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Consequences of General Anesthesia vs. Spinal Anesthesia on Newborn Outcome: A Prospective Study on Tertiary Hospital in Bangladesh

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Abstract **Original Research Article**

Objective: Alternative treatment Cesarean section patients having general anesthesia and spinal anesthesia were compared for neonatal outcomes. ***Methods:*** This quasi-experimental study was conducted in the Department of Anaesthesia, Rajshahi Medical College Hospital, and Tertiary Hospital in Rajshahi, Bangladesh. From March 2018 to November 2020. During lower segment Cesarean sections, patients were admitted through the obstetric OPD. Patients were chosen at random via an envelope draw. There were 160 patients in all, split equally into two groups for analysis. Patients in Group A (n=80) received spinal anesthesia, whereas those in Group B (n=80) received general anaesthetic. Umbilical artery blood was drawn shortly after the newborn's birth to measure the pH of the blood. At 0 and 5 minutes, the APGAR score was evaluated and recorded on a proforma. If the APGAR score was 7 or higher, and the blood pH was 7.2 or above, anesthesia was deemed successful, i.e., acceptable. ***Results:*** The total amount of neonates in group A with an APGAR score > 7 was 78 (97.5 %) whereas in group B it was 60 (75 %) and 74 (92.5 %). More neonates in group A had an APGAR score greater than 7 than in group B (p =0.028). Additionally, group A's average Apgar score at 0 minutes was higher than group B's at both 1 and 5 minutes (p=0.0001) B; 8.04±0.82 vs 7.10±0.92 (p=0.0001) and 9.89±0.32 vs 9.34±1.07 respectively (p=0.0001). Umbilical artery blood pH>7.2 was observed significantly high in group A93.8% as compared to group B 83.8% (p=0.045). Also, average pH was significantly high in group A than group B e.g., 7.38±0.15 vs 7.21±0.16 (p=0.017). ***Conclusion:*** In interventional Cesarean sections, spinal anesthesia has a better neonatal outcome than general anaesthetic.

Keywords: Spinal anesthesia, General anesthesia, Cesarean section, Rajshahi Medical College Hospital.

INTRODUCTION

General or regional anaesthetic, such as the spinal or epidural method, can be used for a cesarean section. To give safe anesthesia, the obstetric anesthetist must undergo further training and acquire specialized knowledge and abilities. Techniques and substances used for anesthesia and analgesia should have minimum impact on fetomaternal well-being while yet providing adequate anesthesia and analgesia [1, 2]. As a result of its ease of administration, minimal monitoring requirements, and the 1.5 milliliter dose of drugs needed to induce spinal anesthesia (which is unlikely to produce systemic effects in the baby, reducing neonatal exposure to depressant drugs), spinal anesthesia is widely regarded as more practical and safer than other techniques like general anesthesia and epidural. Like any regional method, there are hazards associated with a large block, set duration of anesthesia, hypotension2 (9%), and the possibility of postdural puncture headaches and hypotension[3].

For general anesthesia, a few medicines are necessary, and most of these drugs affect the baby in

two ways: directly through placental drug transfer and indirectly through changes in the mother's physiological and biochemical makeup, the latter of which appears to be far more significant. As a result, the newborn may experience systemic symptoms such as a low Apgar score and sedation. As a result of this method's inherent dangers, women should exercise caution when having a baby. Maternal mortality may be as high as 10% of all deaths [4, 5].

After the development of Dr. Apgar's Apgar score in 1952, obstetric anesthesiologists all over the world began using it to quickly assess an infant's physical well-being. The results are recorded at the time of delivery and again at the time of five minutes following that. Long-term survival in infancy is better predicted by the 05-minute score than the other. However, the 01-minute mark has importance for evaluating the impact of various medicines given to the mother during the Cesarean section. Because it's non-invasive, this procedure is much more enticing [6].

