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ORIGINAL ARTICLE

Effect of COVID-19 on anesthesia preferences in cesarean section: An observational study

[1]Meryem ONAY
[1]Sema ŞANAL BAŞ
[2]Ümit AKKEMİK
[1]Ayten BİLİR

[1]Department of Anesthesiology and Reanimation, Eskişehir Osmangazi University Faculty of Medicine, Eskişehir, Türkiye

[2]Department of Algology, Konya City Hospital, Konya, Türkiye

ORCID ID
MO : 0000-0002-5028-9135
SŞB : 0000-0002-2943-0456
ÜA : 0000-0001-8483-5416
AB : 0000-0002-3491-3209

ABSTRACT

Objective: During the pandemic, everyone including healthcare professionals were under stress. Regional blocks in the cesarean section were considered safer during this period. We aimed to evaluate the effect of this stress on the patient's choice of anesthesia.

Material and Methods: Pregnant women were surveyed preoperatively during the coronavirus disease 2019 (COVID-19) pandemic. The survey investigated the demographic data, pregnancy information, previous delivery type, anesthesia experiences, known panic attack/anxiety diagnosis, and anesthesia preferences before and after COVID-19 and factors affecting this decision.

Results: A total of 108 patients, including elective (n=63) and urgent (n=45), were included in this study. The anesthesia techniques applied to the patients were spinal anesthesia (n=98), epidural anesthesia (n=1), and general anesthesia (n=9). When enquired on the change in their preferences due to COVID-19, only 16.6% (n=18) stated that the patients were affected. In addition, 94.4% of the patients (n=17) underwent regional anesthesia and 5.5% (n=1) underwent general anesthesia owing to anticoagulant use. Furthermore, 58.3% of the patients (n=63) were subjected to their preferred anesthesia technique, whereas 36.1% (n=39) underwent regional anesthesia based on the physicians' recommendations for maternal/fetal health during the COVID-19 pandemic.

Conclusion: We investigated the effect of the anxiety associated with COVID-19 on the anesthesia preferences of pregnant women and found that only a small percentage of patients had a change in their preferences due to COVID-19.

Keywords: Anesthesia preferences, cesarean section, coronavirus disease 2019 pandemic.

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Correspondence: Meryem ONAY, MD. Eskişehir Osmangazi Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon Anabilim Dalı, Eskişehir, Türkiye.
Tel: +90 222 239 29 79 **e-mail:** dr.meryemonay@hotmail.com

INTRODUCTION

In recent years, the cesarean section rates have increased worldwide and in Türkiye. Although the World Health Organization (WHO) aims to keep the cesarean section rates under 15%, according to the Türkiye Statistical Institute, this rate was 52% in Türkiye in 2015.[1,2] The importance of obstetric anesthesia increases as the rate of cesarean section increases. Regional anesthesia is considered safer than general anesthesia based on maternal and fetal mortality and morbidity. The selection of the anesthesia technique is generally based on the clinical and laboratory results of the patients, experience of the anesthetist, and patient preference.[3] Studies investigating patient preferences for general or regional anesthesia report that their preferences are affected by their sociocultural background, physician's guidance, having first childbirth, previous negative experiences, and psychological problems (panic attack, anxiety, etc.).[4]

The coronavirus disease 2019 (COVID-19) pandemic was first detected in China in December 2019; the first case in Türkiye emerged in March of 2020. The disease can cause mild infections, such as the common self-limiting cold, to more serious infections, such as acute severe respiratory syndrome (SARS). In addition, there is a high risk of human-to-human transmission.[5] Changes in the immune responses during pregnancy render pregnant women susceptible to infection. In addition, physiological and anatomical changes diminish maternal tolerance to hypoxia. Hence, pregnant women and newborns are considered potential risk groups in the COVID-19 pandemic given the incomplete maturation of the newborn and the probability of infection transmission from mother to baby.[5,6]

We think that due to the rapid spread of infection, high mortality and morbidity rates in infected patients and the measures taken to prevent the disease will increase birth anxiety in pregnant women. In this study, our hypothesis is to evaluate the effect of COVID 19 on the anesthesia preference of pregnant women with a pre-operative questionnaire due to high anxiety.

