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Assessment of failed spinal anesthesia for cesarean section during COVID-19 pandemic

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ABSTRACT

Objective: 1490 pregnant women with confirmed COVID 19 were admitted to the hospital between April 2020 and February 2021. In Ankara City Hospital, Ankara, Turkey, 416 pregnant women gave birth spontaneously and 251 underwent cesarian section. We attempted spinal anesthesia for cesarian sections because all regional anesthesia organizations advised regional anesthesia for obstetric surgery. However, spinal anesthesia for cesarean delivery is not a foolproof method.

Material and Method: We used a retrospective analysis of 251 COVID 19 cesarean section anesthesia to determine the incidence of failed spinal anesthesia, management strategies, and risk variables that contribute to failure.

Results: The total number of failed spinal anesthesia instances was 14 (5.58%), with 1% of complete failures and 4% of partial failures. One patient was given spinal anesthesia for the 2nd attempt (0.4%), while the other two were given general anesthesia (0.79%). In failed spinal cases, sedation was utilized. Patients received varied dosages of midazolam, fentanyl, ketamine, and propofol.

Conclusion: The rate of failed spinal anesthesia among COVID 19 pregnant women was similar to, even lower than, the rate of failed spinal anesthesia in the general population. Despite all the negative consequences, such as wearing PPE and moving around, vision and hearing problems due to PPE, anesthesiologist fear about being infected by the patient or patient anxiety about infection, the future and babies' health is the reason for this result.

Keywords: SARS-CoV-2 (COVID-19), spinal anesthesia, obstetrical anesthesia

INTRODUCTION

All anesthesiologists face a challenge when it comes to the anesthesia of patients with coronavirus disease who are going to have a cesarian section. Patients' and healthcare personnel' safety should be prioritized. Non-emergent procedures in patients with respiratory infections, such as COVID-19, should be postponed and rescheduled once the infection has been treated. However, some emergency treatments, such as cesarian section, cannot be postponed.

Furthermore, general anesthesia, which requires aerosol-generating procedures such as ventilating and intubating patients, has a higher risk of respiratory problems during or after surgery than regional anesthesia. (1, 2, 3) Another important point is that, when compared to those who are not exposed to tracheal intubation, the transfer of acute respiratory infection to a health care professional during tracheal intubation is 6.6 times higher (4).

For such reasons, the European and American Societies of Regional Anesthesia jointly issued COVID 19 recommendations stating that regional anesthesia should be preferred over general anesthesia whenever possible, and practice recommendations for regional anesthesia during the pandemic have already been published (5).

In many facilities, single-shot spinal anesthesia is the preferred method for cesarian section. It delivers great anesthesia because of its ease of use, rapid onset of sensory and motor blockage, reliability, ease of mastering, and capacity to provide optimal surgical circumstances; it also minimizes the hazards of general anesthetic while enhancing partition satisfaction (6,7). In addition, when compared to general anesthesia, the risk of complications such intraoperative bleeding, surgical site infection, and postoperative pain is lower with spinal anesthesia (8).

Failed spinal anesthesia can be partial or complete. If anesthesia and analgesia are not achieved within ten minutes after successful intrathecal injection, the

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bupivacaine spinal anesthetic is regarded to have failed. Partial failure was defined as insufficient extent, quality, or duration of pharmacological action for that procedure, while complete failure was described as no sensory or motor blockage (9).

The failure rate of spinal anesthesia is widely distributed, according to researches, ranging from 1 to 17 percent. During spinal anesthesia, the Royal College of Anesthetics proposes a failure rate of 3% in emergencies and 1% for elective procedures (10,11,12).

The goal of this study was to determine our failure rate for spinal anesthesia in the context of a COVID 19 pandemic.

MATERIAL AND METHOD

The study was initiated with the approval of the Ankara City Hospital Ethics Committee (Date: 17.11.2021, Decision No: E1-21-2116). All procedures were performed adhered to the ethical rules and the Helsinki Declaration of Principles.

Study Design

After receiving approval from the local ethics committee and permission to use the hospital archives, we included records of spinal anesthesia performed on confirmed COVID 19 patients in the Ankara City Hospital between April 2020 and February 2021, as well as related data, in our study. Patients who did not have their data gathered, or whose operation took more than 3 hours due to any reason, were excluded from the study.