Arterial pH is a better indicator of fetal metabolism than umbilical cord blood glucose concentration. Changes in cord blood flow during birth can have an impact on umbilical cord gas and pH values [7]. Neonatal outcome following Cesarean section under general and spinal anesthesia is best assessed using the Apgar score and umbilical artery pH. An Apgar score research performed at Rajshahi Medical College Hospital, Bangladesh. shows that the Apgar score of newborns at 1 and 5 minutes whose mother underwent spinal anesthesia was 8.1±0.7and 9.8±0.41 whereas it was 9.52±0.71 and6.9±0.73 in general anesthesia [8].

Studies have shown that neonates born under general anesthesia have higher rates of acidemia and lower Apgar scores, whereas spinal anesthesia causes a decrease in pH and acidemia in the newborn, but these studies did not show any results on pH and as an overall outcome, including the Apgar score, remain unproven [5, 9]. Due to the prevalent usage of spinal anesthetic in our set-up, we wanted to perform this study to get our own observations on pH and APGAR score. There is a paucity of local data on this subject, thus this study was carried out to determine the safest anesthetic method for elective Cesarean sections in terms of newborn outcome, so that it may be used in patients who need it.

METHODOLOGY

This randomized control trial was conducted Department of Anaesthesia, Rajshahi Medical College Hospital, and Tertiary Hospital in Rajshahi, Bangladesh. From March 2018 to November 2020. The trial included 160 patients who met the eligibility requirements. In Group A (spinal anesthesia), the Apgar score at 5 minutes is P1=80 percent, whereas in Group B (general anesthesia), the Apgar score is P2=62.2%. There were 80 patients in each Group, with the test having an 80% power and a 5% degree of confidence. By using the envelop draw approach, the patients were split into two separate groups. General anaesthetic was used on Group B whereas spinal anesthesia was administered on the other two groups.

Purposive sampling was used as the sample strategy. All pregnant women with a gestational age of 37-40 weeks, an ASA 1 pregnancy status, and a singleton pregnancy were included in the study. Normal ultrasonography growth measurements and enough liquor were considered for fetal considerations. Mothers with PIH, a history of spinal or brain malformation, or a BMI > 40 were excluded from the trial, as were patients who were morbidly obese, had a skin-to-uterine incision time > 10 minutes, or a uterine incision time to delivery > 3 minutes. Congenital defects, newborns that were too tiny for the dates and fetal discomfort were all grounds for rejection. All patients who met the inclusion and exclusion criteria provided written informed permission. The department of gynecology/obstetrics was the main referral source for patients. All patients in the research groups were informed of the risks and benefits of both spinal and general anesthesia. Patients were randomly split using the envelop draw method, hence eliminating any possibility of bias or other confounding factors.

General anesthesia was administered using a standardized anesthesia technique after the use of standard monitors such as non-invasive blood pressure, ECG, and pulse oximetry were applied and the intravenous lines were maintained. The rapid sequence induction and intubation with inj. propofol 2mg/kg, inj. suxamethonium 1.5 mg/kg, application of Sellick's maneuver, confirmation of the tracheal tube, inj. atracurium 0.5m Inj. nalbuphine 0.2mg/kg was administered after the infant was born. Inj. neostigmine 0.35 mg/kg and inj. glycopyrrolate 0.05mg/kg were used to counteract any remaining effects after surgery, when the patient was able to exert some breathing effort again. Laterally positioned tracheal tube was withdrawn while patient was conscious.

Crystalloid solution was pre-infused into the bloodstreams of patients undergoing spinal anesthesia. In the sitting or lateral position, bupivacaine 0.75%, 1.5 ml was administered in the L3-4 or L4-5 interspaces, with all patients in supine posture. Oxygen at a rate of 4 liters per minute was supplied using a Hudson mask. The newborn was delivered, and an umbilical artery blood sample was obtained for the purpose of determining the blood pH and recording the Apgar score at 01 and 05 minutes. Apgar scores under ≥ 7 and blood pH below ≥7.2 were considered adequate for anesthesia.

