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Research Article

Comparison of Anesthesia Techniques Used in Cesarean Deliveries on the Neonate - Anesthesia Techniques and Neonate -

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ABSTRACT

Introduction: Though there are many studies on the effects of anesthesia methods used for cesarean section on the newborn, research on this topic still continues. In our prospective observational study, we investigated the effects of different anesthesia techniques used in routine cesarean deliveries on early neonatal outcomes in our hospital.

Methods: This prospective, observational, randomized study included a total of 222 ASA II risk group pregnant women undergoing elective cesarean section at term (38-41 weeks' gestation) without fetal distress. The women were randomized into three groups. In the general anesthesia with propofol group (Group P, n = 74), anesthesia was induced with 2 mg·kg⁻¹ propofol and 0.6-0.9 mg·kg⁻¹ rocuronium. In the general anesthesia with thiopental sodium group (Group T, n = 74), anesthesia was induced with 5 mg·kg⁻¹ thiopental sodium and 0.6-0.9 mg·kg⁻¹ rocuronium. Women in the spinal anesthesia group (Group SA, n = 74) were administered 0.5% (10 mg) hypertonic bupivacaine and 10 mcg fentanyl.

Results: There were no significant differences between Group SA, Group P, and Group T in terms of delivery time; neonatal 1- and 5-min Apgar scores; neonatal jaundice rates; neonatal systolic, diastolic, or mean blood pressure or peak heart rate; neonatal intensive care requirement; pH, PCO₂, PO₂ values in cord blood gas; or neonatal glucose and lactate values. The rate of ephedrine use was significantly higher in Group SA than in Group P and Group T. Maternal satisfaction score was higher in Group SA at postoperative 4 hours and in Group P at 24 hours. The number of newborns taken into intensive care unit in Group T was significantly higher in the 1st hour, 4th hour, 5th hour and total. Respectively p value (0.006, 0,048, 0,048, and 0,005).

Conclusion: None of the three anesthesia methods showed superiority after elective cesarean delivery. However, spinal anesthesia and general anesthesia with propofol are more appropriate for pregnant women in terms of effects on the neonate.

Keywords: Cesarean; General anesthesia; Spinal anesthesia; Apgar; Neonatal intensive care unit

INTRODUCTION

In general, cesarean delivery rates are increasing in both developed and developing countries worldwide [1]. It is reported that cesarean sections account for 14.3% of births in Holland, 16.5% in Finland, 17.1% in Norway, 23.4% in England, 26.6% in Canada, 32.3% in the USA, 38.5% in Italy, 43.9% in Mexico, and 52% of births in Turkey [2,3].

Anesthesiologists administering anesthesia for cesarean sections are responsible for the care of both the mother and baby. There are many factors involved when selecting the type of anesthesia for cesarean section, including the experience of the anesthesiologist, the mother's preference (to a degree), presence of maternal comorbidities, and the urgency of the procedure [4]. Propofol and thiopental sodium are induction agents commonly used for general anesthesia [5]. However, regional anesthesia has become more popular in recent years because it ensures postoperative analgesia, has less pronounced effects on the mother and fetus, enables an earlier return to daily life activities for the mother, and allows earlier interaction between mother and baby [6,7].

Regional and general anesthesia both have advantages and disadvantages when applied in cesarean sections. Advantages of spinal anesthesia are that the patient is conscious, there is no risk of aspiration, and it does not depress neonatal respiration. The most serious disadvantages of regional anesthesia are the potential for fetal acidosis and hypoxia as well as maternal postdural puncture headache. General anesthesia is superior to spinal anesthesia in terms of providing more rapid induction, better cardiovascular stability and respiration control, and the low likelihood of hypotensive attacks. However, aspiration of gastric contents and intubation difficulties are more common when using general anesthesia in pregnant women and comprise the main disadvantages of this method for cesarean sections [8,9].

Apgar score and cord blood gas analysis are parameters used to assess the well-being of the newborn [10]. Every newborn undergoes a clinical evaluation immediately after birth. The aim of

this assessment is to determine whether there is any condition that requires emergency intervention or special care, to detect any major or minor anatomic anomalies, and to record findings that establish a baseline for later examinations [11].

The ideal anesthesia method for cesarean section is that which is most reliable and comfortable for the mother, has the minimum depressant effects on the fetus, and ensures optimal conditions for the operation.