MATERIAL AND METHODS

After obtaining approval from Eskisehir Osmangazi University Faculty of Medicine Ethics Committee (Decision No.: 2020-03), patients undergoing emergency or elective cesarean section between May 20, 2020, and August 20, 2020, in our clinic during the COVID-19 pandemic were included in the study. Those in emergency state I (Based on the emergency classification, category I: Patients who require cesarean delivery within 30 min at the latest for maternal and infant health), with communication problems and mental incompetence to answer questions, and unwilling to participate in the study were excluded from the study. The survey investigated the demographic data (age and educational background), pregnancy information (gestational week, gravidity, and parity), previous delivery type (normal birth and/or cesarean section), anesthesia experiences (general and/or regional), known panic attack/anxiety diagnosis, and anesthesia preferences before and after COVID-19 and factors affecting this decision. After the patients were informed about the study by the same anesthesiologist, their verbal and written consent was obtained. The answers to the questions asked by the anesthesiologist were recorded. The participants were informed that they were not under any obligation to answer all the questions and could skip any questions and end the survey at any time. Patients took the survey, comprising 13 questions preoperatively in the waiting room since the measures taken for the pandemic (protective equipment preparations for operating room and health-care professionals, etc.) and would further increase the patients' stress levels. In addition, the patients were informed that they would be administered the anesthesia technique of their choice except in case of systemic disease, emergency, or anticoagulant use.

After taking the patients to the operating room, vascular access was established using an 18-gauge granule with routine monitoring (electrocardiogram, non-invasive blood pressure, and peripheral oxygen saturation). Patients were administered standard regional or general anesthesia.

Sample Size and Statistical Analysis

Since the study was carried out during the COVID-19 pandemic, the sample size calculation planned to be included in the study was based on an "effect size" assumption. Since pregnant women were the specific group in the study, the power level was planned at 80%. The effect size was determined at the "medium" level. A total of 108 patients were included in the study, with a type I error level of 0.05. The power analysis was performed using the G *Power 3.1.9.7 package program.

Data are presented as mean±standard deviation. Frequency tables are defined as n and percentages. Pearson's exact Chi-square test was used for the cross analysis of categorical data. Data analysis was performed using IBM SPSS 21.0 package program. Statistical significance was set at $p<0.05$.

RESULTS

A total of 108 patients, including elective (n=63) and urgent surgery (n=45), were included in the present study. The demographic and pregnancy information of the patients are presented in Table 1. The intragroup comparison of the general and regional anesthesia groups revealed no statistically significant differences in terms of age (p=0.313), gestational week (p=0.899), gravida (p=0.643), and parity (p=0.856) (Table 2). Anesthesia techniques were spinal (n=98), epidural (n=1), and general anesthesia (n=9); additionally, 91.6% of the patients were administered regional anesthesia and 8.3% were administered general anesthesia.

Information about educational background is shown in Table 1 and the education level was not affect the choice of anesthesia (p=0.133). Moreover, it was the first childbirth in 52% of the patients. One question in the survey interrogated the previously administered anesthesia technique (Table 1). In addition, 92.4% of the patients without anesthesia (n=66), 85.7% of those with previous general anesthesia (n=21), 100% of those with previous regional anesthesia (n=12), and 88.8% of those who underwent regional+general anesthesia (n=9) preferred regional anesthesia (p=0.531).

The anesthesia techniques applied did not differ significantly based on the previous delivery type (p=0.347), emergency or elective cesarean section (p=0.112), and presence of panic attacks/anxiety (p=1.000).

We observed that 26.8% of the patients preferred general anesthesia and 51.8% preferred regional anesthesia, whereas 21.2%