SPSS version 10 was used for all statistical analyses. For categorical variables like age groups, Apgar scores, and satisfactory and unsatisfactory

outcomes, frequency and percentages were calculated. For quantitative variables like age, Apgar score, and pH, the mean was estimated along with the standard deviation, 95% confidence range, and median. Age, Apgar score, and pH were all compared using an independent sample t-test. The chi-square test and the fisher exact test were used to compare groups with adequate and poor conditions based on Apgar score and pH threshold values. The level of significance was set at P<0.05.

RESULTS

Pregnant women constituted the majority of the population. 21 to 35 years of age 148(92.5%) in both groups. The average age of the patients was 27.61±4.36 years (95% CI: 26.93 to 28.29). Average and 95% trans correlation coefficient overall APGAR score at one and five minutes and pH of both groups are presented in Table 1.

Table-1: Overall descriptive statistics of study variables (n=160)

Study Variables	Mean±SD	95%CI	Median (IQR)	Range
Age	27.61±4.36	26.93 to 28.29	28(5)	40-19
Apgar at 01 min	7.57±0.99	7.41 to 7.72	8 (1)	10-5
Apgar at 05 min	9.61±0.83	9.48 to 9.74	10(1)	10-6
pH	7.24±0.16	7.21 to 7.26	7.24(0.08)	7.8-6.12

The patients who underwent spinal anesthesia had an average age of 27.49±4.32 years and those received general anesthesia was 27.74 ± 4.42 years. There was no discernible difference in the groups in terms of age (p=0.72). Women who had spinal anesthetic had significantly higher mean Apgar scores for their newborns at the 01-minute and 5-minute mark. 7.21±0.16 and 9.89±0.32 as compared to those who received general anesthesia7.10±0.92 and 9.34±1.07 (p<0.01). Average pH was also significantly high in spinal group 7.38±0.15 as compared to general anesthesia group7.21±0.16 (p=0.017) (Table 2).

Table-2: Mean comparison of characteristics of patients between groups

Variables	Group A (SA)	Group B (GA)	*P*-Value
Age	27.49±4.32	27.74±4.42	0.72
Apgar 01 Min	8.04±0.82	7.10±0.92	0.0001
Apgar 06 Min	9.89±0.32	9.34±1.07	0.0001
pH	7.38±0.15	7.21±0.16	0.017

Group B had 60 newborns (75 percent) with satisfactory Apgar scores at one minute, whereas group A had 78 neonates (97, 5 percent) with satisfactory Apgar scores at one minute. Twenty-five percent (20%) of newborns in group B had an unsatisfactory Apgar score, compared to two percent (2.5%) of neonates in group A. (graph 01). Table 3 and Graph 2 compare the acceptable Apgar scores of the groups after five minutes. All the newborns in group A, i.e., 80(100%), had satisfactory (Apgar 7) health, but in group B, it was only seen in 74(92.5%) of the neonates. Group A had a considerably higher Satisfactory APGAR Score than group B (p =0.028).

Table-3: Comparison of satisfactory condition with respect to Apgar score at five minutes and pH.

Outcome	Group A(SA) N=80	Group B(GA) N=80	Frequency	*P*-Value
Apgar≥ 7	80 (100%)	74 (92.5%)	154 (96.3%)	0.028
Apgar< 7	0 (0%)	6(7.5%)	06(3.8%)	
pH≥7.2	75(93.7%)	67(83.7%)	142(88.7%)	0.045
pH<7.2	5(6.3%)	13(16.3)	18(11.3%)	

