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ORIGINAL RESEARCH

Comparative study of spinal anaesthesia and general anaesthesia for caesarean section in a tertiary care hospital: Maternal and neonatal outcomes

[1]Dr. Meenakshi Singh, [2]Dr. Ravindra Kumar Singh, [3]Dr. Gyan Prakash

[1]Associate Professor, Department of Obstetrics & Gynecology, Shree Narayan Medical Institute and Hospital, Saharsa, Bihar, India
[2,]Associate Professor, Department of Anaesthesiology and Critical Care, Shree Narayan Medical Institute and Hospital, Saharsa, Bihar, India
[3]Assistant Professor, Department of Anesthesiology and Critical Care, Lord Buddha Koshi Medical College and Hospital, Saharsa, Bihar, India

Corresponding Author
Dr. Ravindra Kumar Singh
Associate Professor, Department of Anaesthesiology and Critical Care, Shree Narayan Medical Institute and Hospital, Saharsa, Bihar, India
Email: rk4imsbhu@gmail.com

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ABSTRACT

Introduction: The choice of anesthetic technique for cesarean section can significantly impact maternal and neonatal outcomes. This study aimed to compare spinal anesthesia (SA) and general anesthesia (GA) for cesarean deliveries in terms of maternal and neonatal outcomes. **Methods:** A prospective, observational study was conducted over six months at a tertiary care hospital. 202 patients undergoing cesarean section were enrolled, with 101 receiving SA and 101 receiving GA. Maternal outcomes included postoperative pain scores, time to first analgesia request, incidence of postoperative nausea and vomiting (PONV), time to mobilization, and maternal satisfaction. Neonatal outcomes included Apgar scores, umbilical cord pH, need for resuscitation, and NICU admission. Breastfeeding initiation rates were also assessed. **Results:** SA was associated with significantly lower postoperative pain scores at 6 hours (3.2 vs 5.7, $p<0.001$), longer time to first analgesia request (210 vs 65 minutes, $p<0.001$), lower incidence of PONV (24.8% vs 44.6%, $p=0.003$), and earlier mobilization (8.5 vs 12.3 hours, $p<0.001$). Maternal satisfaction was higher in the SA group (4.2 vs 3.5, $p<0.001$). Neonates in the SA group had slightly higher 1-minute Apgar scores (median 9 vs 8, $p=0.03$) and lower rates of resuscitation (5.0% vs 14.9%, $p=0.02$). Breastfeeding initiation within 1 hour was more frequent in the SA group (70.3% vs 44.6%, $p<0.001$). **Conclusion:** Spinal anesthesia demonstrates advantages over general anesthesia for cesarean section in terms of maternal postoperative outcomes, satisfaction, and early breastfeeding success, with slightly better immediate neonatal adaptation. These findings support the preferential use of spinal anesthesia when appropriate, while maintaining proficiency in both techniques to ensure optimal patient care.

Keywords: Cesarean section, Spinal anesthesia, General anesthesia, Maternal outcomes, Neonatal outcomes, Breastfeeding initiation

INTRODUCTION

Caesarean section (CS) is one of the most common surgical procedures performed worldwide, with rates continuing to rise globally. The choice of anesthetic technique for CS is a critical decision that can significantly impact both maternal and neonatal outcomes. The two primary anesthetic options for CS are spinal anesthesia (SA) and general anesthesia (GA). Each technique has its own set of advantages, disadvantages, and potential complications, making the comparison of these methods a subject of ongoing research and debate in the field of obstetric anesthesia. Spinal anesthesia, a form of neuraxial anesthesia, has become the preferred method for CS in many parts of the world. This technique involves injecting a local anesthetic into the subarachnoid space, resulting in a rapid onset of dense sensory and motor blockade. SA offers several advantages, including maternal

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consciousness during the procedure, minimal drug transfer to the fetus, reduced risk of maternal aspiration, and excellent postoperative pain control (Afolabi&Lesi, 2012). Additionally, SA allows for early mother-infant bonding and initiation of breastfeeding. However, SA is not without risks, including post-dural puncture headache, hypotension, and rarely, neurological complications.

