

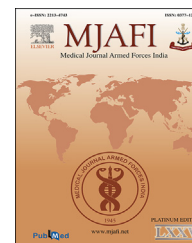


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## Case Report

# Coagulation conundrum in obstetric anesthesia with COVID-19

Anand Kuppusamy<sup>a</sup>, B. Natarajan<sup>b,\*</sup>, Belinda Cherian<sup>c</sup>, K. Gunasri<sup>d</sup><sup>a</sup> Professor (Anaesthesiology), SRM Medical College Hospital & Research Centre, Chengelpet, Tamil Nadu, India<sup>b</sup> Senior Resident (Anaesthesiology), SRM Medical College Hospital & Research Centre, Chengelpet, Tamil Nadu, India<sup>c</sup> Medical ICU Consultant, Rajagiri Hospital, Chunangamvely Aluva, Ernakulam, Kerala, India<sup>d</sup> Post Graduate, (Anaesthesiology), SRM Medical College Hospital & Research Centre, Chengelpet, Tamil Nadu, India

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## ABSTRACT

Coronavirus disease (COVID-19) pandemic is an unprecedented public health calamity that has caused an immense setback to maternal health services in developing countries. In addition to morbidity and mortality caused by COVID-19 disease in parturient directly, the indirect adverse impact of lockdown imposed during pandemic causing loss of follow-up of patients with coexisting illness is significant. There are no standard protocols to manage COVID-19 patients with comorbid medical illness, who are not optimized during antenatal visits. We report an interesting case of an antenatal patient with COVID-19, with prosthetic aortic valve on warfarin with elevated International Normalized Ratio (INR) and severe pre-eclampsia, posted for emergency cesarean section.

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## Introduction

Coronavirus disease-19 (COVID-19) attributed to the SARS CoV-2 (Severe Acute Respiratory Syndrome – Coronavirus 2) has affected a large number of pregnant patients all over the world. COVID-19 disease is associated with increased risk in pregnant patients and their newborns, but there is a significant void in knowledge on the course of the disease and the overall prognosis in this vulnerable population.<sup>1</sup> The majority of pregnant women who are infected with SARS-CoV-2 are asymptomatic. Most symptomatic women experience only mild or moderate cold/flu-like symptoms. Parturients with COVID-19 disease have high rates of intensive care admission

and adverse maternal consequences including maternal death compared to pregnant women without COVID-19.<sup>2</sup> Few studies have found a high prevalence of complications of COVID-19 among parturients with coexisting illness.<sup>3</sup>

Obstetric emergencies in a parturient with a prosthetic cardiac valve on anticoagulants and active COVID-19 disease present a unique challenge to anesthesiologists. Anticoagulants may preclude the administration of spinal anesthesia while pulmonary complications due to the administration of general anesthesia and aerosol generation during tracheal intubation are serious problems in patients affected by COVID-19. There are no standard protocols for the management of COVID-19 obstetric patients with comorbid illness. Much of our current clinical management of obstetric patients

\* Corresponding author.

E-mail address: [Natraj892@gmail.com](mailto:Natraj892@gmail.com) (B. Natarajan).

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is based on case reports. Given limited literature about pregnant patients with coexisting medical illness contracting COVID-19, we present an interesting case of a pregnant patient with the prosthetic aortic valve, on warfarin anticoagulation with imminent eclampsia and COVID-19, posted for emergency cesarean section.

## Case report

29 years old parturient, in 30 weeks of gestation, presented with complaints of headache, bilateral leg swelling along with fever and sore throat for 5 day at the emergency department. She had undergone aortic valve replacement for rheumatic heart disease seven years back and was on regular warfarin anticoagulation till confirmation of pregnancy. She was administered unfractionated heparin in the first trimester, following which she was restarted on warfarin 2 mg once daily with monthly International Normalized Ratio (INR) monitoring. She was diagnosed to have pre-eclampsia during her second-trimester antenatal visit for which she was prescribed oral labetalol 100 mg twice daily. She had skipped regular antenatal and cardiology follow-up for the next two months due to the pandemic. On examination, the patient was conscious, oriented, febrile, had bilateral pitting pedal edema, and not dyspneic with oxygen saturation of 96% in room air. Clinically cardiac and respiratory parameters were stable except for persistent high blood pressure 180/100 mmHg. Investigations revealed elevated INR (7.8) and urine showed proteinuria 4+. Echocardiogram revealed normal prosthetic valves with no thrombosis and perivalvular leak. A nasopharyngeal swab was sent for confirmation of COVID-19 by Reverse transcriptase-polymerase chain reaction (RT-PCR) and confirmed positive.