In this study, we aimed to assess the effects of different anesthesia methods used in cesarean section deliveries on neonatal Apgar score, umbilical venous blood gas and hemodynamic parameters, need for neonatal intensive care at birth and in the first 48 hours, neonatal jaundice, and maternal satisfaction at postoperative 4 and 24 hours.

MATERIALS AND METHODS

Ethical approval for the study was obtained from the Institutional Review Board of our local ethics committee (approval number: 2017/114). Written informed consent was obtained from all patients. In a performed study of Mancuso et al. (13); In the spinal anesthesia group, the rate of newborns who were depressed (APGAR < 7) according to APGAR evaluation at the 1st minute was 1.1%. It was 12.7% in general anesthesia group. In order to find a significant difference of 11,60% between the two groups, we determined the minimum number of subjects in each group as n = 74 while type 1 error was 0.05, type 2 error was 0.20 and power was 80%.

Exclusion criteria for the study included

1. Maternal cardiopulmonary disorders
2. Preeclampsia or eclampsia
3. Maternal history of alcohol or drug addiction
4. Multiple and/or preterm pregnancies
5. Fetal growth restriction
6. Maternal allergy to local anesthesia, abnormalities of bleeding/clotting time

7. Maternal liver or kidney disease
8. Maternal obesity (body mass index > 30)
9. Emergency surgery

Inclusion criteria for the study included

1. Planned elective cesarean section
2. Term pregnancy (38–41 weeks' gestation)
3. No fetal distress

Pregnant women in American Society of Anesthesiologists classification II were included

The study included 222 pregnant women aged 18 years and older at 38–41 weeks' gestation. Demographic data of the participants were recorded. Systolic and diastolic blood pressures were measured after resting in a seated position for 10 minutes. Mean Arterial Blood Pressure (MAP) was calculated as $2/3 \times \text{diastolic blood pressure} + 1/3 \times \text{systolic blood pressure}$. Body Mass Index (BMI) was calculated as weight (kg) divided by the square of the height (m^2). None of the participants were administered premedication. Women were taken into the routine operating room and had electrocardiography, noninvasive blood pressure, and pulse oximetry (SpO_2) monitoring. A venous route was opened in the antecubital vein with a 20-gauge (G) venous cannula. Physiological serum infusion was initiated at 10 mL/kg/h. All women had preoxygenation with 100% oxygen at 2–4 L·min⁻¹ for 3 minutes. The women were then randomly divided into three groups before operating room. Randomization was performed according to the table we prepared on the computer and the anesthesiologist performing induction or spinal anesthesia left the room where another anesthesiologist came. The anesthesiologist who came after general anesthesia induction or spinal anesthesia did not know that the patient was a study patient. The neonatal specialist who evaluated the newborn's APGAR scores did not know which anesthesia technique had been used. After the newborn was delivered to the Neonatal Intensive Care Unit (NICU), the neonatal specialist did not know that the mother of the newborn had undergone surgical anesthesia.

Group P

In the general anesthesia with propofol group (Group P, n = 74), anesthesia was induced with 2 mg·kg⁻¹ propofol and 0.6–0.9 mg·kg⁻¹ rocuronium.

Group T

In the general anesthesia with thiopental sodium (Group T, n = 574) group, anesthesia was induced with 5 mg·kg⁻¹ thiopental sodium and 0.6–0.9 mg·kg⁻¹ rocuronium.

In all cases, endotracheal intubation was performed after muscle relaxant with cricoid compression. All women had volume-controlled ventilation with a Datex-Ohmeda S/5 Avance device set to a tidal volume of 6–8 mL·kg⁻¹ and respiration frequency of 10–12/min. Anesthesia maintenance was achieved with 1% sevoflurane administered with FiO_2 of 50%. If necessary, an additional dose of 0.15 mg·kg⁻¹ rocuronium muscle relaxant was administered.

Group SA

Women in the spinal anesthesia group (Group SA, n = 74) were placed in left flank position or sitting position. Staining was

done under sterile conditions. A spinal needle (25-G Quincke) was slowly advanced in the L4-5 or L3-4 interspace until free CSF flow was observed. Spinal anesthesia was administered with previously prepared 10 mg 0.5% hypertonic bupivacaine (Marcain Heavy®) and 10 mcg fentanyl. Sensory block level was assessed with the pin-prick test and motor block level was assessed with the Bromage scale. When sensory block had reached sufficient levels (T4), the operation was started. For the entire duration of the operation, 100% oxygen support at a rate of 1 L·min⁻¹ was provided via mask.