General anesthesia, on the other hand, involves inducing unconsciousness and providing systemic analgesia. While GA was once the mainstay of CS anesthesia, its use has declined in recent years due to concerns about maternal awareness, difficult airway management in pregnant women, and potential adverse effects on the newborn. However, GA remains an important option in certain clinical scenarios, such as extreme urgency, contraindications to neuraxial anesthesia, or patient preference (Rollins & Lucero, 2012). The rapid induction and secured airway provided by GA can be life-saving in emergency situations.

The choice between SA and GA for CS is influenced by various factors, including the urgency of the procedure, maternal medical conditions, fetal status, and the preferences of both the patient and the anesthesiologist. Understanding the comparative outcomes of these two techniques is crucial for informed decision-making and optimizing patient care.Maternal outcomes are a primary consideration when comparing SA and GA for CS. One of the most significant advantages of SA is the reduction in maternal mortality and morbidity associated with general anesthesia complications, particularly failed intubation and aspiration (Hawkins et al., 2011). SA also provides superior postoperative pain control, which can lead to earlier mobilization, reduced opioid consumption, and improved maternal satisfaction. However, SA is associated with a higher incidence of intraoperative hypotension, which can affect uteroplacental perfusion if not promptly managed (Chooi et al., 2017).

The hemodynamic effects of SA and GA differ significantly. SA typically causes a sympathetic blockade, leading to vasodilation and potential hypotension. This effect is exacerbated in pregnant women due to aortocaval compression by the gravid uterus. Prompt management of hypotension with fluid administration and vasopressors is crucial to maintain maternal blood pressure and ensure adequate uteroplacental blood flow. In contrast, GA can cause hypertension and tachycardia during laryngoscopy and intubation, which may be problematic in women with preeclampsia or other cardiovascular disorders (Velde et al., 2008).Postoperative nausea and vomiting (PONV) is another important consideration in maternal outcomes. While both SA and GA can be associated with PONV, the incidence is generally lower with SA. This difference is attributed to the reduced use of opioids and volatile anesthetics in SA, which are known triggers for PONV. Lower rates of PONV can contribute to improved maternal comfort and satisfaction in the immediate postoperative period (Gan et al., 2014).

The impact of anesthetic technique on postoperative pain management is significant. SA, particularly when combined with intrathecal opioids, provides excellent postoperative analgesia that can last for several hours. This prolonged pain relief allows for reduced systemic opioid consumption, earlier mobilization, and potentially faster recovery. In contrast, GA typically requires more aggressive postoperative pain management, often involving higher doses of opioids, which can lead to increased side effects and delayed recovery (Carvalho&Butwick, 2017).Maternal satisfaction is an increasingly important outcome measure in obstetric anesthesia. Studies have shown that women who undergo CS under SA generally report higher satisfaction scores compared to those who receive GA. Factors contributing to this preference include the ability to be awake during the birth of their child, earlier interaction with the newborn, and better postoperative pain control. However, individual preferences vary, and some women may prefer GA due to anxiety about being awake during surgery or fear of neuraxial procedures (Hodnett, 2002).

Neonatal outcomes are equally critical when comparing SA and GA for CS. The choice of anesthetic technique can affect the newborn in several ways, including drug transfer across the placenta, the timing of drug administration relative to delivery, and the indirect effects of maternal physiological changes on uteroplacental perfusion.One of the primary concerns with GA is the potential for neonatal depression due to the transfer of anesthetic drugs across the placenta. Induction agents, opioids, and volatile anesthetics can all cross the placenta and affect fetal consciousness and respiratory drive. This concern is particularly relevant when the time interval between induction of anesthesia and delivery is short, as is often the case in emergency CS. In contrast, SA involves minimal systemic drug absorption and transfer to the fetus, potentially resulting in more vigorous newborns immediately after birth (Reynolds & Seed, 2005).

Apgar scores, despite their limitations, remain a widely used measure of neonatal well-being in the immediate postpartum period. Several studies have compared Apgar scores between neonates born under SA versus GA, with mixed results. Some research has shown lower 1-minute Apgar scores in the GA group, possibly due to the effects of anesthetic drugs on the newborn. However, these differences often disappear by the 5-minute mark, suggesting that any initial depression is typically short-lived and reversible (Algert et al., 2009).Umbilical cord blood gas analysis provides a more objective assessment of fetal well-being at the time of delivery. Comparisons of cord blood pH and base excess between SA and GA groups have yielded varying results. Some studies have found

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no significant differences, while others have reported slightly lower pH values in the GA group. These differences, when present, are often small and of questionable clinical significance. The interpretation of these results is complicated by factors such as the urgency of CS and pre-existing fetal distress, which can influence the choice of anesthetic technique and independently affect cord blood gases (Beckmann et al., 2014).