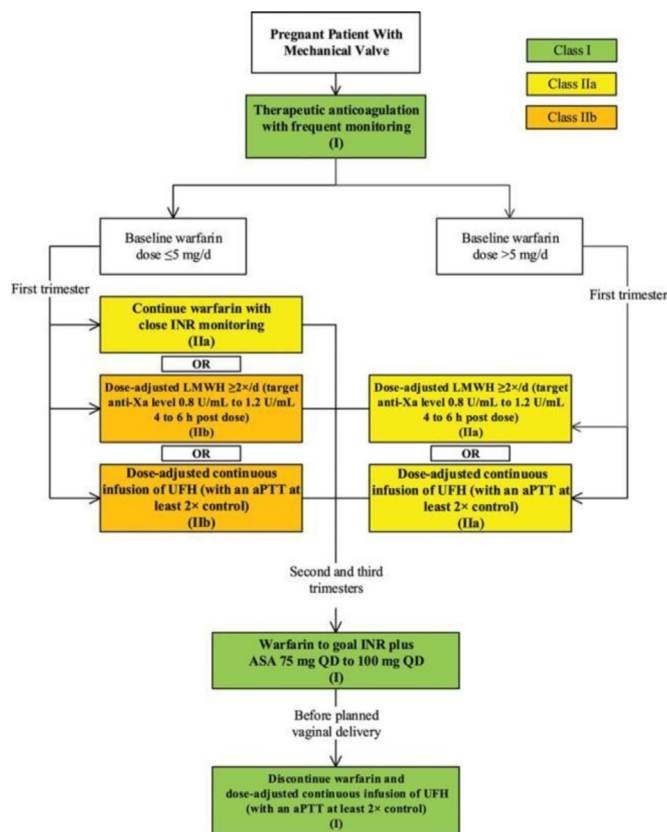
The patient was shifted to obstetric isolation ICU and two large-bore 16G intravenous cannula were secured. Inj. Labetalol was administered as bolus 40 mg followed by infusion at a rate of 8 mg/h and titrated to diastolic blood pressure of <90 mmHg. Inj. Betamethasone 12 mg was administered intramuscularly to patient to aid lung maturity in preterm neonate. Inj. Magnesium sulphate 4 g was administered intravenously as a bolus over 20 min followed by maintenance infusion at 1 g/h with clinical monitoring to avoid magnesium toxicity. Four units of fresh frozen plasma (15 ml/kg) were transfused to reduce INR to normal limits in view of the emergency nature of surgery. Diastolic blood pressure was controlled to less than 90 mmHg over the next 4 h with Labetalol infusion. Urine output was adequate (75 ml per hour) and fundus examination revealed Grade 2 hypertensive retinopathy. Fetal heart rate was monitored with Doppler ultrasound to confirm fetal well-being. INR reduced to 1.3 after FFP transfusion. Since the patient had persistent headache and visual disturbances in spite of controlling blood pressure, patient was posted for emergency cesarean section. Informed consent was obtained from patient before surgery. Since the patient's coagulation parameters were corrected and to avoid the risk of aerosol generation in the COVID-19 patient, spinal anesthesia was planned. Patient was shifted to negative pressure operating room with all healthcare personnel in

Personal Protective Equipment (PPE). Following universal barrier precautions, the right radial artery was secured for invasive blood pressure monitoring, in addition to standard hemodynamic monitoring. Patient was preloaded with 500 ml of crystalloids and spinal anesthesia was performed with 27G quincke spinal needle and 7.5 mg hyperbaric bupivacaine and 25 mcg Fentanyl was administered intrathecally. Intraoperative hemodynamics was stable. Visco-elastic point of care coagulation testing could have been of immense use in this patient, if available.

Postoperative pain was managed with intravenous paracetamol and tramadol, based on Visual Analogue Score. The patient was started on Inj Enoxaparin on first postoperative day with aPTT monitoring. Oral warfarin was restarted on the third postoperative day after repeating PT/INR values. Heparin was given together with warfarin till INR increased to 2.5–3.5. Patient was monitored for five days for possible spinal hematoma which may manifest as new-onset weakness or numbness in lower limbs and back pain. The patient's respiratory status and inflammatory markers like C-Reactive Protein and Interleukin 6 were monitored for deterioration of COVID-19. The patient recovered well and was discharged from the hospital on the tenth postoperative day with stable parameters.

