ORIGINAL ARTICLE

Effects of Type of Intrauterine Anesthesia on Neurophysiological Assessment of Newborn Babies

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ABSTRACT

Background: It is proposed in different studies that different types of anesthesia affect the physiological status of the neonate while other studies revealed no change.
Aim: To determine and compare the changes in neonatal APGAR score at 1 and 5 minutes according to the type of anesthesia.
Study design: It was a comparative study and was conducted in Obstetrics and Gynecology Department, Lahore General Hospital, Lahore. Duration of the study was of six months duration.
Sample size: The subjects were divided into three equal groups; group A, group B and group C. Each group comprised of 28 patients. Subjects in group A were those who were undergoing spontaneous vaginal delivery, group B was composed of subjects who were undergoing cesarean delivery under spinal anesthesia and group C was composed of subjects who were undergoing cesarean delivery under general anesthesia.
A strict inclusion and exclusion criterion was followed. Physiological status of the baby was assessed from by measuring APGAR score.
Results: The results of this study show significant difference between the study groups.
Conclusion: Subjects undergoing SVD and Cesarean delivery under spinal anesthesia are associated with significantly better APGAR score at 1 and 5 minutes as compared to Cesarean delivery under general anesthesia.
Keywords: APGAR score, SVD, spinal anesthesia, general anesthesia.

INTRODUCTION

Pregnancy is defined as the maternal physiological condition of having a growing fetus in the body that ends with delivery of the baby either by vaginal route or by operation[1,2]. Spinal or general anesthesia is used as a routine practice when delivery of the baby is carried out by cesarean operation. Number of the cesarean deliveries is increasing due to different factors[3]. The different anesthetic drugs given to the mother cross the placenta and affect the neonatal status of the babies. These effects are evaluated by different study groups in post-partum period by using APGAR scores that is numerical assessment of the newborn babies on scale 0-10. This scoring system of newborn's status gives an idea whether resuscitation of the baby is required or not[4,5]. APGAR assessment system is composed of different components that can be visualized as a cycle in which five basic components are related to each other through cardio-respiratory reflexes and metabolic pathway[6]. APGAR score is routinely evaluated twice, usually after 1 minute and 5 minutes of birth[7]. This study is designed to evaluate the difference in neurophysiological status of the babies by using APGAR numbering system after 1 and 5 minutes of delivery between spontaneous vaginal delivery and cesarean delivery under general anesthesia and spinal anesthesia.

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AIMS AND OBJECTIVES

To compare and determine the changes in neonatal physiological status by using APGAR scoring system after 1 and 5 minutes according to mode of delivery and type of anesthesia.

SUBJECTS AND METHODS

It was a comparative study conducted at department of Gynae and obstetrics, LGH, Lahore during six months, in neonates delivered to healthy pregnant females of age 20-40 years. The total number of 84 patients were included in the study and were divided:
Group A: Those undergoing spontaneous vaginal delivery.
Group B: Those undergoing Cesarean delivery under spinal anesthesia.
Group C: Those undergoing Cesarean delivery under general anesthesia.

Neonates delivered to subjects in second stage of labor with vertex presentation undergoing spontaneous vaginal delivery and neonates delivered to subjects undergoing elective Cesarean section for cephalo-pelvic disproportion (CPD), mal-presentation and previous c-section were included in the study.

Pregnancy related problems like pregnancy-induced hypertension, gestational diabetes, intrauterine growth retardation, placental abnormalities, multiple gestation, oligohydramnios, antepartum hemorrhage, infections, preterm, smokers and mothers on CNS depressant drugs were excluded from the study.

Recoding of apgar score

The APGAR score was recorded according to the following table

Parameter	0 score	1 score	2 score
Heart Rate	Absent	Less than 100 per min	More than 100 per min
Respiratory effort	Absent	Weak	Good, crying
Muscle tone	Flaccid	some flexion of extremities	Well flexed
Reflex Irritability	No response	Grimace	Cough or sneeze
Colour	Pale or blue	Body pink-extremities blue	Completely pink

Statistical analysis: Data was entered and analyzed using SPSS version 18.0. Mean±SD (standard deviation) was calculated for quantitative variable (APGAR score). One-way ANOVA was applied to observe mean differences in three groups, according to type of anesthesia. Post Hoc Tukey test was also applied to observe differences in the mean values between the groups.