The absence of block formation despite delivery of the anesthetic agent, the requirement for sedation to complete the surgery, converting to general anesthesia, or re-performing spinal anesthesia were all defined as spinal anesthesia failure using data from patient files and anesthesia records. So, we invented the term "failed block" to describe spinal anesthesia that was attempted but failed to produce a block (full failed block) or a block that was insufficient (partial failed block). The age of the patients, ASA status, gestational week, surgical emergency, co-morbidities, COVID 19 infection symptoms, and the amount of medicine utilized during spinal or sedation, Bromage scales of lower extremity of the patients were all documented.

Cesarian delivery urgency was classified as "emergent," indicating a threat to the mother or fetus that necessitates immediate delivery; "urgent," indicating a need for delivery within 30 minutes in situations where there is no immediate threat to the mother or fetus, but maternal or fetal compromise may be expected if spontaneous delivery is delayed; "Elective," suggesting that an early cesarean delivery is required, that no maternal or fetal compromise exists, and that the cesarean delivery should take place at a time that is convenient for the patient and labor and delivery staff (13,14,15).

RESULTS

The study included 251 patients. The overall number of failed spinal anesthetic cases was 14 (5,58%). One patient had spinal anesthesia again (0,4 %), while the other two received general anesthesia (0,79 %). Resting 11 patients were sedated with analgesic and hypnotic agents. Patients in the successful and unsuccessful spinal block groups had similar demographic data and used the same bupivacaine dose (**Table 1**). All the women were in their third trimester of pregnancy.

Table. Properties of patients with succesful and failed spinal block

	Successful Spinals	Failed Spinals	p
Age (years)	29,35±5,13 (16-45)	29,86±6,76 (18-41)	0,72
Height (cms)	162,87±7,64 (150-180)	167,33±8,03 (158-172)	0,34
Weight (kgs)	82,83±17,01 (52-161)	88,00±4,46 (85-93)	0,60
Gestational age (weeks)	37,13±2,62 (27-41)	38,14±1,17 (36-40)	0,14
Bupivacaine dose (mgs)	12,59±1.02 (10-15)	12,93±1,37 (12-15)	0,24
Data expressed mean±SD, and (min-max)			

Sedation was used in unsuccessful spinal cases. Midazolam, fentanyl, ketamine, and propofol were combined in varying amounts in 11 of 14 patients.

All the patients who had failed spinal anesthesia were emergent cesarean sections.

DISCUSSIONS

Our study is the first one in the literature which was conducted to determine the incidence and associated factors of failed spinal anesthesia among COVID 19 positive women who underwent a cesarean section. In this retrospective analysis, we used a failed term to describe spinal anesthesia that was attempted but failed to produce a complete block or a partial block. Our findings revealed that 14 out of 251 pregnant women treated by obstetric-specialized anesthesiologists had failed spinal anesthesia. The incidence rate was 5,8 %. And midazolam, propofol, fentanyl, and ketamine were used to sedate 4,4 percent of unsuccessful instances. 2 of the patients were converted to general anesthesia with endotracheal intubation (0,79 %), and 1 was treated with repeated spinal (0,4 %). According to the Royal College of Anesthesiologists (RCOA), the acceptable conversion rate from spinal to general anesthesia in obstetric anesthetic treatment should be less than 1% for elective CS and less than 3% for emergency CS (16). Our findings

suggest conversion rates that are similar to or even lower than the RCOA's target.

The failure rate of spinal anesthesia for elective procedures was 8.7%, and 9.3% for emergency sections, according to Rukewe et al (17). All of our cases were emergencies, and our failure spinal anesthetic rate was 5.8%. Our result, on the other hand, is outside the acceptable range of 0-4 % stated by previous researchers. (6,12, 17-19).

In our study, we found that patients who need supplemental analgesia to complete the surgery begin with a spinal block rate was 4,4 % and was comparable with the 5,7 % reported by Rukewe et al. (17) and % 4,1 reported by Sngb et al. (20). And our result was nearly half of the Gary and Davies (21) study results (10,9 %).