After delivery of the baby, all pregnant women were administered 20 International Units (IU) of oxytocin in 500 mL of 0.9% saline at an infusion rate of 500 mL/h. The women were administered an Intravenous (IV) bolus of 10 units oxytocin and 15 units oxytocin crystalloid infusion. Both general anesthesia groups (groups P and T) received an additional 1–2 $\mu\text{g}\cdot\text{kg}^{-1}$ dose of fentanyl. All women who developed hypotension ($\text{MAP} < 50$ mmHg and Pulmonary Hypertension [$\text{PHR}] < 50$ mmHg) were given 5mg iv ephedrine and 0.5 mg iv atropine.

To ensure postoperative analgesia for patients with general anesthesia, 1 mg·kg⁻¹ tramadol hydrochloride (Contramal, Abdi İbrahim İlaç San. ve Tic. A.Ş., İstanbul) and 1 g iv paracetamol were administered while suturing the womb. Anesthetic agents were discontinued when skin suturing began.

The patients' age (years), duration of delivery (defined as the time between skin incision and cord clamping), and number of patients given ephedrine were recorded. After cord clamping, the obstetrician obtained an umbilical vein blood sample for blood gas analysis (using a Medica Easy Blood Gas device) and pH, PO_2 , PCO_2 , glucose, and lactate values were noted. Neonatal evaluation was performed by a pediatrician and 1- and 5-minute Apgar scores were recorded. The effect of anesthesia method on neonatal hemodynamics was assessed by measuring peak heart rate and systolic, diastolic, and mean blood pressures. Groups were compared in terms of NICU admissions in the first 48 hours and rates of neonatal jaundice. Mothers were asked to rate their satisfaction with their medical care on a Visual Analog Patient Satisfaction Scale (VAPSS) at 4 and 24 hours postoperatively. This scale is a straight vertical line marked from 1 point ("not satisfied at all") to 10 points ("very satisfied").

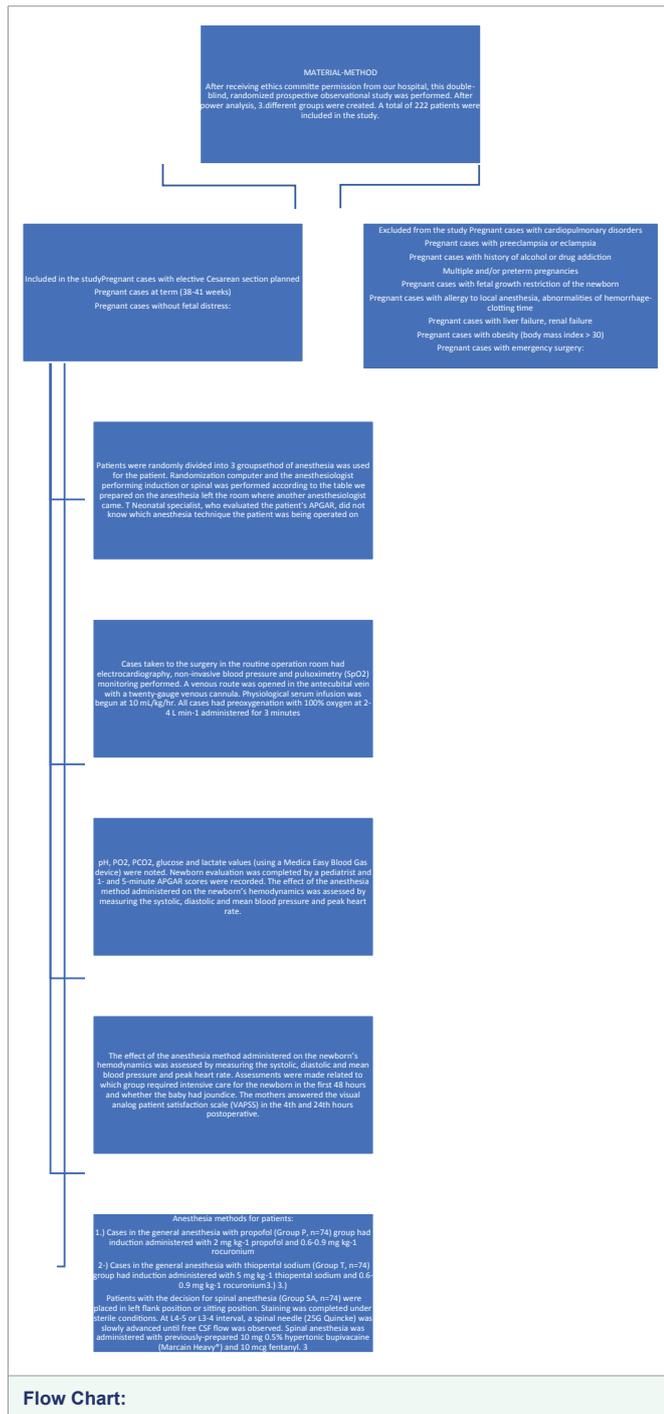
Flow Chart:

STATISTICAL ANALYSIS

The study data were analyzed using SPSS 22.0 program (IBM SPSS Statistics for Windows, Version 22.0. IBM Corp, Armonk, NY). We evaluated the normality of data distributions with Shapiro-Wilk test. Normally distributed data were compared with one-way ANOVA and Tukey test was used to find the groups responsible for significant differences. Data were expressed as mean \pm standard deviation (SD). Data that did not show normal distribution were evaluated by Kruskal-Wallis test and Mann-Whitney U was used to identify the different group. Data were expressed as median and minimum-maximum values. Chi-square test was used to evaluate categorical data and Fisher's exact test was used to identify the different group. $P < 0.05$ was considered statistically significant in all comparisons.

RESULTS

Maternal and neonatal demographic and clinical data are presented in tables 1 and 2.



There were no significant differences between Group SA, Group T, and Group P in terms of age, delivery time, 1- and 5-min Apgar scores, number of births, systolic pressure, diastolic pressure, MAP, PHR, cord blood pH, PCO₂, and PO₂, neonatal blood glucose and lactate values, neonatal jaundice rate, or need for neonatal intensive care ($p > 0.05$) (Table 2).

The ephedrine rate was significantly higher in Group SA than in Groups P and T ($p < 0.05$). There was no significant difference in the ephedrine rates between Groups P and T groups ($p > 0.05$) (Table 2).

Maternal postoperative 4-h VAPSS score was significantly higher in Group SA than in Groups P and Group T ($p < 0.05$), but did not differ significantly between Groups P and T (Table 2).

Maternal postoperative 24-h VAPSS score was significantly lower in Group SA than in Group P ($p = 0.006$). Maternal postoperative 24-h VAPSS score was significantly higher in Group P when Group SA was compared to Group P ($p = 0.013$) but There was no significant difference between Group P and Group T ($p = 0.619$).

Compared to acceptance time to neonatal intensive care unit and the number of newborns are given in Table 3. The number of newborns taken into intensive care unit in Group T was significantly higher in the 1st hour, 4th hour, 5th hour and total. Respectively p value (0.006, 0,048, 0,048, and 0,005).

DISCUSSION

Considering most pregnant women are young and healthy individuals, the safety of the mother and baby carries great importance for obstetric anesthesia.

While patient safety and comfort and the provision of favorable operating conditions are the priorities for all surgical anesthesia, with obstetric anesthesia and analgesia, the potential effects on mother and baby must also be considered. Though most women giving birth are young and healthy, their surgical and obstetric risks can be increased substantially by pregnancy, maternal changes, and existing medical conditions [12].

One of the anesthesia methods used for cesarean sections is general anesthesia. As the medications used may cross the placenta and affect the fetus, neonatal Apgar scores may be low. Additionally, maternal hypotension caused by regional anesthesia may affect uteroplacental blood flow, causing fetal acidosis, asphyxia, and subsequent low Apgar scores. Many studies comparing regional anesthesia with general anesthesia for elective cesarean sections have demonstrated that regional anesthesia is superior in terms of effects on the baby [13-14].