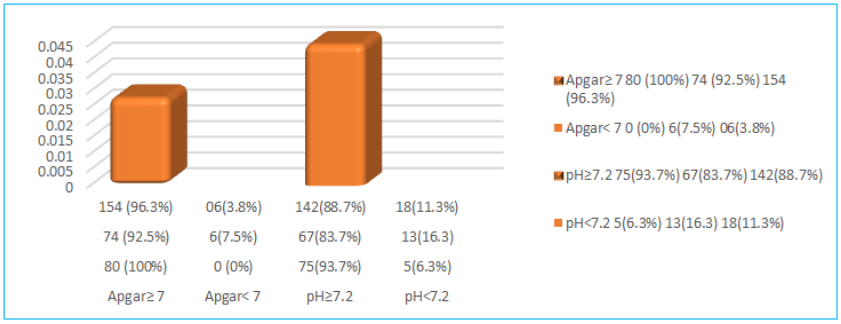

Fig-1: Outcome satisfactory

Umbilical artery blood pH≥7.2 was observed significantly low in group B as compared to group A; 83.8% vs. 93.8% respectively (p=0.045) as shown in Table 3.

DISCUSSION

Spinal and epidural anesthesia is preferred over general anaesthetic for the majority of Cesarean sections, according to a global obstetric anesthesia guideline [10, 11]. Many researchers have looked into this topic throughout the years. Even while Apgar ratings varied between groups, others reported lower Apgar scores and worse outcomes when general anesthesia was utilized [12].

This study's Apgar score of neonates at 01 and 05 minutes was higher in women who had spinal anesthesia (8.04±0.82 and 9.89±032) than in women who had general anesthesia (7.10±092 and 9.34±1.37), which is nearly in line with a previous study on Apgar score conducted at Rajshahi Medical College Hospital, Bangladesh; the Apgar scores were 8.1±0.7 and 9.8±0.41 in the spinal anesthesia group versus 6.9±0.7 The APGAR scores of infants whose mothers had had general anesthesia were similarly reported to be lower. by Kolatat *et al*. [13], Ong BY [14], and Alfredo M *et al*. [15]. A study by Dyer *et al*. [16] found that patients in the spinal group had a worse pH outcome than those in the general group, but the Apgar score was higher in the spinal group. Other researchers [17, 18] reported no differences in patient outcomes while using various anesthetic regimes.

At one-minute, spinal group newborns had a higher acceptable Apgar score 78 (97.5 %) than general anesthetic group neonates 60 (75%). Twenty-five percent 20(25%) of infants in the general anaesthetic group had an unsatisfactory APGAR score, compared to two percent of neonates in the spinal anesthesia group 2 (2.5%). 0.6 percent in spinal anesthesia and 2% in general anesthesia were identified by Tony et al18, whereas 36% of the general anesthesia group was found [16] discovered depressed babies in the spinal group at a rate of 1.1% , and in the overall population at a rate of 25.9 % . At 01min, the spinal group had greater scores than the general anesthetic group on each measure.

Group A had significantly higher Apgar scores at five minutes that group B, indicating a satisfactory condition. Apgar <7 was seen in 6(7.5 %) infants in Group A, but in Group B, it was seen in 74(92.5%) neonates and all the neonates in Group A had it, i.e., 80(100 %). There were 1.3% of patients in the general anesthetic group and 4.3% in the spinal anesthetic group who scored a <7 Apgar at the 05-minute mark. All babies in both groups were active at 05 minutes, according to Alfredo M *et al*. [15]. Spinal anesthesia may be preferable than general anesthesia in Cesarean section because of the higher Apgar score and earlier commencement of breast-feeding. The Apgar score is lowered by general anesthesia; however, this is only temporary. Umbilical artery pH monitoring, according to some researchers, is a more reliable way to gauge a fetus' well-being [19].

