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The Role of Anesthesia in Enhancing Maternal and Fetal Outcomes in Cesarean Deliveries

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Abstract: Background and Purpose: The type of anesthesia utilized during cesarean delivery has a considerable impact on maternal and fetal outcomes. Therefore, the present study is intended to compare general anesthesia and spinal anesthesia with respect to anesthetic maternal and neonatal perioperative outcomes. **Methods:** It was a cross-sectional study on 100 cesarean women, 50 of whom received GA, and 50 underwent SA. It collected data regarding demographic characteristics, pre-operative laboratory outcomes, surgical outcomes, postoperative complications, maternal satisfaction, and neonatal outcomes. **Results:** In comparison between anesthesia techniques (general and spinal), it enrolled clinical outcomes of 100 cases (50 under general vs 50 under spinal). Based on the general anesthesia group, we found that the duration of surgery was 45.3 ± 10.2 minutes, the duration of hospital stay was 5.2 ± 1.0 days, uterine atony incidence had 20%, post-cesarean complications had 40%, 40% of women were very satisfied, NICU admission got 16%, and low birth weight (<2500 g) was 8% of total women. Based on the spinal anesthesia group, the current outcomes shown that the duration of surgery was 38.1 ± 8.5 minutes, the duration of hospital stay was 3.8 ± 0.8 days, uterine atony incidence had 6%, post-cesarean complications had 26%, 80% of women were very satisfied, NICU admission got 4%. Low birth weight (<2500 g) was 4% of total women. **Conclusion:** SA showed superior maternal and newborn outcomes compared with GA in cesarean births, enabling speedier recovery and increased satisfaction in both mothers and fetuses.

Keywords: Cesarean section; Anesthesia techniques; Complications; APGAR Scores; and Health quality-life questionnaire.

INTRODUCTION

A popular surgical method of childbirth, cesarean delivery has special risks and issues for the health of the mother and fetus (Blanco & Lemaire, 2020; Gonzalez, *et al*., 2018; Huang, *et al*., 2019). Understanding the function of anesthesia in this setting has grown more crucial as the number of cesarean sections performed worldwide continues to climb (Koh, *et al*., 2021; Sharma, *et al*., 2021). In addition to making the surgical process easier, anesthesia has a big impact on the comfort, recuperation, and general results of the mother (Srinivasan, *et al*., 2020; Akbari, *et al*., 2017; Badrinath, *et al*., 2020). In addition to guaranteeing the fetus's safety and well-being, appropriate anesthetic procedures can lessen pain, lower stress levels, and increase maternal happiness (Beilin, *et al*., 2018; Brull & McCartney, 2020).

The type of anesthetic, whether general or spinal, influences the rate of recovery, the occurrence of complications, along with the relationship between the mother and fetus during and after the procedure, among other elements of the cesarean experience (Choi, *et al*., 2019; Chumbley, *et al*., 2021; Curtin, *et al*., 2017). Compared to general anesthesia, spinal anesthetic has been linked to better infant outcomes, less blood loss, and lower mother morbidity (Farrugia, *et al*., 2020).

PATIENTS AND METHODS

Study Design:

In this current study, 100 pregnant women who underwent elective and emergency cesarean deliveries at different hospitals in Baghdad, Iraq, between July 2024 and July 2025 were divided into two groups according to the type of anesthesia: general anesthesia (GA group, N=50) and spinal anesthesia (SA group, N=50). Information about the patient's demographics, laboratory results, surgical specifics, and postoperative complications was gathered from hospital records.

Inclusion Criteria:

Women between the ages of 25 and 35 had single pregnancies, planned cesarean deliveries, and informed agreement on the kind of anesthetic.

Exclusion Criteria:

Spinal anesthetic contraindications; emergency caesarean births necessitating prompt attention; and any serious co-morbid conditions impacting results.

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Statistical analysis

The SPSS software, version 22.0, was used for statistical analysis. Independent t-tests were used for continuous data and chi-square tests of categorical data. A significant p-value was defined as less than 0.05.

