SAS Journal of Medicine
Abbreviated Key Title: SAS J Med
ISSN 2454-5112
Journal homepage: https://saspublishers.com

OPEN ACCESS

Anesthesiology

Anesthesia for Cesarean Section in Parturients with COVID-19: Experience of the Mohamed V Military Hospital-Rabat Morocco

Jeddab Achraf[1*], Hamza Boukanouf[2], Tarik Baadi[1], Ayoub Azzouzi[1], Abderrahmane Elwali[1], Hicham Balkhi[1], Mustapha Bensghir[1]

[1]Department of Anesthesiology and Critical Care, Military Teaching Hospital Mohammed V, Faculty of Medicine and Pharmacy of Rabat, Mohammed V University of Rabat, Rabat, Morocco
[2]Department of Anesthesiology and Critical Care, Ibn Sina's Teaching Hospital, Faculty of Medicine and Pharmacy, Mohammed V University of Rabat, Rabat, Morocco

DOI: 10.36347/sasjm.2024.v10i06.007 | **Received:** 29.04.2024 | **Accepted:** 04.06.2024 | **Published:** 12.06.2024

***Corresponding author:** Jeddab Achraf
Department of Anesthesiology and Critical Care, Military Teaching Hospital Mohammed V, Faculty of Medicine and Pharmacy of Rabat, Mohammed V University of Rabat, Rabat, Morocco

Abstract **Original Research Article**

Background*:** The emergence of COVID-19, caused by the SARS-CoV-2 virus, has posed significant challenges in managing pregnant women, who are particularly vulnerable due to physiological changes and immunological adaptations during pregnancy. Anesthetic management during cesarean section in COVID-19-positive parturients remains contentious, necessitating a nuanced approach to balance maternal and fetal well-being with infection control measures. ***Material and Methods*:** This prospective study, conducted from June 2020 to December 2021 at the Anesthesiology Department of HMIMV, Rabat, aimed to analyze anesthetic practices for cesarean sections in COVID-19-positive parturients. Inclusion criteria comprised positive SARS-CoV-2 RT-PCR tests within a week before delivery, with cesarean section performed during the study period. Exclusion criteria included suspected cases not confirmed by PCR. ***Results*:** Twenty parturients were included, with ages ranging from 20 to 36 years and gestational ages from 30 to 41 weeks. Respiratory manifestations varied, from mild symptoms in 11 patients to moderate cases with bilateral pneumonia in 5 patients. Four patients required intensive care, including one intubated and ventilated. Spinal anesthesia was the preferred technique, with 19 patients undergoing it, while one patient received general anesthesia. Despite challenges, favorable outcomes were observed in most cases, with only one maternal mortality and two neonatal deaths. ***Conclusion: In COVID-19-positive parturients, the choice of anesthetic technique hinges on respiratory status, with spinal anesthesia emerging as a preferred option for those with mild to moderate severity. This study underscores the importance of tailored approaches in managing cesarean sections in this vulnerable population, balancing maternal-fetal safety with infection control imperatives.

Keywords: SARS-CoV-2; Cesarean section; anesthetic management.

Abbreviations: HMIMV; COVID-19: Coronarovirus Disease 2019; SARS-CoV-2: Severe Acute Respiratory Syndrome Coronarovirus 2; RT- PCR: Reverse Transcription Polymerase Chain Reaction; CT: Computed Tomography; ICU: Intensive Care Unit; FiO2: Fraction of Inspired Oxygen; PaO2: Partial Pressure of Oxygen;