Table 1: Demographic data and pregnancy information

Parameters	All (n=108)	Parameters	All (n=108)
1. Age	31.13±5.13	10. Have you been tested or treated for fever, cough, and respiratory distress due to COVID-19 in the last month?	
2. Education status		No	98.1% (n=106)
Did not go to school	2.8% (n=3)	I was followed closely just because t was my contact history	0.9% (n=1)
Primary education	33.3% (n=36)	Yes I got it, I got better	0.9 % (n=1)
High school	26.9% (n=29)	My outpatient treatment continues	0% (n=0)
Unıversıty	37% (n=40)	I am in the treatment process (COVID service/intensive care)	0% (n=0)
3. Pregnancy week	37±2.48	11. If your anesthesia preference changed due to the COVID-19 outbreak, why?	
4. Gravida/Parity	2.04±1.28/0.85±1.12	Anesthesiologist	14.8% (n=16)
5. What was your previous delivery method?		Obstetrician	2.7% (n=3)
Normal delivery	8.3% (n=9)	Social media (TV, internet, etc.)	0% (n=0)
Cesarean section	36.1% (n=39)	Friend, family, environment	0% (n=0)
Normal delivery+cesarean	2.8% (n=3)	Infection anxiety (mother/baby)	0% (n=0)
No delivery history	52.8% (n=57)	12. Cesarean emergency or elective?	
6. If you gave delivery by cesarean before, which one was our anesthesia experiment??		Urgent	41.7% (n=45)
I have no experience	61.1% (n=66)	Elective	58.3% (n=63)
General anesthesia	19.4% (n=21)	13. What anesthesia technique was applied to the patient?	
Regional anesthesia	11.1% (n=12)	Patient's preferred	58.3% (n=63)
Regional + general anesthesia	8.3% (n=9)	The anesthesiologist's recommendation due to the current systemic disease	7.5% (n=8)
7. What was your anesthesia preference in your current pregnancy period? (before the COVID-19 pandemic)		General anesthesia due to anticoagulant therapy	0.92 % (n=1)
General anesthesia	26.9% (n=29)	Obstetrician's advice for mother/baby health	36.1% (n=39)
Regional anesthesia	51.9% (n=56)	It is an emergency case and regional anesthesia is used due to the risk of aspiration due to unsuitable fasting	5.6% (n=6)
I was hesitant	21.3% (n=23)	General anesthesia due to failure of regional anesthesia	1.85 % (n=2)
8. Do you have a disease that you previously diagnosed such as panic attack/anxiety?			
Yes	5.6% (n=6)		
No	94.4% (n=102)		
9. Has your anesthesia preference changed due to the COVID- 19 pandemic?			
Yes	16.7% (n=18)		
No	83.3% (n=90)		

were indecisive regarding their pre-COVID-19 anesthesia preferences. Regional anesthesia was administered to 82.7% of the patients who preferred general anesthesia (n=24), 96.42% of those preferring regional anesthesia (n=54), and 91.3% of the indecisive patients (n=21). Only 16.6% (n=18) agreed to being influenced when asked whether their preference had changed due to COVID-19. A total of 94.4% of the patients (n=17) the use of regional anesthesia, and 5.5% (n=1) received general anesthesia due to anticoagulant use. In addition, 5.5% of those whose preferences were affected by COVID-19 had never attended school, whereas 50% of the patients were elementary school graduates, 33.3% were high school graduates, and 11.1% were university graduates.

Anesthesiologists (n=15), obstetricians (n=1), or both (n=2) were involved in the decision change.

One patient who participated in the study had contact with a history of contact and one patient had upper respiratory tract symptoms. However, both patients tested negative on polymerase chain reaction (PCR). Other patients (n=106) showed no symptoms or a history of COVID-19.

In 58.3% of the patients (n=63), the anesthesia technique of their preference was administered, whereas 36.1% (n=39) were administered regional anesthesia as recommended by the physician for maternal and fetal health during the COVID-19 pandemic.

DISCUSSION

COVID-19 infection has a rapid spread of infection, high mortality and morbidity rates in patients with COVID-19 infection. Pre-surgery

Table 2: Comparison of demographic data between the groups of regional and general anesthesia

Parameter	General (n=9)	Regional (n=99)	*p
Age (year)	31.8±7.09	31.06±4.96	0.313
Gestational week	36.7±3.38	37.02±2.40	0.899
Gravida	2.22±1.30	2.03±1.28	0.643
Parity	0.77±1.09	0.85±1.13	0.856
Educational background			0.133
No school education	n=1 (0.9%)	n=2 (1.8%)	
Primary school education	n=4 (3.7%)	n=32 (29.6%)	
High school education	n=0 (0%)	n=29 (26.8%)	
University education	n=4 (3.7%)	n=36 (33.3%)	

*: P<0.05, statistically significant values.

anxiety and stress are considered more intense in pregnant women scheduled for cesarean section. In our study, we investigated whether these factors could have an effect on the anesthesia preferences of pregnant women and found that only a small percentage of patients had a change in their preferences due to the COVID-19 pandemic.

