe shortness of breath and her saturation dropped quickly to 89–94%

despite oxygen supplementation of 8–10 lpm NRM. Upper airway changes, enlarged breasts, and obesity can make intubation difficult. Laryngoscopes with short handles, smaller diameter tubes, and ramp position at the head end might be needed [3].

The induction on pregnant women also needs precautions. Obesity and pressure from the uterus compressed the inferior vena cava and cause dilatation of epidural venous plexus. There is an increase in epidural fat and decrease in epidural free space and spinal cerebrospinal fluid volume. Progesterone also has a role in increasing the sensitivity of neuronal membranes to LA. Pregnant females are more prone to hypotension and hemodynamic instability following sympathetic blockade caused by neuraxial anesthesia [3]. During surgery, we used levobupivacaine 0.5% 10 mg as the spinal agent and fentanyl 25 mcg as the adjuvant agent. To prevent hemodynamic instability, we used ephedrine 10 mg as a maintenance agent. The current practice of spinal hypotension prevention with vasopressors helps with hemodynamic instability following neuraxial anesthesia for cesarean delivery [7]. Dosage adjustments are needed since pregnant patients are physiologically more sensitive to intravenous induction agents [3], as in our case, we used intravenous propofol 50 mg, fentanyl 100 mcg, and atracurium 30 mg during intubation.

Another aspect that must be in caution is the neonatal outcomes in such cases. A review by Wastnedge *et al*. revealed that in the majority of studies reporting on neonatal outcomes, no serious adverse outcomes have been observed in neonates born to SARS-CoV-2-positive mothers. Thirteen studies tested neonates for SARS-CoV-2 and only three studies identified positive cases. Even when neonates tested positive for SARS-CoV-2, they were largely asymptomatic or had mild self-limiting symptoms. Three studies reported neonatal deaths. In two of these, the cause was not identified. Our patient gave birth to a healthy baby girl with birth weight of 3300 g. However, SARS-CoV-2 examination was not tested on the child as COVID-19 tests were not routinely performed on infants in our center [2].

Our case report presented a case of a pregnant women with moderate which later progressed to severe COVID-19, requiring 2 days of ICU care. This case was in line with other studies and reviews discussing on the impact of pregnancy on severity of COVID-19. In June 2020, the CDC published data reporting that pregnant people were 5.4 times more likely to be hospitalized, 1.5 times more likely to be admitted to the ICU, and 1.7 times more likely to receive mechanical ventilation than non-pregnant people [8]. In the multinational cohort study (INTERCOVID) that enrolled 706 pregnant cases with COVID-19 and 1424 pregnant controls without COVID-19 between March and October 2020, COVID-19 in pregnancy was associated with consistent and significant increases in severe maternal

morbidity and mortality and neonatal complications when pregnant people with and without COVID-19 were compared [9]. Finally, in the largest cohort study evaluating 18,715 pregnant people delivering with COVID-19 in 499 academic centers in the United States between March 2020 and February 2021, COVID-19 was associated with increased mortality, risk of intubation and ventilation, and ICU admission [10].

Conclusion

COVID-19 in pregnant women may complicate the delivery, requiring an appropriate anesthetic management. This will include therapy for hypercoagulable state, dosage adjustments of anesthetic drugs, prevention of hemodynamic instability, prompt treatment of desaturation following apnea, and other managements conforming to the physiological changes due to both pregnancy and COVID-19. We should be aware of hemodynamic changes during our anesthetic management using subarachnoid block and we should prepare accurately for the general anesthesia plan in case worsening condition happen during our daily routine of cesarean section surgery.

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