

*Anesthesia management in obstetric patients with positive COVID-19*_____

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Abstract

The COVID-19 pandemic, is an ongoing pandemic caused by corona virus. It can lead to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). As of 9 March 2021, more than 117 million cases have been confirmed, with more than 2.6 million deaths attributed to COVID-19, making it one of the deadliest pandemics in history. As the pandemic evolves rapidly, there are data emerging to suggest that pregnant women diagnosed as having coronavirus disease 2019 can have severe morbidities (up to 9%). The aim of this article is to bring attention to all steps that should be followed in obstetric patients with positive COVID-19.

This is a literature review, referring to international guidelines and international colleagues experiences, especially from Wuhan and USA.

In contrast to earlier data that showed good maternal and neonatal outcomes, the latest data suggest that pregnant woman can have severe morbidities. Exposure to virus predisposes both mother and fetus to an increased risk of infection and severe adverse maternal and perinatal outcomes.

The anesthesia management of the patient with a suspected or confirmed COVID-19 infection presents a major challenge for anesthesia professionals because of the pathophysiologic and confirmed rapid human-to-human

transmission of the virus through symptomatic and asymptomatic carriers. As with SARS and MERS, the most critical goal in the OR is to prevent cross-contamination by implementing stringent anesthesia guidelines and infection control strategies in the perioperative setting.

Pregnant women with suspected or confirmed COVID-19 should be triaged and their condition categorized as mild, severe, or critical. Asymptomatic and mild cases should be isolated at home, and be taken care through all the process until the day of the delivery.

Severe and MOF patients should be taken care in the hospital by a multidisciplinary group. Vaginal delivery is recommended in stable patients because viral shedding and vertical transmission have not been reported. There are international recommendations starting to continuous CTG monitoring due to possible increased risk of fetal distress, monitor temperature, respiratory rate. Under normal labor progression, vaginal examinations should be minimized. Neuraxial analgesia is not contraindicated, and by providing good analgesia, it may reduce cardiopulmonary stress from pain and anxiety. Although evidence of mother-to-child transmission is lacking, early cord clamping may be discussed with the patient. The patient could informedly decide skin-to-skin contact with the newborn, ensuring precautions for respiratory droplets with the use of a mask as well as hand and skin hygiene. Caesarean section should follow usual obstetric indications. The potential risk of vertical transmission is not an indication for caesarean section. Because of pulmonary complication known in COVID-19, the regional anesthesia is recommended unless there are no contraindication. Before neuraxial anesthesia must be done blood count test, especially to assess the platelet count. If general anesthesia is required, the anesthesia machine must be prepared with an HMEF between the circuit and the patient's airway. The most experienced anesthesia provider should be dedicated to the intubation. The anesthesiologist should manage the pain, preferably with NSAIDs, the PONV using antiemetics and VTE prophylaxis. COVID-19 is highly contagious, and this must be taken into consideration when planning intrapartum care. Rational use of personal protective equipment is key in preventing infection in attending professionals. The first of all is "Primum non nocere", it should be done the best for the pregnant patient and for the newborn protecting the personnel.

There are still limited data on the care and management of the parturient with COVID-19. It is paramount that our profession shares our experiences and practices to help guide our multidisciplinary approach in delivering the best care possible to these women.

Key words: COVID -19, obstetric patient, anesthesia, cesarean delivery, neuroaxial block, PPE (Personal Protective Equipment), HMEF (Heat and Moisture Exchanger Filter)

Introduction

The **COVID-19 pandemic**, is an ongoing pandemic caused by corona virus. It can lead to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It was first identified in December 2019 in Wuhan, China. The World Health Organization declared the outbreak a Public Health Emergency of International Concern in January 2020 and a pandemic in March 2020. As of 9 March 2021, more than 117 million cases have been confirmed, with more than 2.6 million deaths attributed to COVID-19, making it one of the deadliest pandemics in history.¹