The average pH of newborns in group A was significantly higher than that of neonates in group B (7.38±0.15 vs. 7.21±0.16) in the current research. There was a greater prevalence of acidemia pH 7.21-7.26 in babies born under general anesthetic, as well as lower Apgar ratings, whereas acidotic pH 7.19-7.26 was related with robust neonates delivered by spinal anesthesia High neonatal pH was found in the spinal group [20]. There were no significant differences between the groups in the mean umbilical artery blood $PaCO_2$ and HCO_3 levels. While modern general anesthetic can sedate a newborn, the effects are transient, readily overcome, and the influence on acid-base balance is largely benign. Modern general anaesthetic can sedate the infant. When it came to Apgar ratings and cord gas measurements, Kvak and his colleagues [9] found no differences between the two groups.

In addition, in our research, patients in the spinal group 75(93.7%) had a satisfactory pH compared to patients in the general anesthesia group 67(83.7%), and patients in the spinal group [05(6.3%) vs. 13(16.3%)] had a satisfactory pH compared to patients in the general anesthesia group 13 (16.3%) had an unsatisfactory pH. Anesthesia patients in study had an inadequate pH of 16.1%. Discovered no variations in pH levels between the two groups of people. In spinal and general anesthesia, it was determined to be 4.7% and 1.1%, respectively, by Morgan and colleagues [21] Robert *et al*. [22] found that localized anesthesia was linked to fetal acidemia and had characteristics of acute respiratory acidemia, with umbilical artery blood pH values of 7.19 or lower in around 18% of babies. Neonatal Apgar scores and umbilical artery parameters can be affected by anesthetics in different ways, and the significance of slight changes in these figures is not yet apparent. It's imperative that every scenario be assessed on its own merits.

CONCLUSION

Neonates whose mothers had general anesthesia had lower APGAR scores and umbilical-artery blood pH than neonates whose mothers had spinal anesthesia, according to our research. When it comes to prenatal outcomes, spinal anesthetic is preferable to general anaesthetic since it's just as effective. Large studies on emergency cesarean sections, including all levels of anaesthetic risk factors, can be used in the future to analyze it further.

REFERENCES

1. Hasan, H., Ali Chowdhury, M. (2021). Evaluate and Outcome Safety of Epidural Analgesia in Surgical Practice for Labour Pain: Study on Tertiary Hospital