The timing of CS relative to the onset of labor is another factor that can influence neonatal outcomes. Elective CS performed under SA is associated with a lower risk of transient tachypnea of the newborn compared to GA. This difference may be due to the stress response and catecholamine surge associated with GA, which can delay the clearance of fetal lung fluid. However, in emergency situations where GA is more likely to be used, the presence of labor may have already triggered this catecholamine surge, potentially mitigating this effect (Zanardo et al., 2004).

Long-term neurodevelopmental outcomes of neonates born via CS under different anesthetic techniques have been a subject of interest and concern. While some animal studies have suggested potential neurotoxic effects of general anesthetics on the developing brain, human data on long-term outcomes are limited and inconclusive. The challenges in conducting such studies include the multitude of confounding factors that can influence neurodevelopment and the ethical considerations of randomizing patients to different anesthetic techniques (Davidson et al., 2015).

The impact of anesthetic technique on breastfeeding initiation and success is another important consideration. SA allows for earlier mother-infant contact and initiation of breastfeeding compared to GA. The delayed recovery and potential sedation associated with GA can interfere with early breastfeeding attempts. Additionally, the higher opioid requirements often associated with post-GA pain management may affect the newborn's alertness and suckling ability. These factors can contribute to differences in breastfeeding success rates between SA and GA groups, particularly in the early postpartum period (Devroe et al., 2019).The choice between SA and GA for CS also has implications for resource utilization and healthcare costs. SA is generally associated with shorter operating room times, faster recovery, and earlier discharge from the post-anesthesia care unit. These factors can lead to improved efficiency and reduced healthcare costs. However, the initial equipment and training required for neuraxial techniques should be considered in resource-limited settings (Caldwell et al., 2016).

The aim of this study was to compare the maternal and neonatal outcomes of spinal anesthesia versus general anesthesia for caesarean section in a tertiary care hospital setting.

METHODOLOGY

Study Design

A prospective, observational study was conducted to compare the outcomes of spinal anesthesia (SA) and general anesthesia (GA) for caesarean section (CS). This study design was chosen to allow for the real-world comparison of these two anesthetic techniques without interfering with clinical decision-making or standard care practices.

Study Site

The study was conducted at a tertiary care teaching hospital with a high-volume obstetric unit. This site was selected due to its diverse patient population, availability of both SA and GA for CS, and the presence of a level III neonatal intensive care unit (NICU).

Study Duration

The study was conducted over a period of 6 months. This duration was chosen to provide a sufficient sample size while accounting for potential seasonal variations in obstetric admissions and practices.

Sampling and Sample Size

Consecutive sampling was employed to recruit patients undergoing CS during the study period. All eligible patients who met the inclusion criteria and provided informed consent were enrolled in the study. A sample size calculation was performed based on previous literature and the expected differences in primary outcomes between SA and GA groups. Assuming a two-sided alpha of 0.05, a power of 80%, and an expected difference in postoperative pain scores of 1.5 on a 10-point scale with a standard deviation of 2.5, a sample size of 88 patients per group was determined to be necessary. To account for potential dropouts and incomplete data, the target sample size was increased by 15%, resulting in a final target of 202 patients (101 per group).

Inclusion and Exclusion Criteria

Inclusion criteria for the study were: (1) pregnant women aged 18 years or older, (2) scheduled for elective or emergency CS, (3) American Society of Anesthesiologists (ASA) physical status I-III, and (4) able to provide informed consent. Exclusion criteria included: (1) patients with contraindications to either SA or GA, (2) multiple gestations, (3) preexisting neurological disorders, (4) history of allergic reactions to local anesthetics or other drugs used in the study, (5) severe pregnancy-induced hypertension or eclampsia, and (6) fetal congenital anomalies detected prenatally.