All spinal anesthesia in our study was performed by obstetric anesthesiologists with at least 5 years of full-time obstetric clinic experience and common sense about complications; our failure rate (5.8%) was comparable to the RCOA's predictions. Despite stringent precautions, there is a high chance of contamination and becoming a possible patient or infector during the COVID 19 pandemic. Anxiety and fear are the results of feelings (22). Regardless of how senior the obstetrician anesthesiologist was, this worry, or anxiety may have contributed to the failed spinal anesthesia. Since there was no resident anesthesiologists' group to compare the outcomes with, this may be a disadvantage of our study.

The operation rooms in our hospital are positive-pressure rooms. We use Level III PPE for infection control, which includes a disposable surgical cap, medical protection mask, goggles or face shields, surgical scrubs, gowns, disposable surgical gloves, and disposable foot rubbers. The most common problems associated with using PPE kits were excessive sweating (100%), fogging of goggles, spectacles, or face shields (88%), suffocation (83%), breathlessness (61%), fatigue (75%), headache due to prolonged use (28%), and pressure marks on the skin in one or more areas of repeated use (19%) (23). Although we use PPE to prevent infection, it has a negative impact on our lives. Limitation of movement due to foot rubbers, loss of vision because of the fogging over the surface of goggles or sheets, and most importantly communication problems with the patient because of the masks, cap and rubbers especially positioning during spinal anesthesia could be other factors for the failed spinal anesthesia procedures.

In some studies, they discovered that injecting less than 2 ml of local anesthetics was linked to failed spinal anesthesia without the use of adjuvants (24). However, because we administered at least 12,5 mg of bupivacaine in our investigation, this reason could not be the source of our failed anesthesia rates.

Intraabdominal pressure increases with gestational age, which may increase intrathecal medication dissemination throughout pregnancy, Henos et al. (24) and Adesope et al. (25) discovered that the spinal failure rate dropped as gestational age increased. All the failed spinal anesthesia patients in our study were in their third trimester. Only one of the patients was 36 weeks pregnant, and the others were bigger.

We use a 26-gauge atraucon spinal needle in our clinic because it has a greater rate of successfully identifying the subarachnoid space on the first attempt, faster CSF backflow, less postdural puncture headaches, and less paresthesia than other spinal needles (26,27) Smaller spinal needles, according to some studies, may lead to more spinal attempts and increase the probability of failure (19, 24). However, we did not repeat the spinal attempts to create failure in our work.

Furthermore, studies have shown that parturients who were operated by the resident obstetricians had a higher risk of spinal anesthesia failure during surgery than those who were operated on by senior surgeons (24). Inexperienced hands may manipulate the upper sites of adjacent structures to the uterus, as well as take a long time to operate, allowing the block to resolve. Unfortunately, we did not identify the surgeon's seniority in our research, although there were no changes in surgery times.

The drug's action on the spinal nerve root is one of the failure mechanisms of spinal anesthesia. However, because failure did not occur with just one batch of the drug, our failure was random. If one batch of the drug was defective, all patients who received that batch should have failed at the same time.

In a single patient, we repeated spinal anesthesia for a failed spinal block and no complications were seen. But the studies suggest that repeat injection after a failed spinal can be potentially unsafe (28,29).

CONCLUSION

Although spinal anesthesia is the preferred method for COVID 19 confirmed cases, failed anesthesia can occur for a variety of reasons. The reason could be technical, but we should also consider other factors during COVID 19 pandemic, such as the patient's and anesthesiologist's anxiety, as well as personal equipment issues. Despite these disadvantages, the team's most senior anesthesiologist must be the one in charge, because quick response in difficulties or emergencies requires clinical experience and common sense, and in this way failure rates are comparable to those of normal pregnant women. Resident anesthesiologists, like senior anesthesiologists, must adapt to these new normals and

medical conditions as we become accustomed to living with COVID 19 disease.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was initiated with the approval of the Ankara City Hospital Ethics Committee (Date: 17.11.2021, Decision No: E1-21-2116).

Informed Consent: The study was designed retrospectively; no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer- reviewed.

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

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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