Kim et al. reported that spinal anesthesia was increasingly used for elective cesarean sections due to its more favorable effect on neonatal Apgar scores [15]. A study by Saygı et al. [16] showed that for elective cases, spinal anesthesia was superior to general anesthesia in terms of postoperative comfort, and the authors concluded that spinal anesthesia was preferable for pregnancies at risk of fetal stress based on 1-min Apgar score. Mancuso et al. and Abdullah et al. reported significantly higher 1- and 5-min APGAR scores in newborns born under spinal anesthesia [13,17]. Severe preeclamptic mothers receiving general anesthesia and their babies required more critical care support. Maternal as well as neonatal mortality was also reported to be significantly higher with general anesthesia [18].

In our study, comparison of 1- and 5-min Apgar scores in the general anesthesia (Group P, Group T) and spinal anesthesia (Group SA) groups showed that Apgar score was significantly higher at 5 min than at 1 min in both of the general anesthesia groups. This suggests that both anesthesia techniques affect the fetus to some degree, but the effect is short-lived and reversible. Although there was no statistically significant difference in our study, the spinal anesthesia group had the best 1- and 5-min Apgar scores.

Mahjoobifard et al. [19] compared propofol and thiopental induction in pregnant women and stated 1- and 5-min Apgar scores were clearly higher in the propofol group. Another clinical study emphasized that the use of propofol or thiopental for induction had similar effects on Apgar scores and cord blood gas values [20]. In our study, we observed that 1- and 5-min Apgar scores were slightly

Table 1: Demographic and clinical data of the mothers (Mean \pm SD and Min-Max, n = 222).

| | Min-Max | | | Median | Mean \pm s.d./n-% | | |
|---------------------------------|---------|---|-------|--------|---------------------|-------|--------|
| Age (Year) | 18.0 | - | 45.0 | 32.0 | 31.5 | \pm | 6.1 |
| Delivery time (Hour) | 4.0 | - | 12.0 | 8.0 | 8.3 | \pm | 1.8 |
| Apgar 1 | 1.0 | - | 9.0 | 8.0 | 7.9 | \pm | 1.3 |
| Apgar 5 | 6.0 | - | 10.0 | 9.0 | 9.0 | \pm | 0.8 |
| Birth number | 1.0 | - | 7.0 | 2.0 | 2.5 | \pm | 1.2 |
| Systolic pressure (mmHg) | 40.0 | - | 82.0 | 58.5 | 59.1 | \pm | 10.0 |
| Diastolic pressure (mmHg) | 13.0 | - | 50.0 | 31.5 | 31.9 | \pm | 7.9 |
| Mean pressure (mmHg) | 25.0 | - | 68.0 | 42.0 | 43.1 | \pm | 8.8 |
| PHR (mmHg) | 100.0 | - | 170.0 | 135.0 | 132.4 | \pm | 18.2 |
| PH | 7.2 | - | 7.5 | 7.3 | 7.3 | \pm | 0.1 |
| PCO ₂ (mmHg) | 24.6 | - | 67.0 | 46.0 | 45.2 | \pm | 7.7 |
| PO ₂ (mmHg) | 9.8 | - | 122.0 | 31.8 | 33.9 | \pm | 15.3 |
| Glucose (g dL ⁻¹) | 30.0 | - | 154.0 | 71.0 | 72.4 | \pm | 20.3 |
| Lactate (mmol L ⁻¹) | 0.4 | - | 5.3 | 1.6 | 1.7 | \pm | 0.8 |
| Icterus | (-) | | | | 208 | | 93.7% |
| | (+) | | | | 14 | | 6.3% |
| ICU | (-) | | | | 189 | | 85.13% |
| | (+) | | | | 33 | | 14.87% |
| Ephedrine | (-) | | | | 195 | | 87.83% |
| | (+) | | | | 27 | | 12.16% |
| Mat VAPSS 4.H | 6 | - | 9 | 7.0 | 7.4 | \pm | 1.0 |
| Mat VAPSS 24 H | 7 | - | 9 | 8.5 | 8.4 | \pm | 0.7 |

Mat VAPSS: Mathernal Visual Analog Patient Satisfaction Scale

ICU: Intensive Care Unit

HT: Hearth Rate

PHR: Pulmonary Hypertension

H: Hour

better in Group P compared to Group T. In fact, the 5-min Apgar score in Group P was equal to that of Group SA.