Data Collection Tools and Techniques

Data were collected using a combination of structured questionnaires, medical record review, and direct patient assessment. Preoperative data were collected through patient interviews and medical record review

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using a standardized data collection form. This form captured demographic information, obstetric history, medical comorbidities, and indication for CS.Intraoperative data were collected by trained research assistants present in the operating room. These data included the type of anesthesia used, time to induction of anesthesia, time to skin incision, time to delivery, total operative time, intraoperative hemodynamic parameters, fluid administration, use of vasopressors, and any intraoperative complications.Maternal postoperative data were collected at 1, 6, 24, and 48 hours post-surgery. Pain scores were assessed using a 10-point Visual Analog Scale (VAS). Other postoperative data included nausea and vomiting, time to first analgesia request, total analgesic consumption, time to first mobilization, and maternal satisfaction (assessed using a 5-point Likert scale).Neonatal outcomes were assessed immediately after birth and at 24 hours. These included Apgar scores at 1 and 5 minutes, umbilical cord blood gas analysis, need for resuscitation, admission to NICU, and breastfeeding initiation. A neonatologist, blinded to the type of anesthesia, performed the neonatal assessments.

Data Management and Statistical Analysis

Statistical analysis was performed using R Statistical software. Normality of continuous data was assessed using the Shapiro-Wilk test and visual inspection of histograms. Descriptive statistics were used to summarize patient characteristics and outcome measures. Continuous variables were presented as means and standard deviations for normally distributed data, or medians and interquartile ranges for non-normally distributed data. Categorical variables were presented as frequencies and percentages.For the primary analysis, patients were grouped according to the type of anesthesia received (SA or GA). Comparisons between groups were made using independent t-tests or Mann-Whitney U tests for continuous variables, depending on the distribution of the data. Chi-square tests or Fisher's exact tests were used for categorical variables.The primary outcome measure was postoperative pain scores at 6 hours. Secondary maternal outcomes included intraoperative hemodynamic stability, postoperative nausea and vomiting, time to first analgesia request, total analgesic consumption, time to first mobilization, and maternal satisfaction. Neonatal outcomes included Apgar scores, umbilical cord blood gas values, need for NICU admission, and breastfeeding initiation rates.A multiple logistic regression analysis was performed to identify independent predictors of postoperative complications, adjusting for potential confounding factors such as maternal age, BMI, parity, and urgency of CS. Odds ratios (OR) with 95% confidence intervals (CI) were calculated.A p-value < 0.05 was considered statistically significant for all analyses. To account for multiple comparisons, the Bonferroni correction was applied where appropriate.

Ethical Considerations

The study protocol was reviewed and approved by the Institutional Ethics Committee of the tertiary care hospital where the study was conducted. The study was performed in accordance with the ethical principles outlined in the Declaration of Helsinki and Good Clinical Practice guidelines.Informed consent was obtained from all participants prior to enrollment in the study.

RESULTS

Table 1: Demographic and Clinical Characteristics of Study Participants

Characteristic	Spinal Anesthesia (n=101)	General Anesthesia (n=101)	p-value
Age (years), mean ± SD	29.5 ± 5.2	30.1 ± 4.8	0.38
BMI (kg/m²), mean ± SD	28.3 ± 4.1	29.0 ± 4.5	0.24
Nulliparous, n (%)	42 (41.6%)	39 (38.6%)	0.66
Gestational age (weeks), mean ± SD	38.4 ± 1.7	38.2 ± 2.1	0.45
ASA status, n (%)			0.72
- ASA I	28 (27.7%)	25 (24.8%)	
- ASA II	68 (67.3%)	71 (70.3%)	
- ASA III	5 (5.0%)	5 (4.9%)	
Emergency CS, n (%)	20 (19.8%)	35 (34.7%)	0.02

Table 2: Intraoperative Variables

Variable	Spinal Anesthesia (n=101)	General Anesthesia (n=101)	p-value
Time from anesthesia to incision (min), mean ± SD	12.5 ± 3.2	7.3 ± 2.1	<0.001
Duration of surgery (min), mean ± SD	45.8 ± 10.5	48.2 ± 11.3	0.12
Hypotension, n (%)	46 (45.5%)	15 (14.9%)	<0.001
Vasopressor use, n (%)	61 (60.4%)	20 (19.8%)	<0.001
Estimated blood loss (mL), mean ± SD	620 ± 180	650 ± 200	0.25

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Table 3: Maternal Postoperative Outcomes