in Bangladesh. 2021. Available from: DOI: 10.36347/sjams.2021.v09i10.017

2. Sener, E. B., Guldogus, F., Karakaya, D., Barıs, S., Kocamanoglu, S., & Tur, A. (2003). Comparison of neonatal effects of epidural and general anesthesia for cesarean section. *Gynecologic and obstetric investigation*, *55*(1), 41-45.
3. Karaman, S., Akercan, F., Akarsu, T., Fırat, V., Ozcan, O., & Karadadas, N. (2005). Comparison of the maternal and neonatal effects of epidural block and of combined spinal–epidural block for Cesarean section. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, *121*(1), 18-23.
4. Attari, M. A., Mirhosseini, S. A., Honarmand, A., & Safavi, M. R. (2011). Spinal anesthesia versus general anesthesia for elective lumbar spine surgery: A randomized clinical trial. *Journal of research in medical sciences: the official journal of Isfahan University of Medical Sciences*, *16*(4), 524.
5. Reynolds, F., & Seed, P. T. (2005). Anaesthesia for Caesarean section and neonatal acid-base status: a meta-analysis. *Anaesthesia*, *60*(7), 636-653.
6. Sahana, K. S. (2014). Comparison of apgar score in neonates: spinal versus genaral anaesthesia for elective caesarean section. *Journal of Evolution of Medical and Dental Sciences*, *3*(3), 538-544.
7. Khoury, A. D., Moretti, M. L., Barton, J. R., Shaver, D. C., & Sibai, B. M. (1991). Fetal blood sampling in patients undergoing elective cesarean section: a correlation with cord blood gas values obtained at delivery. *American journal of obstetrics and gynecology*, *165*(4), 1026-1029.
8. Lim, G., Facco, F. L., Nathan, N., Waters, J. H., Wong, C. A., & Eltzschig, H. K. (2018). A review of the impact of obstetric anesthesia on maternal and neonatal outcomes. *Anesthesiology*, *129*(1), 192-215.
9. Kavak, Z. N., Başgül, A., & Ceyhan, N. (2001). Short-term outcome of newborn infants: spinal versus general anesthesia for elective cesarean section: A prospective randomized study. *European journal of obstetrics & Gynecology and reproductive biology*, *100*(1), 50-54.
10. Cyna, A.M. (2007). Clinical update: obstetric anaesthesia - PubMed [Internet]. Available from: https://pubmed.ncbi.nlm.nih.gov/17720001/
11. American Society of Anesthesiologists Task Force on Obstetric Anesthesia. (2007). Practice guidelines for obstetric anesthesia: an updated report by the American Society of Anesthesiologists Task Force on Obstetric Anesthesia. *Anesthesiology*, *106*, 843-863.
12. 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 and neonatal outcomes: a population-based study. *BMC medicine*, *7*(1), 1-7.
13. Kolatat, T., Somboonnanonda, A., Lertakyamanee, J., Chinachot, T., Tritrakarn, T., & Muangkasem, J. (1999). Effects of general and regional anesthesia on the neonate (a prospective, randomized trial). *Journal of the Medical Association of Thailand= Chotmaihet Thangphaet*, *82*(1), 40-45.
14. Ong, B. Y., Cohen, M. M., & Palahniuk, R. J. (1989). Anesthesia for cesarean section--effects on neonates. *Anesthesia and analgesia*, *68*(3), 270-275.
15. Mancuso, A., De Vivo, A., Giacobbe, A., Priola, V., Savasta, L. M., Guzzo, M., ... & Mancuso, A. (2010). General versus spinal anaesthesia for elective caesarean sections: effects on neonatal short-term outcome. A prospective randomised study. *The Journal of Maternal-Fetal & Neonatal Medicine*, *23*(10), 1114-1118.
16. Dyer, R. A., Els, I., Farbas, J., Torr, G. J., Schoeman, L. K., & James, M. F. (2003). Prospective, randomized trial comparing general with spinal anesthesia for cesarean delivery in preeclamptic patients with a nonreassuring fetal heart trace. *The Journal of the American Society of Anesthesiologists*, *99*(3), 561-569.
17. Wallace, D. H., Leveno, K. J., Cunningham, F. G., Giesecke, A. H., Shearer, V. E., & Sidawi, J. E. (1995). Randomized comparison of general and regional anesthesia for cesarean delivery in pregnancies complicated by severe preeclampsia. *Obstetrics & Gynecology*, *86*(2), 193-199.
18. Lertakyamanee, J., Chinachoti, T., Tritrakarn, T., Muangkasem, J., Somboonnanonda, A., & Kolatat, T. (1999). Comparison of general and regional anesthesia for cesarean section: success rate, blood loss and satisfaction from a randomized trial. *Journal of the Medical Association of Thailand= Chotmaihet Thangphaet*, *82*(7), 672-680.
19. Casey, B. M., McIntire, D. D., & Leveno, K. J. (2001). The continuing value of the Apgar score for the assessment of newborn infants. *New England Journal of Medicine*, *344*(7), 467-471.
20. Hodgson, C. A., & Wauchob, T. D. (1994). A comparison of spinal and general anaesthesia for elective caesarean section: effect on neonatal condition at birth. *International journal of obstetric anesthesia*, *3*(1), 25-30.
21. Morgan, P. J., Halpern, S., & Lam-McCulloch, J. (2000). Comparison of maternal satisfaction between epidural and spinal anesthesia for elective Cesarean section. *Canadian Journal of Anesthesia*, *47*(10), 956.
22. Roberts, S. W., Leveno, K. J., Sidawi, J. E., Lucas, M. J., & Kelly, M. A. (1995). Fetal acidemia associated with regional anesthesia for elective cesarean delivery. *Obstetrics & Gynecology*, *85*(1), 79-83.