INTRODUCTION

In December 2019, a pneumonia of unknown origin, later identified as caused by a coronavirus and termed coronavirus disease 2019 (COVID-19), was first detected in Wuhan, China. The responsible virus was named Severe Acute Respiratory Syndrome Coronavirus 2, or SARS-CoV-2 [1]. Coronaviruses are single-stranded RNA viruses that can cause a spectrum of illness, ranging from a common cold to severe and fatal pneumonia. The COVID-19 pandemic has not spared pregnant women. The clinical and laboratory presentation is nonspecific. Pregnant women may be particularly susceptible to respiratory pathogens due to physiological changes in both their immune and cardiorespiratory systems, rendering them intolerant to hypoxia [2]. There is evidence suggesting that the risk of critical illness may be higher in the advanced stages of pregnancy [3]. Clinical consequences in pregnant women during the SARS-CoV-2 epidemic were worse than those in non-pregnant women, with a higher rate of tracheal intubation, renal failure, and disseminated

intravascular coagulation. The occurrence of COVID-19 infection also complicates the course of childbirth and increases the use of cesarean delivery. The choice of anesthesia technique for cesarean section is well codified, with spinal anesthesia being the reference, except in particular obstetric situations and extreme emergencies where general anesthesia is recommended. However, for parturients infected with SARS-CoV-2, this choice remains controversial [4]. The aim of this study was to analyze anesthetic practices for cesarean section in parturients with COVID-19 at the anesthesiology department of HMIMV.

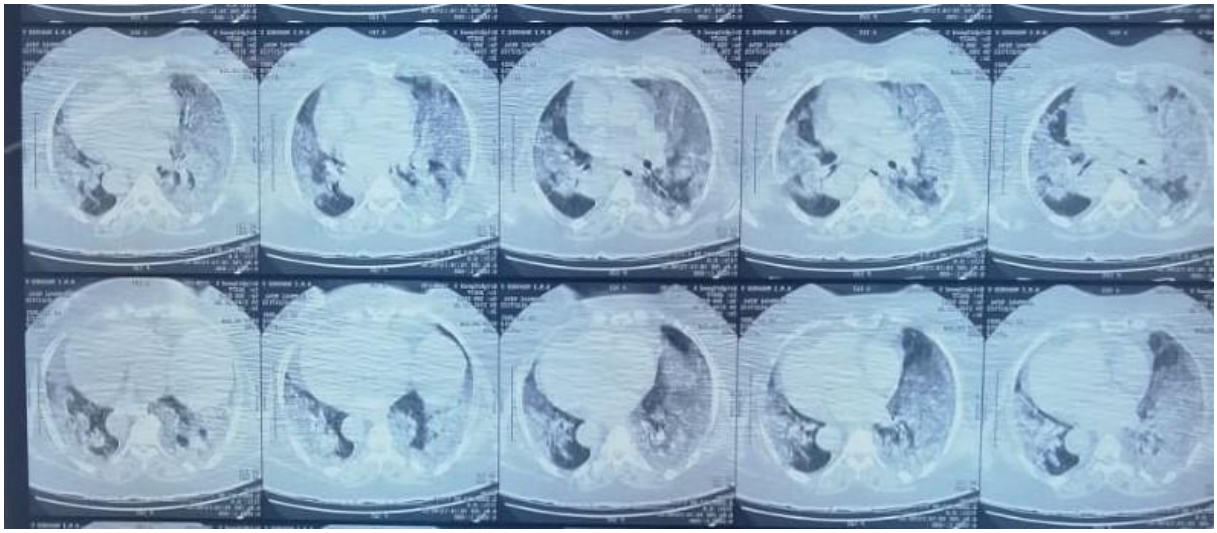
MATERIAL AND METHODS

This was a prospective study conducted from June 2020 to December 2021. All parturients with a positive SARS-CoV-2 virus test by RT-PCR (reverse transcription polymerase chain reaction) in the week prior to delivery and who underwent cesarean section were included. Parturients suspected but not confirmed by PCR were excluded.

RESULTS

During this period, 20 patients were included. The age range was between 20 and 36 years old, with gestational ages ranging from 30 to 41 weeks. Eleven parturients had a mild infection with mild symptoms such as fever, fatigue, anorexia, and arthralgia. Five parturients had a moderate infection with bilateral pneumonia on thoracic CT scan and were receiving oxygen (3 to 5 liters/minute). Four parturients were hospitalized in the intensive care unit for severe infection: two were on high-flow nasal oxygen therapy with a flow rate of 50 l/min and an FiO2 of 80%, one patient was on non-invasive ventilation, and the last patient was intubated and ventilated.