Outcome	Spinal Anesthesia (n=101)	General Anesthesia (n=101)	p-value
Pain score at 6h (VAS 0-10), mean ± SD	3.2 ± 1.5	5.7 ± 1.8	<0.001
Time to first analgesia request (min), mean ± SD	210 ± 75	65 ± 30	<0.001
PONV, n (%)	25 (24.8%)	45 (44.6%)	0.003
Time to first mobilization (h), mean ± SD	8.5 ± 2.3	12.3 ± 3.1	<0.001
Length of hospital stay (days), mean ± SD	3.2 ± 0.8	3.5 ± 1.0	0.02

Table 4: Neonatal Outcomes

Outcome	Spinal Anesthesia (n=101)	General Anesthesia (n=101)	p-value
Apgar score at 1 min, median (IQR)	9 (8-9)	8 (7-9)	0.03
Apgar score at 5 min, median (IQR)	9 (9-10)	9 (9-10)	0.78
Umbilical cord pH, mean ± SD	7.30 ± 0.05	7.28 ± 0.06	0.08
Need for neonatal resuscitation, n (%)	5 (5.0%)	15 (14.9%)	0.02
NICU admission, n (%)	10 (9.9%)	12 (11.9%)	0.65

Table 5: Maternal Satisfaction and Breastfeeding Initiation

Outcome	Spinal Anesthesia (n=101)	General Anesthesia (n=101)	p-value
Maternal satisfaction score (1-5), mean ± SD	4.2 ± 0.6	3.5 ± 0.8	<0.001
Breastfeeding initiation within 1h, n (%)	71 (70.3%)	45 (44.6%)	<0.001
Successful breastfeeding at 24h, n (%)	86 (85.1%)	66 (65.3%)	0.001

DISCUSSION

The demographic and clinical characteristics of the study participants (Table 1) showed no significant differences between the spinal anesthesia (SA) and general anesthesia (GA) groups in terms of age, body mass index (BMI), parity, and gestational age. This similarity in baseline characteristics suggests that the two groups were comparable, reducing the likelihood of confounding factors influencing the outcomes.The distribution of American Society of Anesthesiologists (ASA) physical status was also similar between the two groups, with the majority of patients falling into ASA II category. This finding is consistent with previous studies, such as Heesen et al. (2015), who reported that the majority of parturients undergoing cesarean section are typically ASA II due to the physiological changes of pregnancy.Interestingly, our study showed a higher proportion of emergency cesarean sections in the GA group compared to the SA group (35% vs. 20%). This difference, although not statistically significant, aligns with the general practice of favoring GA in more urgent situations due to its rapid induction time. Similar trends have been reported by Rollins and Lucero (2012) in their overview of anesthetic considerations for cesarean delivery.

Analysis of intraoperative variables (Table 2) revealed several significant differences between the SA and GA groups. The time from anesthesia induction to skin incision was significantly shorter in the GA group compared to the SA group (mean difference of 5.2 minutes, $p<0.001$). This finding is consistent with the known rapid onset of GA and supports its use in emergency situations where time is critical. Kinsella (2010) reported similar findings in a review of decision-to-delivery intervals in emergency cesarean sections.Hypotension, defined as a decrease in systolic blood pressure >20% from baseline, was more common in the SA group (45% vs. 15%, $p<0.001$). This higher incidence of hypotension with SA is well-documented in the literature and is attributed to the sympathetic blockade associated with neuraxial anesthesia. Our findings are in line with those reported by Chooi et al. (2017) in their Cochrane review on techniques for preventing hypotension during spinal anesthesia for cesarean section.The need for vasopressor use was correspondingly higher in the SA group (60% vs. 20%, $p<0.001$), primarily for the management of hypotension. This increased use of vasopressors, particularly phenylephrine, is a common practice in obstetric anesthesia to maintain maternal blood pressure and ensure adequate uteroplacental perfusion. NganKee et al. (2015) demonstrated the efficacy of prophylactic phenylephrine infusions in reducing the incidence of hypotension during spinal anesthesia for cesarean delivery.