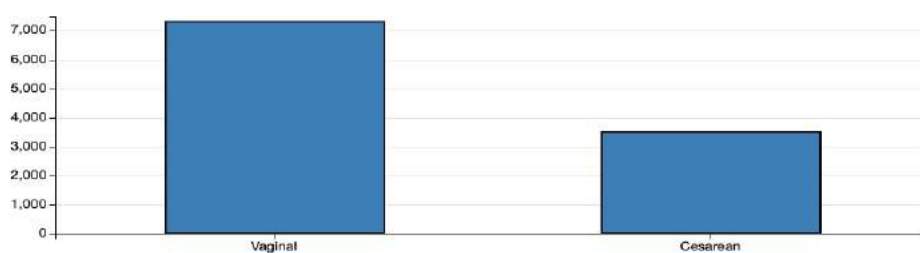
As the pandemic evolves rapidly, there are data emerging to suggest that pregnant women diagnosed as having coronavirus disease 2019 can have severe morbidities (up to 9%). This is in contrast to earlier data that showed good maternal and neonatal outcomes.⁴

Recent investigations from Sweden and the US have indicated that pregnant and postpartum women are at increased risk of severe complications associated with COVID-19.²

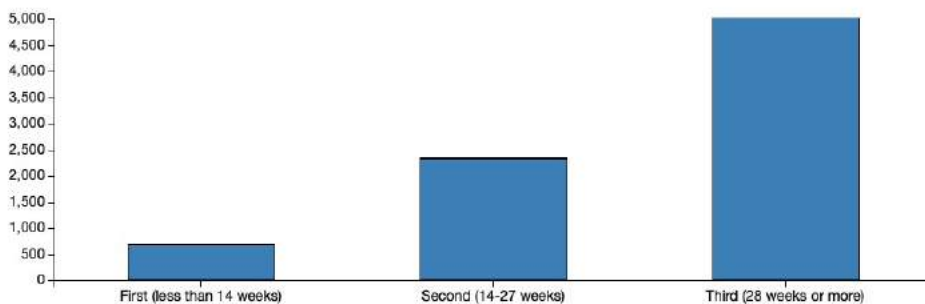
- According to CDC (Centers for Disease Control and Prevention) data from March 29, 2020-February 10, 2021, for 20 jurisdiction, total woman with completed pregnancies are 11764! 7279 of them had vaginal delivery and

3492 cesarean delivery. The information presented below in graphics.³ Referring these data, and the fact that, 30% of delivery are cesarean delivery, so we find it necessary to bring a literature review for management of anesthesia in obstetrics patient with COVID-19 positive. It was difficult collecting information because of lack of data, as we know COVID-19 is a new challenge for all of us.

Data were collected for 11,964 birth outcomes, but delivery type was only available for 10,771 outcomes >20 weeks gestation (90%).



Data Table		
	Vaginal	Cesarean
Delivery type	7,279	3,492



Data Table

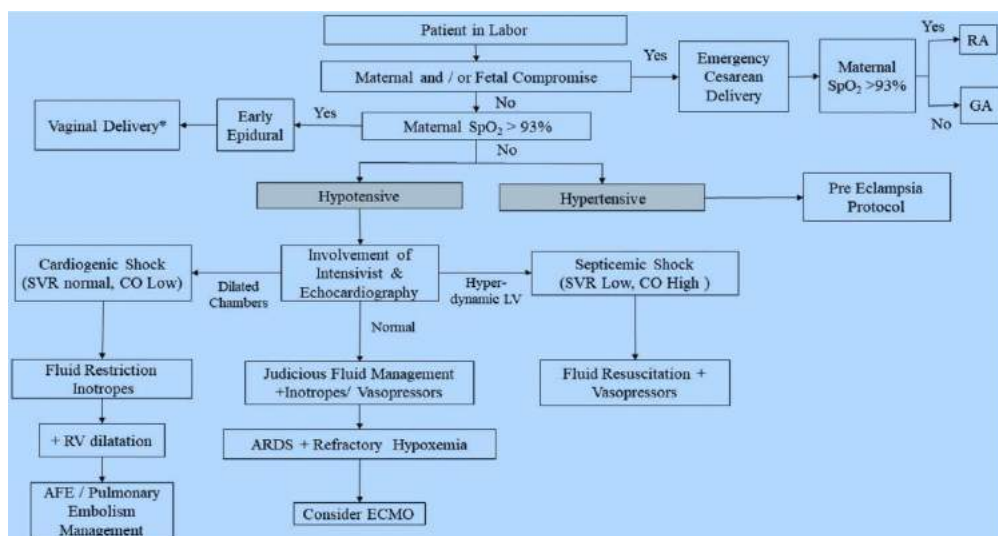
	First (less than 14 weeks)	Second (14-27 weeks)	Third (28 weeks or more)
Trimester of infection	693	2,337	7,186