A thoracic CT scan was performed on 9 patients, all of whom were classified as stage VI according to the CORADS classification. Three patients had lung involvement < 25%, two patients had involvement between 25-50%, three patients had involvement between 50-75%, and the intubated patient had involvement > 75%.



Chest CT Scan of a patient showing bilateral alveolar-interstitial opacities affecting more than 75% of the lungs

All cesarean sections performed in our patients were urgent. Obstetric indications were present in 11 patients (fetal distress in 5, severe preeclampsia in 2, cephalopelvic disproportion in 1, and retroplacental hematoma in 3), all with mild to moderate severity. In the other 9 patients, the indication was maternal and fetal rescue due to worsening maternal respiratory status with maternal and fetal hypoxemia.

Spinal anesthesia was performed in 19 patients, with only the intubated patient receiving general anesthesia. Spinal anesthesia was performed at the L2-L3 level, with injection of 10 mg hyperbaric bupivacaine, 25 micrograms fentanyl, and 100 micrograms morphine.

The 11 patients with mild infection received perioperative oxygenation via nasal cannula with a flow rate of 3 liters/min, which was immediately discontinued postoperatively.

For the 5 patients with moderate infection, oxygen flow was slightly increased after spinal anesthesia. Three patients were immediately returned to their usual oxygen flow rates after surgery, while 2 experienced worsening respiratory status postpartum, requiring admission to the intensive care unit. However, their oxygen requirement was < 12 liters, with a postpartum ICU stay of 5 days for the first patient and 8 days for the second.

Perioperative ventilation for severely ill patients was provided via high-flow nasal oxygen therapy with increased flow rates of 70 l/min and FiO2 of 80% for one patient, while the other two patients were

ventilated with non-invasive ventilation. There was no respiratory deterioration after spinal anesthesia in these patients.

Intraoperative photo of a patient operated on under spinal anesthesia, with intraoperative noninvasive ventilation

The average length of ICU stay for severely ill patients ranged from 5 to 25 days. The outcome was favorable for all patients except the intubated patient who died 24 hours after cesarean section due to refractory hypoxemia.

For the newborns, there were two deaths: the newborn of the intubated patient died after 36 hours in the neonatal intensive care unit (premature at 30 weeks gestational age, with fetal hypoxemia, maternal oxygen saturation during cesarean section was between 60-70%), and the newborn of the patient who was on non-invasive ventilation also died after 6 days due to complications of prematurity (30 weeks gestational age).

DISCUSSION

Pregnancy physiologically induces cardiovascular, respiratory, and immunological changes in parturients. Respiratory changes include an increase in respiratory rate and tidal volume to meet the increased oxygen demands of both the mother and the fetus. However, there is a decrease in functional residual capacity due to compression of the thoracic cage by the gravid uterus, which is further exacerbated towards the end of pregnancy. These factors render pregnant women particularly vulnerable to viral and bacterial pulmonary infections [5, 6]. Indeed, numerous studies have shown that pregnant women are more likely to develop severe forms of COVID-19 [3].

Spinal anesthesia remains the gold standard for cesarean section, with general anesthesia reserved for extreme emergencies, specific obstetric situations, or when there is a contraindication to spinal anesthesia. However, in parturients with COVID-19, this choice remains delicate and controversial, taking into account the patient's pre-existing respiratory and hemodynamic status, as well as the safety of healthcare personnel and the risk of transmission. The diagnosis of COVID-19 is not considered a contraindication to spinal anesthesia [7, 8].

In our series, 19 out of 20 patients received spinal anesthesia, despite 3 of them having severe respiratory conditions. This choice was justified by the significant difficulty in weaning ventilatory support observed in intubated patients with COVID-19 in our intensive care units, due to the severity of acute respiratory distress syndrome caused by the virus, in

addition to the risk of ventilator-associated pneumonia, which complicates the management of these patients.