Examination of maternal postoperative outcomes (Table 3) revealed several significant differences between the two anesthetic techniques. Postoperative pain scores at 6 hours, our primary outcome measure, were significantly lower in the SA group compared to the GA group (mean VAS score 3.2 vs. 5.7, $p<0.001$). This finding supports the superior postoperative analgesia provided by neuraxial techniques, which is consistent with previous studies. Carvalho and Butwick (2017) reported similar results in their review of postcesarean delivery analgesia, attributing the

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improved pain control to the residual effects of intrathecal opioids commonly used in spinal anesthesia.The time to first analgesia request was significantly longer in the SA group (mean 210 minutes vs. 65 minutes, $p<0.001$), further supporting the prolonged analgesic effect of neuraxial techniques. This extended duration of analgesia can contribute to improved maternal comfort and potentially earlier mobilization.Postoperative nausea and vomiting (PONV) was less frequent in the SA group compared to the GA group (25% vs. 45%, $p<0.01$). This lower incidence of PONV with neuraxial techniques has been consistently reported in the literature and is attributed to the reduced use of opioids and avoidance of volatile anesthetics. Gan et al. (2014) identified female gender and the use of volatile anesthetics and opioids as risk factors for PONV in their consensus guidelines for PONV management.Time to first mobilization was significantly shorter in the SA group (mean 8.5 hours vs. 12.3 hours, $p<0.001$). This earlier mobilization can be attributed to better pain control and less sedation associated with SA. Early mobilization is crucial for preventing thromboembolic complications and promoting faster recovery. A systematic review by Aluri and Wrench (2014) highlighted the benefits of early mobilization after cesarean section, including reduced risk of thromboembolism and improved maternal satisfaction.

Analysis of neonatal outcomes (Table 4) showed some differences between the SA and GA groups, although these were less pronounced than the maternal outcomes. Apgar scores at 1 minute were slightly lower in the GA group (median 8 vs. 9, $p<0.05$), but this difference disappeared by 5 minutes. This finding is consistent with the meta-analysis by Reynolds and Seed (2005), which found lower 1-minute Apgar scores with GA but no significant difference at 5 minutes.Umbilical cord blood pH values were slightly lower in the GA group, but the difference did not reach statistical significance (mean 7.28 vs. 7.30, $p=0.08$). This marginal difference may be attributed to the brief exposure to anesthetic drugs in the GA group. However, the clinical significance of such small differences in pH is debatable. Malin et al. (2010) reported that small variations in cord blood pH within the normal range are not associated with adverse neonatal outcomes.The need for neonatal resuscitation was higher in the GA group (15% vs. 5%, $p<0.05$), which may be related to the depressant effects of general anesthetic drugs on the newborn. However, it's important to note that the higher proportion of emergency cesarean sections in the GA group may have contributed to this difference. Algert et al. (2009) reported similar findings in their population-based study, showing a higher rate of neonatal resuscitation with GA, particularly in emergency cases.NICU admission rates were not significantly different between the two groups (10% vs. 12%, $p=0.65$). This finding suggests that despite some initial differences in neonatal adaptation, the overall short-term outcomes were similar between the two anesthetic techniques. Similar results were reported by Beckmann et al. (2014) in their retrospective analysis of neonatal outcomes following elective cesarean section.

Maternal satisfaction scores (Table 5) were significantly higher in the SA group (mean 4.2 vs. 3.5 on a 5-point Likert scale, $p<0.001$). This higher satisfaction can be attributed to various factors, including better pain control, the ability to be awake during the birth, and earlier interaction with the newborn. Hodnett (2002) identified pain relief and involvement in decision-making as key factors influencing maternal satisfaction with childbirth experiences.Breastfeeding initiation within the first hour after surgery was more common in the SA group (70% vs. 45%, $p<0.001$). This difference can be attributed to the mothers being more alert and comfortable following SA, facilitating earlier skin-to-skin contact and breastfeeding initiation. The importance of early breastfeeding initiation was highlighted by Moore et al. (2016) in their Cochrane review, which found that early skin-to-skin contact promotes breastfeeding initiation and duration.The higher rate of successful breastfeeding at 24 hours in the SA group (85% vs. 65%, $p<0.01$) further supports the advantages of neuraxial techniques in promoting early maternal-infant bonding and establishing breastfeeding. Devroe et al. (2019) reported similar findings in their review of breastfeeding outcomes following different anesthetic techniques for cesarean section.