The management of a pregnant woman is carried out by a team of professionals under the international guidelines. The American Journal of Obstetrics and Gynecologist recommend the guideline below:⁸

Exposure to virus predisposes both the mother and fetus to an increased risk of infection and severe adverse maternal and perinatal outcomes.⁵ The physiologic and immunologic changes during pregnancy increase maternal morbidity and mortality.⁶ Our knowledge of the epidemiology, pathogenesis, disease progression, and clinical course of COVID-19 is continually changing as more information and evidence emerge. Unfortunately, there are known maternal deaths of patients with COVID-19 due to respiratory complications after delivery. We have maternal deaths in Albania too, but we have lack of official data to consult.

The anesthesia management of the patient with a suspected or confirmed COVID-

19 infection presents a major challenge for anesthesia professionals because of the pathophysiologic and confirmed rapid human-to-human transmission of the virus through symptomatic and asymptomatic carriers. As with SARS and MERS, the most critical goal in the OR is to prevent cross-contamination by implementing stringent anesthesia guidelines and infection control strategies in the perioperative setting (Table 4). The American Association of Nurse Anesthetists (AANA) published an infographic highlighting anesthesia considerations in managing patients with COVID-19 infections.⁷



Perioperative phase	Clinical considerations/management of obstetric patients with COVID-19
Prehospital admission	<ul style="list-style-type: none"> • Conduct phone screening before appointment. • If patient is asymptomatic for COVID-19, proceed with routine prenatal care. • Perform severity assessment if patient presents in clinic with symptoms. • For COVID-19 testing, prioritize patients with suspected COVID-19 or those who have signs and symptoms suggestive of COVID-19.
Preoperative	<ul style="list-style-type: none"> • Isolate patient in negative pressure room. • All healthcare providers involved in care should wear gown, gloves, N95 mask, and face shield (per hospital protocol). • Patient should wear a surgical mask. • Use hospital's adopted checklist for donning appropriate PPE. If possible, obtain an observer. • Order routine laboratory studies and encourage neuraxial anesthesia in absence of thrombocytopenia. • Avoid general anesthesia to mitigate the risks involved in aerosol-generating procedure. • Prepare COVID-19 OR kit to avoid contaminating medication station (uterotonic agents, vasopressors, narcotics for intrathecal administration, and antiemetics). • Dedicate an OR for patients with COVID-19, to minimize contaminating surfaces. • Alert necessary staff for backup coverage and assign a runner to retrieve supplies or help if needed.
Intraoperative	<ul style="list-style-type: none"> • Use of spinal anesthesia is not contraindicated for patients with COVID-19 and should be the preferred method of anesthesia for these patients. • Follow standard precautions when placing neuraxial anesthetic. • Avoid excessive or deep sedation to reduce need for any airway manipulation or instrumentation. • Patient should wear a surgical mask at all times throughout procedure to minimize viral spread. • If general anesthesia is indicated, all personnel in OR at time of intubation should wear PPE for airborne precautions. • Minimize OR to only essential personnel during intubation. • Preoxygenation should occur with a breathing circuit extension and high-quality filter at the patient side of the circuit. • Maximize chance of first-pass intubation by having experienced providers manage airway. • Use video laryngoscopy if able. • During extubation, which has a high risk of aerosolization of the virus, minimize personnel in OR and be sure every healthcare worker is protected with proper PPE. • The patient should be monitored in OR until safe and before transfer to a COVID-19-designated room following hospital guidelines.
Postoperative	<ul style="list-style-type: none"> • Use of NSAIDs in the intraoperative and postoperative periods lacks sufficient evidence. It is unknown if the treatment of postpartum pain with NSAIDs will worsen the trajectory of patients with COVID-19.