RESULTS

This study aimed to determine and compare the effects of type of anesthesia on neonatal physiological parameters by APGAR score. A total of 84 pregnant women fulfilling inclusion criteria were selected in the study and divided in 3 equal groups on the basis of type of anesthesia. After delivery, neonatal APGAR score at 1 and 5 minutes was recorded and compared. Subject's particulars, maternal age, mode of delivery, indication for Cesarean section, birth weight and sex of baby were also recorded. The mean±SD APGAR score at 1 minute was 7.96 ± 0.19 in SVD, in spinal anesthesia it was 7.36±0.49 and in general anesthesia it was 6.96±0.74. At 5 minutes, the mean±SD APGAR score in SVD was 9.86 ± 0.45, in spinal anesthesia group, mean±SD APGAR score at 5 minutes was 9.57±0.50 and mean±SD APGAR score at 5 minutes in general anesthesia was 9.39±0.92 (Table 1).

Application of Post hoc Tuckey test showed that the difference in APGAR scores was highly significant at 1 minute time between SVD and Cesarean delivery under spinal anesthesia (p-value <0.001). Similarly, the difference in APGAR scores between SVD and Cesarean delivery under general anesthesia was highly significant (p-value < 0.001) at 1 minute time. Cesarean delivery under spinal anesthesia and Cesarean delivery under general anesthesia groups also showed a significant difference at 1 minute time (p-value = 0.017) (Table 2).

Table 1: Comparison of APGAR scores in three study groups by One-way ANOVA

APGAR Score	SVD	Spinal anesthesia (Cesarean delivery)	General anesthesia (Cesarean delivery)	P-value
At 1 Min.	7.96 ±0.19	7.36± 0.49	6.96± 0.74	<0.001**
At 5 Min.	9.86 ±0.45	9.57± 0.50	9.39± 0.92	0.033*

Data are reported as Mean ± SD

*Significant **Highly significant

Table.2 Pair wise comparison of APGAR scores between three groups by Post HOC Tukey's test

APGAR Score	(I) Group	(J) Group	Mean Difference (I-J)	P-value
At 1 Minute	SVD	Spinal anesthesia	0.61	< 0.001**
		General anesthesia	1.00	< 0.001**
	Spinal anesthesia	General anesthesia	0.39	0.017*
At 5 Minutes	SVD	Spinal anesthesia	0.29	0.240
		General anesthesia	0.46	0.026*
	Spinal anesthesia	General anesthesia	0.18	0.568

*Significant **Highly significant

After 5 minutes of delivery, significant difference was observed between SVD and Cesarean delivery under general anesthesia (p-value=0.026). Differences between other groups were insignificant at 5 minutes (p-values > 0.05) (Table 2).

DISCUSSION

The 1 minute APGAR score correlates with survival, while the 5 minutes score may predict neurological outcome[7,8]. A baby who scores 7 or above after 1 minute of birth is generally taken as having good health while lesser score is indicative of certain transient abnormality requiring immediate intervention to ameliorate the condition like opening of the airway by placing in neutral position/slight sniffing position[9].

At 5 minutes after birth, a persistently low APGAR score, below 7, may require institution of other necessary emergency measures and intense monitoring of the baby. Score less than 7 is reported to be associated with impaired neurological cognitive function in early adulthood. These babies show

cognitive impairment even in later life[10]. Risk of attention deficient hyperactive syndrome also increases in these children[11]. Different studies supported the idea of discontinuation of further resuscitation if there is less score or there are no signs of life during the first 10 min after birth despite continuous and adequate resuscitative efforts[7,9].

In this study, significant difference is noted in APGAR score between the three groups (p-value <0.001) at 1 min. Our study further concludes that APGAR score at 1 minute interval is higher in SVD and spinal anesthesia group than that of general anesthesia group. Our findings are consistent with the study carried out by Bano et al, 2009 who observed the same difference[12]. Another study documented that this difference is due to sedation that is given during general anesthesia because these sedative drugs can freely cross the placental barrier[13].

Our results differ from Moslemi and Rasooli (2007) who reported no significant difference between the three groups[14]. In contrast to our results, significantly lower APGAR score is documented in spinal anesthesia as compared to general anesthesia[15].

Significant difference was observed between three groups when APGAR was calculated at 5 minutes interval i.e. APGAR score was found less in anesthesia group as compared to spinal anesthesia group and SVD group. Our results are in accordance with many studies when considering for APGAR score at 5 minutes interval[12,14]. Results of our study are different from other studies[16,17,13].