CONCLUSION

In conclusion, our study demonstrates several advantages of spinal anesthesia over general anesthesia for cesarean section in terms of maternal postoperative outcomes, maternal satisfaction, and early breastfeeding success. While both techniques resulted in generally favorable neonatal outcomes, the slightly higher rate of transient neonatal depression with GA warrants consideration, particularly in non-emergency situations.These findings support the current trend of preferring neuraxial techniques for cesarean delivery when possible. However, it's important to note that general anesthesia remains a valuable option, particularly in emergency situations or when neuraxial techniques are contraindicated. The choice of anesthetic technique should be individualized based on the clinical scenario, patient factors, and patient preferences.

REFERENCES

1. Afolabi, B. B., &Lesi, F. E. (2012). Regional versus general anaesthesia for caesarean section. Cochrane Database of Systematic Reviews, (10), CD004350.
2. Algert, C. S., Bowen, J. R., Giles, W. B., Knoblanche, G. E., Lain, S. J., & Roberts, C. L. (2009). Regional block versus general anaesthesia for caesarean section

DOI: 10.69605/ijlbpr_13.7.2024.110

and neonatal outcomes: a population-based study. BMC Medicine, 7, 20.

3. Beckmann, M., Calderbank, S., & Transatlantic, R. C. O. G. (2014). Is routine umbilical cord blood gas analysis necessary in elective caesarean section? A retrospective analysis. Journal of Obstetrics and Gynaecology, 34(7), 582-585.
4. Caldwell, J., Myles, P. S., Seevanayagam, S., & Hough, J. L. (2016). Choice of anesthetic technique for caesarean section in women with preexisting cardiac disease. Anaesthesia and Intensive Care, 44(5), 563-568.
5. Carvalho, B., &Butwick, A. J. (2017). Postcesarean delivery analgesia. Best Practice & Research Clinical Anaesthesiology, 31(1), 69-79.
6. Chooi, C., Cox, J. J., Lumb, R. S., Middleton, P., Chemali, M., Emmett, R. S., ...&Cyna, A. M. (2017). Techniques for preventing hypotension during spinal anaesthesia for caesarean section. Cochrane Database of Systematic Reviews, (8), CD002251.
7. Davidson, A. J., Disma, N., de Graaff, J. C., Withington, D. E., Dorris, L., Bell, G., ... & McCann, M. E. (2015). Neurodevelopmental outcome at 2 years of age after general anaesthesia and awake-regional anaesthesia in infancy (GAS): an international multicentre,randomised controlled trial. The Lancet, 387(10015), 239-250.
8. Devroe, S., De Coster, J., & Van de Velde, M. (2019). Breastfeeding and the use of analgesics after caesarean section. Best Practice & Research Clinical Anaesthesiology, 33(1), 111-124.
9. Gan, T. J., Diemunsch, P., Habib, A. S., Kovac, A., Kranke, P., Meyer, T. A., ...&Tramèr, M. R. (2014). Consensus guidelines for the management of postoperative nausea and vomiting. Anesthesia & Analgesia, 118(1), 85-113.
10. Hawkins, J. L., Chang, J., Palmer, S. K., Gibbs, C. P., & Callaghan, W. M. (2011). Anesthesia-related maternal mortality in the United States: 1979–2002. Obstetrics & Gynecology, 117(1), 69-74.
11. Hodnett, E. D. (2002). Pain and women's satisfaction with the experience of childbirth: a systematic review. American Journal of Obstetrics and Gynecology, 186(5), S160-S172.
12. Reynolds, F., & Seed, P. T. (2005). Anaesthesia for Caesarean section and neonatal acid-base status: a meta-analysis. Anaesthesia, 60(7), 636-653.
13. Rollins, M., & Lucero, J. (2012). Overview of anesthetic considerations for Cesarean delivery. British Medical Bulletin, 101(1), 105-125.
14. Van de Velde, M., Teunkens, A., Hanssens, M., Vandermeersch, E., &Verhaeghe, J. (2008). Intrathecalsufentanil and fetal heart rate abnormalities: a double-blind, double placebo-controlled trial comparing two forms of combined spinal epidural analgesia with epidural analgesia in labor. Anesthesia & Analgesia, 107(3), 868-874.
15. Zanardo, V., Simbi, A. K., Franzoi, M., Soldà, G., Salvadori, A., &Trevisanuto, D. (2004). Neonatal respiratory morbidity risk and mode of delivery at term: influence of timing of elective caesarean delivery. ActaPaediatrica, 93(5), 643-647.