- Administer antiemetics to prevent vomiting in patients undergoing cesarean delivery because gagging and vomiting are considered aerosolization events.
- Because of potential risks of immunosuppression with corticosteroid use, avoid use of dexamethasone in this patient population for PONV prophylaxis and treatment.
- Healthcare facilities providing inpatient obstetric care should limit visitors to those essential for the pregnant woman's care.
- Encourage use of communication techniques that avoid person-to-person contact, such as phone calls and videoconference calls.

Pregnant women with covid 19 positive

Considering the signs, symptoms, and the stage of the corona disease, pregnant women can have different outcomes, and different therapies.

Pregnant women with suspected or confirmed COVID-19 should be triaged and their condition categorized as mild, severe, or critical.

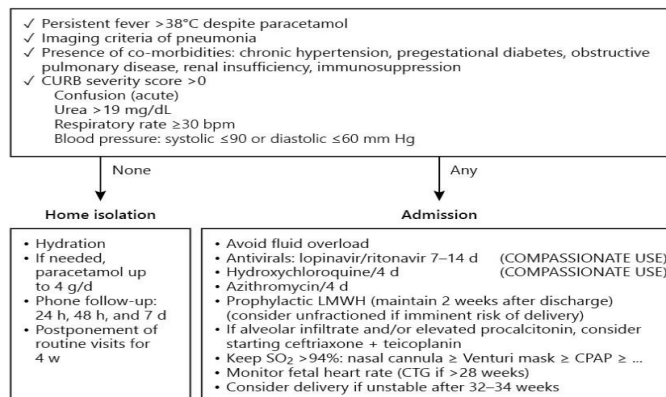
- Liang and Acharya¹⁰ classified a symptomatic patient with stable vital signs as having a mild case of COVID-19. Presence of local symptoms in the upper respiratory tract (cough, sore throat, rhinorrhea, anosmia with or without non specific symptoms like fever or myalgia).

- Pregnant patients with moderate pneumonia, confirmed with x ray, without presentin severity signs(basal $SO_2 \geq 90$, no need for vassopresor or ventilatory assistance.

- Pregnant patients with tachypnea and hypoxemia expressed as a partial pressure of arterial blood oxygen /oxygen concentration ratio less than or equal to 300 mm Hg are considered to have severe cases.

- Moreover, pregnant women present- ing with shock and multiorgan system failure requiring mechanical ventilation have critical cases

Asymptomatic and mild cases should be isolated at home, and be taken care throw all the process untill the day of the delivery Severe and MOF patients should be taken care in the hospital by a multidisiplinary group.



Anesthetic management of obstetric patient with COVID-19 positive

Vaginal delivery

Vaginal delivery is recommended in stable patients because viral shedding and vertical transmission have not been reported.¹

- Continuous CTG monitoring is advised due to possible increased risk of fetal distress, as reported in some early reports. Although there is no evidence on the presence of SARS-CoV-2 in vaginal secretions. It seems reasonable to avoid fetal scalp pH testing or internal fetal heart rate monitoring. If fetal well-being loss is suspected, immediate delivery of pregnancy by the most appropriate mode of delivery according to obstetric conditions will be decided.

- Monitor temperature, respiratory rate, and SO₂ hourly.

- Under normal labor progression, vaginal examinations should be minimized (i.e., every 2–4 h). Ideally, a minimal number of professionals should be involved in labour management to minimize the risk of professional exposure.

- Neuraxial analgesia is not contraindicated, and by providing good analgesia, it may reduce cardiopulmonary stress from pain and anxiety. Preferably, it should be administered early to minimize the risk of requiring general anesthesia for an emergency caesarean section, as airway manipulation, intubation, and extubation are high-risk procedures for personel infection. Some societies recommend against the use of nitrous oxide because of the risk of aerosol generation .

- Consider shortening the second stage of labour (forceps or vacuum) according to obstetric criteria as active pushing while wearing a surgical mask may be difficult for the woman.

- Unless indicated for suspected fetal or neonatal distress, routine umbilical cord gas analysis is avoidable.