Currently, propofol is the standard agent for anesthesia induction, leading some authors to question the future use of thiopental for obstetric anesthesia [21,22]. Thiopental has certain disadvantages, including reducing maternal arterial blood pressure [23]. As a result, thiopental usage has declined in many countries [24,25]. Participants in a survey of anesthesiologists in England found 60% stated they used propofol. In most large centers in the USA, propofol is the preferred agent for general anesthesia [26]. In our study, we observed that both Apgar score slightly better in Group T and postoperative need for neonatal intensive care were statistically significant higher in Group T compared to Group P. Our results demonstrate that both general anesthesia administered with propofol and regional anesthesia are reliable methods for the mother and baby.

Umbilical cord blood gas analysis is used to assess for perinatal asphyxia and temporary tachypnea in newborns. Studies show that for normal term neonates, umbilical cord blood gas pH values should be higher than 7.25. Traditionally, cord blood gas pH value lower than 7.20 is assessed as pathologic acidemia [27].

In their 2019 study, Rimsza et al. [28] reported that longer spinal anesthesia to delivery time and uterine incision to delivery time

were associated with decreased umbilical arterial pH in planned term cesarean deliveries. Efforts to minimize predelivery time following spinal anesthesia injection could reduce the frequency of unanticipated neonatal acidemia. In our study, the umbilical cord pH value was significantly lower in the general anesthesia group and higher (7.40) in the spinal anesthesia group. However, as the pH in the general anesthesia group was 7.30 (within normal range), it was not found to be clinically significant.

The negative effects of general anesthesia on newborns are discussed in three facets. The first is that the induction agents, opioids, and volatile anesthetics used in general anesthesia cross the placenta and depress the cardiorespiratory system, resulting in lower neonatal Apgar score and greater need for resuscitation and respiratory support. The second is longer NICU stays, and the third is that umbilical cord pH is generally lower in the general anesthesia group compared to the regional anesthesia group [29].

During spinal anesthesia for cesarean sections, both phenylephrine and ephedrine are used for maternal blood pressure control. As phenylephrine is not available in Turkey, only ephedrine was used. Ephedrine is a vasopressor chosen for obstetric anesthesia because it protects uteroplacental blood flow and can be used as iv bolus or infusion as well as prophylactically [30]. Many studies have



Table 2: Compared of demographic and clinical data of newborns in groups (Mean ± SD and n%).