Neuraxial blocks are preferred in cesarean section for early bonding between the mother and baby in addition to early onset of breastfeeding, better post-operative pain management, and fewer post-operative respiratory complications. Moreover, compared to the overall population, general anesthesia has been applied more in cesarean section due to weight gain, growth in breast size, and risk of difficult intubation caused by edema of the upper respiratory tract mucosa.[7] Failed intubation, failed ventilation, and aspiration risk are the leading causes of obstetric morbidity. Therefore, an increased risk of airway management results in a tendency for neuraxial technique preference in cesarean section.

Studies have also shown that neuraxial blocks are superior to general anesthesia in terms of Apgar scores and umbilical venous pH.[8] However, general anesthesia is preferred in some patients due to fear of paralysis and pain, existing anxiety disorder, or previous negative experiences. The reason for this preference is multifactorial and is influenced by age, gravida, previous delivery type, anesthesia experience, education, monthly income, and employment status.

A study conducted by Arslan et al.[9] in 2012 reported that general anesthesia was administered to 64.2% of patients and regional anesthesia to 35.8%. In addition, regional anesthesia was increasingly preferred in patients with an increase in their income and education levels. The guidance of the anesthesiologist and the obstetrician was the most important factor influencing patients for regional anesthesia. In our study, 91.6% of the patients were administered regional anesthesia. Moreover, regional anesthesia was administered to 66.6% of those who never attended school, 88.8% of the primary school graduates, 100% of the high school graduates, and 90% of the university graduates. Similar to the aforementioned study, regional anesthesia was preferred more in patients with increased levels of education. Furthermore, although the proportion of pregnant women with >12 years of educational background in the aforementioned study was 14.6%, the number of patients with a university degree accounted for 37% (n=40) in our study. Regional anesthesia was administered to 36% of the patients based on the physician's recommendation for maternal and fetal health and in 52% as per the patients' preferences. In addition, 16.6% of the patients altered their preferences due to COVID-19 and these changes were caused by the anesthesiologist and obstetrician. Hence, 94.4% of these patients (n=17) received regional anesthesia, and 5.5% (n=1) received general anesthesia due to anticoagulant use. There was no concordance between education and anesthesia preference who patients with changed preference due to COVID-19 in our study. In terms of mother-infant bonding, the rate of regional anesthesia demand increased considerably if recommended by the physician.

In our study, the rate of regional anesthesia was 91.6%. Those unwilling to participate in the study and those in emergency state I, who could not wait for regional anesthesia, were excluded considering the time needed for the survey. This may be one of the reasons for the increasing rate of regional anesthesia observed in this study. It was observed that 92% of pregnant women without a history of anesthesia preferred regional anesthesia. In addition, 5.5% of the patients (n=6) had a history of panic attack and only one of them was administered regional anesthesia based on her preference, whereas the others were administered regional anesthesia according to the physician's recommendation. Advanced maternal age and a better educational background could be associated with the recent increase in maternal and fetal health. However, we believe that the trend toward regional anesthesia will further increase on providing information about the anesthesia method, increasing experience in regional anesthesia, and a sense of trust in the patient-physician relationship.

Only mandatory, urgent, and life-saving (cancer surgery) surgeries are recommended to maintain staff and resource capacity during the COVID-19 pandemic. Moreover, given the widespread occurrence of COVID-19 in society, all cases should be treated as COVID-19 positive by healthcare professionals. Airway interventions during general anesthesia lead to aerosol production and pose a risk of COVID-19 transmission during intubation and extubation.[10] Health care workers who are involved in tracheal intubation are known to have an increased risk of infection by 6.6% compared to those who are not.[11] One should be prepared for labor and its associated unpredictable environment. PCR tests, which can be used for COVID-19 diagnosis, may yield negative results if the viral load is low or if the sample collection is insufficient.[12] Hence, regional anesthesia should be preferred over general anesthesia to reduce the risk of infection. Regional anesthesia is considered safer in terms of fetal and maternal mortality and morbidity in cesarean section even before the pandemic; however, it has become even more crucial during the COVID-19 pandemic. In the absence of vaccines and therapeutic treatments for COVID-19, we should aim to protect pregnant women and health care workers.