- Allowing people support on labour and delivery is a controversial issue, mainly because in most of the situations, they are close contacts. In any case, the support person should be screened for symptoms before admission to the delivery room, wearing appropriate protective equipment (at least a surgical mask) and keeping droplet and contact isolation measures.

- Any generated material during labour should be treated as contaminated.

This includes biological samples (such as the placenta) and other potential fomites such as neonatal finger- or footprints or CTG strips. As a general rule, their reduction is desirable. During the COVID-19 pandemic, the placenta should not be handed over to the patient.

- Newborn care should be carried out in the same operating/labour room unless resuscitation measures are required that can not be provided in-room.

- Although evidence of mother-to-child transmission is lacking, early cord clamping may be discussed with the patient and recommended to minimize the

risk of transmission after 34 weeks of gestational age. Before 34 weeks, a risk-benefit decision should be made regarding delayed clamping.

- The patient could informedly decide skin-to-skin contact with the newborn .This can only be offered if a good mother-child placement can be ensured, and in asymptomatic newborns >34 weeks, ensuring precautions for respiratory droplets with the use of a mask as well as hand and skin hygiene.

Caesarean Delivery

- Caesarean section should follow usual obstetric indications. The potential risk of vertical transmission is not an indication for caesarean section.

- Maternal indication: in women with respiratory compromise, labour may stress the pulmonary situation, and maternal hypoxia also has fetal risks. Under this rationale, a caesarean section could be considered after 32–34 weeks in women with severe illness, when the risks of prematurity could be assumed. Before 32 weeks, multidisciplinary team decisions should be

made, balancing maternal and neonatal risks, especially in intubated patients or those with need for maternal prone position due to acute respiratory distress syndrome . Continuing maternal support with fetal monitoring in women that remain stable may be an option for severe preterm cases.

If cesarean delivery is necessary, surgery must be performed in a designated negative pressure OR, and regional anesthesia is recommended.

Because of pulmonary complication knowing in COVID-19, the regional anesthesia is recommended unless there are no contraindication. Before neuroaxial anesthesia must be done one blood symple test, especially to asses the platelet count. Recent studies, like Guan and colleagues¹³ and Lippi et al¹⁴ reported

decrease in platelet counts or thrombocytopenia in patients with severe COVID -19 symptoms.

Nevertheless, if general anesthesia is required , the anesthesia machine must be prepared with an HMEF between the circuit and the patient's airway. It can be used two additional high quality filters on expiratory and inspiratory limbs.

The most experienced anesthesia provider should be dedicated to the intubation of a patient with COVID-19. It might be necessary to have a colleague available for assistance, whether inside the OR or immediately available outside the room.¹⁵

It should be performed preoxygenation and rapid-sequence induction. Videolaryngoscopy is recommended ,but it must be choose the least amount time method to minimise time exposition.

Extubation in the OR must be done with limited personnel present, and must be followed imediatly by putting a face mask on the patient.

Adequate time must be spent in the OR before transport to ensure the patient is exchanging air without distress and has respiratory stability.

After surgery, the breathing circuit, reservoir bag, gas sampling tubing and the mask must be discarded.

All exposed area must be cleaned and disinfected according to recommendations. Cleaning of internal parts of the machine is not necessary if appropriate high-quality filters were used based on the design of the anesthesia machine.¹⁶

Pain management

If the epidural catheter is placed, it can be applied an analgesic dose. In other cases, without epidural catheter, it can be use NSAIDs, there is lack of evidence, if the NSAIDs postpartum treatment will worse the trajectory of disease from COVID-19

PONV prophylaxis

Patients with COVID-19 can be immunosuppressed because of corticosteroid use, and it is better to avoid use of dexamethasone for PONV prophylaxis. It should be administer antiemetics to prevent vomiting. It is necessary using antiemetics to reduce gagging and vomiting, which are considered aerosolization events.

Venous Thromboembolism Prophylaxis

There are no data on the use of scoring systems to predict VTE risk in pregnant individuals. Additionally, during pregnancy, the D-dimer level may not be a reliable predictor of VTE because there is a physiologic increase of D-dimer levels throughout gestation.¹⁹

If delivery is threatened, or if there are other risks for bleeding, the risk of bleeding may outweigh the potential benefit of VTE prophylaxis in pregnancy.