| | Group SA (n=74) | | | Group P (n=74) | | | Group T (n=74) | | | P |
|--------------------------------|-----------------|--------|--------|-----------------|--------|--|-----------------|--------|--|---------------------|
| | Mean ± s.d./n-% | Median | | Mean ± s.d./n-% | Median | | Mean ± s.d./n-% | Median | | |
| Age (week) | 31.1 ± 6.4 | 32.0 | | 31.3 ± 6.4 | 30.5 | | 32.1 ± 5.8 | 32.0 | | 0.763 ^κ |
| Delivery time (h) | 8.6 ± 1.7 | 9.0 | | 8.0 ± 2.0 | 8.0 | | 8.3 ± 1.7 | 8.0 | | 0.475 ^κ |
| Apgar 1 min | 8.3 ± 0.8 | 8.0 | | 7.8 ± 1.4 | 8.0 | | 7.5 ± 1.6 | 8.0 | | 0.091 ^κ |
| Apgar 5 min | 9.2 ± 0.7 | 9.0 | | 9.2 ± 0.7 | 9.0 | | 8.6 ± 1.0 | 9.0 | | 0.052 ^κ |
| Birth number | 2.4 ± 1.0 | 2.0 | | 2.8 ± 1.4 | 3.0 | | 2.5 ± 1.2 | 2.0 | | 0.490 ^κ |
| SP (mmHg) | 58.7 ± 11.1 | 58.0 | | 56.4 ± 8.9 | 56.0 | | 62.2 ± 9.5 | 61.5 | | 0.055 ^κ |
| DP (mmHg) | 32.8 ± 9.1 | 32.0 | | 29.8 ± 5.8 | 30.0 | | 33.2 ± 8.2 | 34.5 | | 0.162 ^κ |
| MP (mmHg) | 44.1 ± 10.7 | 44.0 | | 40.5 ± 6.7 | 41.5 | | 44.7 ± 8.2 | 43.0 | | 0.206 ^κ |
| HR(mmHg) | 131.2 ± 19.6 | 134.0 | | 135.7 ± 21.6 | 140.0 | | 130.4 ± 12.0 | 131.0 | | 0.176 ^κ |
| PH | 7.4 ± 0.0 | 7.4 | | 7.3 ± 0.1 | 7.3 | | 7.3 ± 0.1 | 7.3 | | 0.087 ^κ |
| PCO ₂ (mmHg) | 43.5 ± 6.4 | 44.1 | | 46.3 ± 8.6 | 45.5 | | 45.9 ± 8.1 | 46.8 | | 0.199 ^κ |
| PO ₂ (mmHg) | 32.1 ± 11.6 | 29.1 | | 39.7 ± 20.5 | 37.5 | | 29.8 ± 10.3 | 23.5 | | 0.029 ^κ |
| Glucose (g dL ⁻¹) | 73.1 ± 20.0 | 72.0 | | 79.1 ± 24.3 | 72.5 | | 65.0 ± 12.9 | 69.0 | | 0.109 ^κ |
| Lactate(mmol L ⁻¹) | 1.7 ± 0.7 | 1.6 | | 1.9 ± 0.9 | 1.7 | | 1.5 ± 0.6 | 1.4 | | 0.208 ^κ |
| Icterus | (-) | 69 | 93.24% | 71 | 95.94% | | 69 | 93.24% | | 0,808 ^{χ²} |
| | (+) | 5 | 6,75% | 3 | 4,05% | | 5 | 6,75% | | |
| ICU | (-) | 66 | 89.18% | 69 | 93.24% | | 56 | 75.67% | | 0,182 ^{χ²} |
| | (+) | 8 | 10.81% | 5 | 6.75% | | 18 | 24.32% | | |
| Ephedrine | (-) | 48 | 64.86% | 74 | 100.0% | | 74 | 100.0% | | 0,000 ^{χ²} |
| | (+) | 26 | 35.13% | 0 | 0.0%* | | 0 | 0.0%* | | |
| Mat VAPSS 4 H. | 8.3 ± 1.0 | 9.0 | | 7.0 ± 0.6* | 7.0 | | 6.9 ± 0.5* | 7.00 | | 0.000 ^κ |
| Mat VAPSS 24.H | 8.1 ± 0.6 | 8.0 | | 8.7 ± 0.4* | 9.0 | | 8.4 ± 0.8 | 9.00 | | 0.006 ^κ |

^κ Kruskal-wallis (Mann-whitney u test)/^{χ²} chi-squar test

* Difference with Group SA $p < 0.05$

SP: Systolic Pressure

DP: Dyastolic Pressure

MP: Mean Presssure

HT: Hearth Rate

ICU: Intensive Care Unit

Mat VAPSS: Mathernal Visual Analog Patient Satisfaction Scale

H: Hour

Table 3: Comparison of neonatal admissions during the first 48 hours by treatment group (n %).

| | At birth | | 1 st Hour | | 2 nd Hour | | 3 rd Hour | | 4 th Hour | | 5 th Hour | | Total number of the newborns | |
|----------|--------------|------------|----------------------|------------|----------------------|------------|----------------------|---|----------------------|------------|----------------------|------------|------------------------------|--------------|
| | - | + | - | + | - | + | - | + | - | + | - | + | - | + |
| Group SA | 69 93.24% | 5 6,75% | 74 100% | 0 | 71 95.94% | 3 4.05% | 74 100% | 0 | 74 100% | 0 | 74 100% | 0 | 66 89.18% | 8 10.81% |
| Group P | 71 95.94% | 3 4.05% | 74 100% | 0 | 71 95.94% | 3 4.05% | 74 100% | 0 | 74 100% | 0 | 74 100% | 0 | 68 91.89% | 6 8.10% |
| Group T | 69 93.24% | 5 6,75% | 69 93.24% | 5 6,75% | 71 95.94% | 3 4.05% | 74 100% | 0 | 71 95.94% | 3 4.05% | 71 95.94% | 3 4.05% | 55 74.32% | 19 25.67% |
| p | 0,721 | | *0,006 | | 1 | | 1 | | *0,048 | | *0,048 | | *0,005 | |