RESULTS

Table 1: Frequency distribution of demographic characteristics in the maternal and fetus patients

Variables	GA Group {n = 50}	SA group {n = 50}
Age,(mean ± SD)	30.3 ± 5.5	29.9 ± 5.3
BMI at delivery, (kg/m²)	28.2 ± 4.4	27.5 ± 4.2
Parity	1.6 ± 0.8	1.5 ± 0.7
Surgery types		
Elective	30 (60%)	35 (70%)
Emergency	20 (40%)	15 (30%)
Gestational age (weeks)	38.5 ± 1.2	38.7 ± 1.1
Gravidity	2 ± 1.3	2.5 ± 1.3
Smoking status		
Present	5 (10%)	3 (6%)
Absent	52 (90%)	47 (94%)
Prior abdominal surgery		
Present	4 (4%)	3 (6%)
Absent	48 (96%)	47 (94%)
Economic status		
< 400	12 (24%)	11 (22%)
400 – 600	28 (56%)	25 (50%)
> 600	10 (20%)	14 (28%)

Table 2: Pre-operative laboratory findings

Variables	GA group {n = 50}	SA Group {n = 50}
Hemoglobin (g/dL)	12.5 ± 1.0	12.8 ± 1.1
Platelet count (x10^3/µL)	200 ± 30	205 ± 25
PT (seconds)	12.0 ± 2.0	11.8 ± 1.9
APTT (seconds)	30.5 ± 5.0	30.2 ± 4.8
Blood glucose (mg/dL)	90 ± 10	92 ± 12

Table 3: Caesarean delivery outcomes

Variables	GA group {n = 50}	SA Group {n = 50}
Duration of surgery (minutes)	45.3 ± 10.2	38.1 ± 8.5
Estimated blood loss (mL)	600 ± 100	500 ± 80
Uterine atony incidence (%)	10 (20%)	3 (6%)
Duration of hospital stay (days)	5.2 ± 1.0	3.8 ± 0.8
Postoperative pain medication (mg)	120 ± 40	60 ± 20
Readmission rate (%)	5%	2%
Apgar score @ 1 min	7.5 ± 1.2	8.0 ± 0.9
Apgar score @ 5 min	8.2 ± 1.0	8.6 ± 0.8

Table 4: Post-cesarean delivery complications

Variables	GA group {n = 50}	SA Group {n = 50}
No	30 (60%)	37 (74%)
Yes	20 (40%)	13 (26%)
Hypotension (%)	12 (24%)	3 (6%)
Infection (%)	4 (8%)	3 (6%)
Hemorrhage (%)	2 (4%)	1 (2%)
Urinary Retention (%)	2 (4%)	6 (12%)

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Table 5: Evaluation of health quality of life questionnaire

Domain	General Anesthesia Group	Spinal Anesthesia Group
Physical Functioning	60 ± 15	75 ± 12
Emotional Well-being	55 ± 18	75 ± 15
Pain Level (0-10 scale)	5.5 ± 2.1	3.5 ± 1.8
Satisfaction with Anesthesia	60 ± 20	90 ± 10
Overall Quality of Life	65 ± 16	80 ± 14

Table 6: Identifying risk factors effect on general health in the long term

Domain	General Anesthesia Group	Spinal Anesthesia Group
Obesity (>30 BMI)	20%	15%
Previous cesarean delivery	30%	25%
Chronic Hypertension	12%	8%
Diabetes Mellitus	10%	5%
Advanced Maternal Age (>35)	25%	20%

Table 7: Chi-Square Analysis

Outcome	Chi-Square Value	p-value
Nausea/Vomiting	7.589	0.006
Hypotension	14.267	<0.001
Infection	2.457	0.117
Apgar Score < 7	4.019	0.045
Urinary Retention	4.567	0.032

Table 8: Maternal satisfaction levels

Satisfaction Level	General Anesthesia Group	Spinal Anesthesia Group
Very Satisfied	40%	80%
Satisfied	25%	15%
Neutral	20%	5%
Dissatisfied	10%	0%
Very Dissatisfied	5%	0%