Specific recommendations for pregnant or lactating individuals with COVID-19 include:¹⁸

- If antithrombotic therapy is prescribed during pregnancy prior to a diagnosis of COVID-19, this therapy should be continued (AIII).
- For pregnant patients hospitalized for severe COVID-19, prophylactic dose anticoagulation is recommended unless contraindicated (BIII).
- Like for nonpregnant patients, VTE prophylaxis after hospital discharge is not recommended for pregnant patients (AIII). Decisions to continue VTE prophylaxis in the pregnant or postpartum patient should be individualized, considering concomitant VTE risk factors.
- Anticoagulation therapy use during labor and delivery requires specialized care and planning. It should be managed in pregnant patients with COVID-19 in a similar way as in pregnant patients with other conditions that require anticoagulation in pregnancy (AIII).

- Unfractionated heparin, low molecular weight heparin, and warfarin do not accumulate in breast milk and do not induce an anticoagulant effect in the newborn; therefore, they can be used by breastfeeding women with or without COVID-19 who require VTE prophylaxis or treatment (AIII). In contrast, use of direct-acting oral anticoagulants during pregnancy is not routinely recommended due to lack of safety data (AIII).

(Rating of Recommendations: A = Strong; B = Moderate; C = Optional
III = Expert opinion)

Personnel Protection

The SARS coronavirus 2 (SARS-CoV-2) caused by COVID-19 corona virus has been found to be highly virulent and can be transmitted through droplets from normal breathing, sneezing, and coughing, and by aerosolization of bodily fluid discharge. The first and maybe the most important to do, is to protect the personnel. It is necessary to follow rigorously the steps for wear and unwear the PPE

(Personal Protective Equipment). Once admitted to the labor and delivery department, the patient with COVID-19 must be placed in a negative pressure room

and must be provided a face mask. All personnel with direct contact with the patient must have PPE, which include gloves, gown, mask, and face shield during the first and second stages of labor. Visitation of family members during labor and delivery is prohibited.¹¹

Consistent with strict anesthesia management in cesarean delivery is the effective use of personnel. Regardless of the type of cesarean delivery, the current recommendation outlines the use of the most experienced provider performing procedures such as subarachnoid blocks or intubations. Furthermore, the Society for Obstetric Anesthesia and Perinatology suggests that the anesthesia department minimize the use of trainees in the room of a patient with COVID-19.⁹

Conclusion and recommendation

Pregnant women do not appear to be more susceptible to infection or to serious complications compared to non-pregnant women, but the existing data are still limited, and sizable series are scarce. Presence of co-morbidities may increase the risk of presenting with more severe clinical manifestations.

Current data do not suggest an increased risk of miscarriage or early pregnancy loss in pregnant women with COVID-19. At third trimester, cases of preterm

delivery and fetal distress have been described in women with COVID-19 infection, although the evidence is still too weak to establish an association. A significant number of preterm deliveries are due to maternal indication.

Women with mild symptoms without co-morbidities could be safely isolated at home and followed up by telehealth means.

Early identification of cases with serious manifestations allows timely treatment, oxygen support, and referral to the intermediate or intensive care. It should be noted that COVID-19 patients may have sudden clinical deterioration.

In pregnant women with COVID-19 infection without severity criteria with spontaneous-onset delivery or with an indication of induction due to obstetric conditions, the mode of delivery should be based on obstetric conditions and fetal status. Caesarean section should follow usual obstetric indications.

COVID-19 is highly contagious, and this must be taken into consideration when planning intrapartum care. Rational use of personal protective equipment is key in preventing infection in attending professionals.

There are still limited data on the care and management of the parturient with COVID-19. It is paramount that our profession share our experiences and practices to help guide our multidisciplinary approach in delivering the best care possible to these women. Every healthcare institution across the world has been working diligently to educate its employees on the current recommendations that comply with the CDC and other national organizations that we refer to for our practice. Not only is the care of patients with COVID-19 continually changing, but also so are the safety precautions that the anesthesiologist must take. Our national societies have done an excellent job of educating us with the most recent updates, such as on PPE, to ensure that we are providing safe anesthesia in a care as well as keeping ourselves safe.

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