-: Not newborn in newborn intensive care unit

+: Newborn in newborn intensive care unit

*statistically significant

shown that vasopressors are more effective in preventing hypotension developing after spinal anesthesia compared to colloid and crystalloids administered 15-20 minutes before the operation [30,31]. In our study, 10 mL/kg crystalloid fluid infusion was initiated for patients assigned to the spinal anesthesia group. Hypotension developed in 36% of patients. In our study, hypotension and ephedrine use were

only present in the group administered spinal anesthesia. In terms of umbilical vein pH values, we believe the reason for the lack of difference between the groups was that regional anesthesia was administered after ensuring good hydration with prophylactic fluid loading, and hypotension was treated immediately with ephedrine. As a result, though the number of patients with hypotension was high

in the spinal anesthesia group, we believe there was no difference in newborn Apgar scores and blood gas analyses because it was rapidly treated.

In our literature search, we did not encounter any study comparing anesthesia methods in terms of NICU requirement in the first 48 hours. In our study, the percentage of patients requiring intensive care was 14.86% with significant differences between the groups, though we observed 25.67% of newborns in Group T required intensive care. When we examined the reasons for NICU admission, one baby was monitored for 33 days with a prediagnosis of sepsis after being intubated due to low Apgar score and was then discharged. The second baby was intubated due to respiratory distress and was discharged after 7 days of intubation. The third baby was supported with Continuous Positive Airway Pressure (CPAP) on day 2 due to respiratory distress and was discharged. The fourth baby was monitored for 24 hours in for close surveillance and then discharged. In Group SA, 10.81% of babies were monitored in the NICU, with 1 baby intubated due to respiratory distress and discharged after day 6. Another baby was monitored in the NICU for close surveillance and then discharged. In Group P, 8.10% of babies were monitored in the NICU. One baby was supported with CPAP due to respiratory distress. One baby was closely monitored for 24 hours and then discharged. None of the babies died. Based on the results of our study, the statistically significant higher rate (25.61%) of NICU admission in Group T suggests that newborns born to women who receive thiopental should be closely monitored.

Risk factors for neonatal jaundice in the first 24 hours include blood group incompatibility, G6PD deficiency, polycythemia, cephalic hematoma, diabetic mother, excessive weight loss, breastfeeding, male sex, sibling history of receiving phototherapy, trisomy 21, and induction with oxytocin [32]. At least two-thirds of newborns are known to have clinical jaundice within the first week [33]. In our study, jaundice was not observed in the first 24 hours and was detected in 5 newborns at 48-60 hours. There was no difference between the groups.

A study on reasons for choosing elective cesarean section among women in Turkey revealed that fear of vaginal delivery was the most common reason, cited by 45.2% of the women [34]. The VAPSS was developed by Singer et al. [35]. The main features of the VAPSS are that it is easily understood and can be applied by anyone to all patient groups. It is a simple scale that does not aim to identify the components of satisfaction. As it does not contain questions that are unique to any disease or may be affected by the health system, it can be applied to all patient groups in all languages and geographies. The most important aspect of applying the VAPSS is that the patient must understand what being satisfied involves when asked; in other words, they must understand whether or not they are satisfied with what they are asked about, which is generally the medical care they received. Patients are not asked to assess the performance of any doctor, nurse, or health organization. Instead, they must identify their overall satisfaction by synthesizing all health care-related components that affect them and find the point equivalent to this on the line. In our study, postoperative 4-h VAPSS score was significantly lower in Group SA compared to the Group P and Group T ($p < 0.05$), while there was no difference between Groups P and Group T ($p > 0.05$) (Table 2). At postoperative 24 h, VAPSS score was significantly lower in Group SA compared to Group P ($p < 0.05$), while the score in Group T did not differ significantly from other groups (Table 2).

Postoperative 4-h VAPSS score was better in Group SA, while the 24th-hour VAPSS score was better in the Group P.

In conclusion, none of the three anesthesia methods showed superiority in the postoperative period after elective cesarean section deliveries. However, spinal anesthesia and general anesthesia with propofol seem more appropriate for pregnant women in terms of their effects on the fetus. If general anesthesia was administered with thiopental, the close follow-up of the newborn in NICU was found to be significantly higher. The priorities for obstetric anesthesia are that the mother is safe and comfortable and that neonatal vital functions are good. The main factors determining anesthesia technique are the urgency of the procedure, maternal comorbidities and preference, and the experience of the anesthesiologist.

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