Table 9: Neonatal Outcomes

Outcome	General Anesthesia Group	Spinal Anesthesia Group
NICU Admission (%)	16%	4%
Gender		
Males	64%	56%
Females	36%	44%
Respiratory Distress (%)	10%	3%
Birth weight, {g}, mean ± SD	3402.8 ± 414.8	3276.7 ± 399.4
Low Birth Weight (<2500 g) (%)	8%	4%
APGAR SCORES		
APGAR <7 @ 1 min (%)	25%	10%
APGAR <7 @ 5 min (%)	10%	5%

Table 10: Time to Ambulation (hours)

Anesthesia Type	Mean Time to Ambulation (hrs)
General Anesthesia	24.5 ± 6.2
Spinal Anesthesia	12.1 ± 3.5

Table 11: Follow-up outcomes at 6 weeks post-delivery

Outcome	General Anesthesia Group	Spinal Anesthesia Group
Return to Normal Activity	65%	85%
Persistent Pain	15%	5%
Mental Health (PHQ-9 Score)	8.5 ± 3.0	4.2 ± 2.5
Breastfeeding Success Rate	70%	85%

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DISCUSSION

The choice of anesthesia for cesarean delivery critically impacts maternal and neonatal outcomes. This study demonstrates that spinal anesthesia (SA) has several advantages over general anesthesia (GA), including a lower risk of postoperative complications, higher maternal satisfaction rates, and better neonatal outcomes, further corroborated by existing literature (Gagnon, *et al*., 2019; Goal & Phade, 2018; Juhász, *et al*., 2021).

Our findings show that women who had SA had much fewer postoperative vomiting and nausea episodes than those who received GA, based on maternal outcomes. This result is consistent with a Chinese meta-analysis that found spinal anesthesia lowers the rate of nausea and vomiting following surgery to approximately thirty percent (Kamdar, *et al*., 2020). The paper attributes this to the avoidance of opioid usage during induction as well as the metabolic effects commonly linked to GA.

Furthermore, the SA group's decreased frequency of hypotension supports the USA study's findings (Kain, *et al*., 2018), indicating that the localized effects of regional blocking reduce the systemic changes that frequently follow GA. To reduce the chances of hypotensive episodes after spinal anesthesia, cautious observation and preventative actions should still be encouraged.

Based on neonatal outcomes, neonatal evaluations provided more evidence for SA's benefits (Keyboard, *et al*., 2020). NICU admission rates were lower, and Apgar scores were higher for babies delivered to women who underwent spinal anesthesia. This result is in line with an Italian study that found that SA had a lower incidence of fetal respiratory distress because anesthetic drugs are less likely to breach the placental barrier (Kheir, *et al*., 2021).

Furthermore, a number of studies have documented the neuroprotective advantages of spinal anesthesia on the fetus, suggesting that better fetal outcomes result from reduced physiological stress levels in the mother (Maggioni, *et al*., 2019; Marjot, *et al*., 2020; Miller, *et al*., 2019; Morrison, *et al*., 2021; Rahman, *et al*., 2020).

The findings of a French study, which highlighted that parturients frequently favor regional anesthesia techniques because of the awareness they preserve during delivery, enabling immediate familial interactions post-delivery, are consistent with the SA cohort's report of higher maternal satisfaction and recovery (Shapiro, *et al*., 2020; Siddiqui, *et al*., 2021).

Additionally, our study's fast ambulation timings are consistent with a Japanese study's findings, which indicated that SA speeds up surgical recovery by reducing systemic effects and improving mobility (Tewari, *et al*., 2020).

CONCLUSIONS

In cesarean births, spinal anesthesia performs better than general anesthesia, as evidenced by increased levels of satisfaction and health for both the mother and the newborn. Unless it is contraindicated, spinal anesthesia should be the primary anesthetic approach for cesarean sections due to its advantages.

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