## Discussion

Prosthetic valve replacement in valvular heart disease can be done with either mechanical or bioprosthetic valves. Though mechanical valves are durable, patients will need anticoagulation for life to prevent thrombosis.<sup>4</sup> Management of mechanical prosthetic valves in pregnancy poses a unique challenge since inadequate anticoagulation may lead to fatal valve thrombosis while excessive anticoagulation may cause bleeding during delivery. Vitamin K Antagonists (VKA) like warfarin can cause warfarin embryopathy characterized by nasal hypoplasia and stippled epiphysis if administered in the first trimester of pregnancy. A recent meta-analysis has revealed pregnant patients on VKAs developed few maternal complications albeit with reduced incidence of live births. Administration of heparin in the first trimester followed by VKA during the rest of pregnancy does not prevent anticoagulant-induced fetal/neonatal adverse events. Low molecular weight heparin (LMWH) given throughout the antenatal period is associated with the largest number of live births. The safety of administering Unfractionated Heparin (UFH) throughout pregnancy and first-trimester warfarin ( $\leq 5$  mg/day) remains unproven.<sup>5,14</sup> The class I recommendations of ACC/AHA issued in 2014 for anticoagulation of patients with mechanical heart valves in pregnant patients are detailed below (Fig. 1). A target therapeutic INR of 2–3 (INR of 2.5–3.5 for mitral valves) is recommended for all patients taking VKA in the second and third trimesters. It is recommended to withhold warfarin and initiate UFH with target aPTT greater than two times the control before elective vaginal delivery. Aspirin in low doses (75–100 mg) can be given to patients with prosthetic valves in the second and third trimesters of pregnancy. There is no specific class I recommendation for anticoagulation during the first trimester of pregnancy.<sup>6</sup>



**Fig. 1 – ACC/AHA Guidelines for Anticoagulation of Pregnant Patients With Mechanical Valves.** aPTT indicates activated partial thromboplastin time; ASA, aspirin; INR, international normalized ratio; LMWH, low-molecular-weight heparin; QD, once daily; and UFH, unfractionated heparin.

Pregnancy-induced hypertension can cause hematological abnormalities ranging from thrombocytopenia, consumption coagulopathy to HELLP syndrome characterized by hemolysis, raised liver enzymes, and thrombocytopenia that can lead to Disseminated Intravascular Coagulation (DIC).

Studies suggest that most women with COVID-19 do not have severe illness and that transmission of infection from mothers to infants can occur very rarely.<sup>7</sup> Incidence of intensive care unit (ICU) admission in COVID-19 infected pregnant women is higher compared to nonpregnant women with COVID-19, which may be due to reduced threshold for ICU admission, rather than increased severity of disease.<sup>8</sup> Pregnant patients are susceptible to hypoxia induced by COVID-19 due to reduced Functional Residual Capacity as a result of the gravid uterus and increased consumption of oxygen during pregnancy.<sup>9</sup>

A recently published research article compared clinical outcomes of pregnant women with and without COVID-19, with information obtained retrospectively from the American population. Maternal mortality was significantly higher for women with COVID-19 (141 deaths per 100 000 women, 95% CI 65–268) than for women without COVID-19 (5 deaths per 100 000 women, 95% CI 3.1–7.7).<sup>10</sup> Pregnant patients with COVID-19 may develop complications like acute respiratory distress syndrome, sepsis, mechanical ventilation, shock, acute renal failure, thromboembolic disease, adverse

cardiac event/outcome, and preterm labor with preterm delivery.<sup>11,12</sup> Pregnant patients may also develop long-term effects of COVID-19 requiring multidisciplinary rehabilitation.<sup>13</sup>

The risk of spinal hematoma following lumbar puncture was 0.20% among patients without coagulopathy and 0.23% among those with coagulopathy.<sup>15</sup> In the absence of a standard protocol, the decision to administer spinal anesthesia after correction of coagulopathy, with close monitoring for spinal hematoma was the best possible option in view of high blood pressure and to avoid aerosol generation during the administration of general anesthesia in this patient with COVID-19. We thus successfully managed this complicated obstetric patient since there is a dearth of guidelines to manage COVID-19 parturient with uncontrolled coexisting illnesses.

### Disclosure of competing interest

The authors have none to declare.

### Patient consent

Obtained for sharing data and images.

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