We further found that babies born under general anesthesia are less alert as compared to babies born under spinal anesthesia. Overall, our study documents SVD as the safest mode of delivery for neonate thus discouraging the mothers who prefer elective Cesarean delivery without any medical/obstetric indication. If Cesarean delivery is required, spinal anesthesia is safer as compared to general anesthesia. This is due to the avoidance of multiple adverse factors associated with general anesthesia like free cross-over across the placenta to fetus, failed maternal intubation, regurgitation and pulmonary aspiration of gastric contents which may cause hypoxia in the mother and fetus as well. There remains no doubt that considering neonatal safety, spinal anesthesia is superior to general anesthesia whenever medically practicable.

RECOMMENDATIONS

We recommend that this evidence further be supported by a well designed randomized controlled clinical trial, not only to establish the efficacy but also the safety of the mode of delivery and type of anesthesia to be administered. The extensions and application of this study to various socioeconomic segments of the society as well as employing a larger cross-section of the population will further add to our knowledge and at the same time will provide substantial validity to all the findings.

REFRENCES

1. Roberts CL, Bell JC, Ford JB, Morris JM, 2009. Monitoring the quality of maternity care: how well are labor and delivery events reported in population health data? *Paediatr Perinat Epidemiol.*, 23: 144–152.
2. Callahan TL and Caughey AB, 2011. Pregnancy and Prenatal Care. In: Obstetrics & Gynecology 5th ed. Philadelphia: Lippincott Williams & Wilkins, pp. 3-13.
3. Kinsella SM, Girgirah K and Scrutton MJL, 2010. Rapid sequence spinal anaesthesia for category-1 urgency caesarean section: a case series. *Anaesthesia*, 65: 664-669.
4. Robins K and Lyons G, 2009. Intraoperative awareness during general anesthesia for cesarean delivery. *A & A*., 109: 886-890.
5. Ehrenstein V, 2009. Association of apgar scores with death and neurologic disability. *Clin Epidemiol*., 1: 45–53.
6. Pinheiro JM, 2009. The apgar cycle: a new view of a familiar scoring system. *Arch Dis Child Fetal Neonatal Ed.,* 94: 70-72.
7. Laptook AR, Shankaran S, Ambalavanan N, Carlo WA, McDonald SA, Higgins RD. and Das A, 2009. Outcome of term infants using APGAR scores at 10 minutes following hypoxic-ischemic encephalopathy. *Pediatrics*., 124: 1619-1626.
8. Ehrenstein V, Pedersen L, Grijota M, Nielsen GL, Rothman, K.J. and Sorensen, H.T., 2009. Association of APGAR score at five minutes with long-term neurologic disability and cognitive function in a prevalence study of Danish conscripts. *BMC Pregnancy Childbirth*. 9(1): 14.
9. van den Dungen FAM, van Veenendaal MB and Mulder ALM, 2009. Clinical practice: neonatal resuscitation. A Dutch consensus. *Eur J Pediatr*., 169: 521-527.
10. Odd DE, Rasmussen F, Gunnel D, Lewis G and Whitelaw A, 2008. A cohort study of low APGAR scores and cognitive outcomes. *Arch Dis Child Fetal Neonatal Ed*., 93: F115-20.
11. Li J, Olsen J, Vestergaard M and Obel C, 2011. Low APGAR scores and risk of childhood attention deficit hyperactivity disorder. *J Pediatr*., 158: 775-779.
12. Bano K and Bhutta SZ, 2009. Comparing effects of spinal versus general anesthesia in patients undergoing emergency cesarean sections: an obstetrician's view. *JLUMHS*., 8: 173.
13. Zahir J, Syed S, Jabeen N, Anjum Q and Ur Rehman S, 2011. Maternal and neonatal outcome after spinal versus general anaesthesia for caesarean delivery. *Ann. Pak. Inst. Med. Sci*., 7(3): 115-118.
14. Moslemi F and Rasooli S, 2007. Comparison of spinal versus general anesthesia for cesarean delivery in patients with severe preeclampsia. *J. Med. Sci*., 7(6): 1044-1048.
15. Yentur EA, Topcu I, Ekici Z, Ozturk T, Keles GT and Civi M, 2009. The effect of epidural and general anesthesia on newborn rectal temperature at elective cesarean section. *Braz J Med Biol Res*., 42: 863-867.
16. Algert CS, Bowen JR, Giles WB, Knoblanche GE, Lain SJ and Roberts CL, 2009. Regional block versus general anaesthesia for caesarean section and neonatal outcomes: a population-based study. *BMC*, 7: 7-20.
17. Okafor UV, Ezegwui HU and Ekwazi K, 2009. Trends of different forms of anaesthesia for caesarean section in South-eastern Nigeria. Journal of Obstetrics and Gynaecology, 29(5): 392–395.