Spinal anesthesia may have a depressant effect on respiratory function due to paralysis of accessory respiratory muscles, particularly abdominal muscles, and the effects of adjuvants such as fentanyl. However, this effect was counterbalanced by a transient increase in oxygen delivery to our patients after spinal anesthesia. All of our parturients who delivered under spinal anesthesia had a good outcome. The patient who was already on non-invasive ventilation before delivery spent 25 days in the intensive care unit and was transferred to the pulmonary department on 3 liters of oxygen.

Other studies on this subject show a preference for spinal anesthesia by most teams. For instance, Derya Karasu *et al*., [9] had a spinal anesthesia rate of 95.1%, similar to our rate of approximately 95%.

The mortality rate in our series was 5% (1/20). It is worth noting that the deceased patient had bilateral pulmonary involvement estimated at > 75% of lung parenchyma, was intubated 3 hours before cesarean section due to respiratory criteria, and had persistent severe hypoxemia even after intubation, with a pulse oxygen saturation of 64% and a PaO2 of 49, with a P/F ratio of 49. Cesarean section was indicated for maternal and fetal rescue.

CONCLUSION

The choice of anesthetic technique in parturients with COVID-19 depends on their respiratory status. For patients with mild to moderate severity, spinal anesthesia appears to be a favorable choice.

REFERENCES

1. Gorbalenya, A. E., Baker, S. C., Baric, R. S., de Groot, R. J., Drosten, C., Gulyaeva, A. A., ... & Ziebuhr, J. (2020). Severe acute respiratory syndrome-related coronavirus: The species and its viruses–a statement of the Coronavirus Study Group. *BioRxiv*. Disponible sur: http://biorxiv.org/lookup/doi/10.1101/2020.02.07.937862
2. Engjom, H. M., Ramakrishnan, R., Vousden, N., Bunch, K., Morris, E., Simpson, N., ... & Knight, M. (2024). Perinatal outcomes after admission with COVID-19 in pregnancy: a UK national cohort study. *Nature Communications*, *15*(1), 3234.
3. Wong, S. F., Chow, K. M., Leung, T. N., Ng, W. F., Ng, T. K., Shek, C. C., ... & Tan, P. Y. (2004). Pregnancy and perinatal outcomes of women with severe acute respiratory syndrome. *American journal of obstetrics and gynecology*, *191*(1), 292-297.
4. Wang, Y., Yang, M., Wang, L., Dong, H., & Lu, Z. (2020). Pregnancy and COVID-19: what anesthesiologists should know. *Minerva Anestesiologica*, *87*(1), 77-84. Disponible sur: https://www.minervamedica.it/index2.php?show=R02Y2021N01A0077
5. Siston, A. M., Rasmussen, S. A., Honein, M. A., Fry, A. M., Seib, K., Callaghan, W. M., ... & Pandemic H1N1 Influenza in Pregnancy Working Group. (2010). Pandemic 2009 influenza A (H1N1) virus illness among pregnant women in the United States. *Jama*, *303*(15), 1517-1525.
6. Maudhoo, A., & Khalil, A. (2022). Viral pulmonary infection in pregnancy–Including COVID-19, SARS, influenza A, and varicella. *Best Practice & Research Clinical Obstetrics & Gynaecology*, *85*, 17-25.
7. Jan, M., Bhat, W. M., Rashid, M., & Ahad, B. (2020). Elective cesarean section in obstetric COVID-19 patients under spinal anesthesia: a prospective study. *Anesthesia Essays and Researches*, *14*(4), 611-614.
8. Dabrowska, D., & Lock, G. J. (2020). Staying ahead of the curve: modified approach to emergency caesarean section under general anaesthesia in COVID-19 pandemic. *Turkish Journal of Anaesthesiology and Reanimation*, *48*(3), 174-179.
9. Karasu, D., Kilicarslan, N., Ozgunay, S. E., & Gurbuz, H. (2021). Our anesthesia experiences in COVID -19 positive patients delivering by cesarean section: A retrospective single-center cohort study. *J Obstet Gynaecol Res*, *47*(8), 2659-2665.