COVID-19 could present with fever, cough, sore throat, dyspnea, muscle pain, and diarrhea at admission.[5] In these patients, the residual functional capacity decreases, and sensitivity to hypoxia increases with pregnancy-related physiological changes.

Elevated atelectasis due to intubation and mechanical ventilation increases the need for post-operative intensive care and the possibility of complications.[13] One of our patients had symptoms of sore throat and cough, and was considered COVID-19 positive since the patient had a Grade 2 emergency and their PCR test results could not be obtained. One of our patients underwent isolation because of a history of contact with a patient with COVID-19. In our clinic, the necessary precautions were taken for protection against COVID-19 and every patient was considered as a probable case of COVID-19. However, those patients with higher risks were operated in COVID-19 assigned operating rooms with increased safety precautions (operating room preparation, personnel entry and exit procedures' proper implementation, and health care workers' safety optimization). The mother and baby were discharged with complete health in both the aforementioned cases.

In their study, Chen et al.[7] reported that general and combined spinal-epidural (CSE) could be used safely in pregnant women diagnosed with COVID-19, but recommend the use of neuraxial blocks as the first choice to avoid intubation. It was found that 86% of the patients undergoing CSE developed short-term hypotension that did not lead to organ damage. Recent studies have shown that the SARS-coronavirus 2 acts on the angiotensin-converting enzyme II, thereby, rendering the circulatory system highly sensitive in cases of infection. Moreover, as concluded by a meta-analysis by Lippi et al.,[14] the platelet count decreases as the severity of COVID-19 increases.[14,15] Compared to the non-pregnant population, obstetric patients have a lower risk of hypercoagulopathy and epidural hematoma due to high compliance of the epidural space; thus, a lower platelet count could be safe for neuraxial blocks. According to the latest guidelines published by the American College of Obstetricians and Gynecologists, a platelet count of over 80,000 is required for the neuraxial technique.[16] During the COVID-19 pandemic, neuraxial block techniques require proficiency due to coagulation. Therefore, since spinal anesthesia is faster, easier, and successful, we preferred its use for patients whose recent blood test results were favorable. The rates of hypotension in the spinal anesthesia were similar to that of prior experiences (before COVID-19). However, in case of changes in the mental state of patients diagnosed with the disease, patients positive for COVID-19 were excluded from the study. In one of our patients, epidural anesthesia was conducted due to obstructive cardiomyopathy to control the hemodynamic response more closely than spinal anesthesia. Since the neuraxial block failed in two of the patients, general anesthesia was administered to continue the procedure.

The limitations of study, this was a single-center study that excluded pregnant women who were positive for COVID-19. The purpose of this study was to evaluate the effects of infection anxiety on childbirth anxiety and anesthesia preferences among pregnant women. This process requires a multidisciplinary approach that includes obstetrics, anesthesia, and neonatal and infectious diseases. The patients included the study were only operated in the hour of work, not on duty period and the patients were in category I so regional anesthesia was chosen and the number patients who had operated with regional anesthesia were higher than general anesthesia. In addition, instead of a scale for anxiety level, a questionnaire was administered to the patients in which only their preferences and their relationship with COVID-19 were questioned.

CONCLUSION

There are no definite recommendations for anesthesia methods during the COVID-19 period, and its selection should be planned to ensure maternal and fetal health based on experience and proficiency. We investigated the effect of the anxiety associated with COVID-19 on the anesthesia preferences of pregnant women and found that only a small percentage of patients had a change in their preferences due to COVID-19. Our goal is to minimize hospital stay and contact between health-care professionals and potential cases to enhance safety.

Statement

Ethics Committee Approval: The Eskişehir Osmangazi University Non-Interventional Clinical Research Ethics Committee granted approval for this study (date: 20.05.2020, number: 03).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – MO; Design – ÜA; Supervision – SŞB; Resource – MO; Materials – MO; Data Collection and/or Processing – SŞB; Analysis and/or Interpretation – MO; Literature Search – ÜA; Writing – MO; Critical Reviews – AB.

Conflict of Interest: The authors have no conflict of interest to declare.

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