Original Article

The effect of type of anesthesia on mother and neonatal health during Cesarean section

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ABSTRACT

Introduction: CS delivery can be done with either spinal or general anesthesia (GA). Both methods have advantages and disadvantages. The choice of anesthesia for cesarean section has been traditionally influenced by patient and physician preferences. In the hospital setting of this examination, this prospective non-randomized observational study was conducted to look for the best type of anesthesia in regards to maternal and neonatal health parameters. Aims and Objectives: To get an evidence-based selection of the best type of anesthesia for CS (General or spinal), depending on maternal and fetal outcomes. Patient and Method: 76 pregnant women with elective C/S and without any chronic or pregnancy-related diseases were enrolled in the study. They were divided into two groups according to the type of anesthesia used during C/S. Both fetal and maternal parameters were studied to compare the anesthesia's effects on baby and mother. Results: SA group had longer delivery time than GA group (2.83 and 2.75 minutes, respectively). No significant difference between two groups with regards to 1 and 5 minutes and APGAR score (P value = 0.6 and 0.2, respectively) was observed. Conclusion: It was concluded that SA in cesarean section gave longer delivery time, but higher APGAR score for both 1 & 5 minutes when compared with GA group. However, these findings were not statistically significant. SA group sustained lower MAP than those delivered by GA, but it remained within the acceptable limit.

Keywords: GA=general anesthesia, SA=spinal anesthesia, CS=cesarean section, MAP=mean arterial blood pressure

Introduction

Recently, there has been an increasing trend in cesarean section over vaginal delivery, worldwide. In Iraq the rate of cesarean sections has increased from 18.0% in 2008 to 24.4% in 2012 [1]. This may indicate that cesarean section (CS) has been often done for nonmedical indications, leading to the overuse of this surgical obstetric operation. Because of the global increase in CS rates, more attention should be paid to their outcomes.

CS delivery can be done with either spinal or general anesthesia (GA). Both methods have advantages and disadvantages. Although spinal anesthesia has been the primary choice supported by many researchers, there has been a controversy in some

aspects. On the other side, general anesthesia gives superior control over ventilation, avoids hypotension seen with spinal anesthesia, gives rapid induction, and makes the patients unaware of the perioperative time so, makes it preferred especially in emergency situations [2]. But, the general anesthesia has not been without disadvantages, there might be a risk of failed intubation especially in anatomical abnormalities, and it may carry the high risks in patients with respiratory illnesses. The spinal anesthesia has been a safe and effective anesthetic technique for the cesarean section, because it has been simple, rapid and has caused minimal trans-placental distribution of the anesthetic agents [3].

During cesarean section, the simple and accurate method to monitor organ perfusion has been mean arterial pressure (MAP), which has been defined as the average pressure in a patient's arteries during one cardiac cycle. Accurate MAP can only be determined by invasive monitoring and sophisticated calculations. However, it can also be calculated using a formula of the systolic blood pressure (sbp) and the diastolic blood pressure (dbp). It is normally between 65 and 110 mmHg [4].

In 1952, Dr. Virginia Apgar, an anesthesiologist at New York–Presbyterian Hospital, developed APGAR score in order to quantify the effects of obstetric anesthesia on babies. The APGAR

is a word that summarizes five criteria (Appearance, Pulse, Grimace, Activity and Respiration) [5].

The selection of anesthesia type for cesarean section has been traditionally influenced by patient and physician preferences. In the hospital setting of this examination, this prospective non-randomized observational study was conducted to look for the best type of anesthesia in regards to maternal and neonatal health parameters.

Aims and Objectives

The aim of the study was to get an evidence-based selection of the best type of anesthesia for CS (General or spinal), depending on the maternal and fetal outcomes.

1. On maternal side, the researchers had to assess
   a) MAP during CS.
   b) Delivery time (from induction of anesthesia till Uterine Incision).
2. On neonates' side by assessing Apgar scores.

Patients and Methods

Patients

The researchers enrolled pregnant women with a lower age limit of 18 years or older and full-term gestation (40 ± 2 weeks). CS was medically indicated (e.g., previous CS) or was the elective primary CS (due to the patients' preference, but with no clear medical or obstetric indication). Pregnant women with pregnancy-induced hypertension, diabetic mother (gestational or chronic), heart disease, chronic renal disease, asthmatic, and any other chronic disease that may affect maternal and fetal wellbeing, were excluded.

Methods

After obtaining an ethical approval from AL Hayat hospital committee, 76 pregnant women with above-mentioned criteria were informed about the study, and the verbal consent was taken from them. They were classified into two groups:

- **Group A:** 36 pregnant women who were subjected to GA.
- **Group B:** 38 pregnant women who were subjected to SA.

Both groups were compared with regard to MAP, time of delivery (time in minutes from induction of anesthesia until the baby delivery) in the mother side and Apgar score in the neonatal side. Other demographic characteristics were also compared such as the mothers' age and residency.

The data were collected and analysed using Excel from Microsoft office version 2010 and SPSS from IBM version 20.

Table 1. Apgar scores

Score	0	1	2
heart rate (pbm)	0	Less than 100	More than 100
respiration	0	irregular or gasping breath	Regular breathing
muscle tone	limp	normal movement or decreased	active movement
Colour	blue, pale	acrocyanosis	completely pink
response to catheter	nil	grimace	cough

For calculating the mean arterial pressure (MAP), the following formula was used.

$$MAP = \frac{SBP + 2(DBP)}{3}$$

Results

A total of 74 pregnant women who were admitted to Al Hayat private hospital for fertility and labor for the elective C/S, were included in the study according to the above-mentioned criteria.

Table 2. The comparison between groups A & B regarding their age

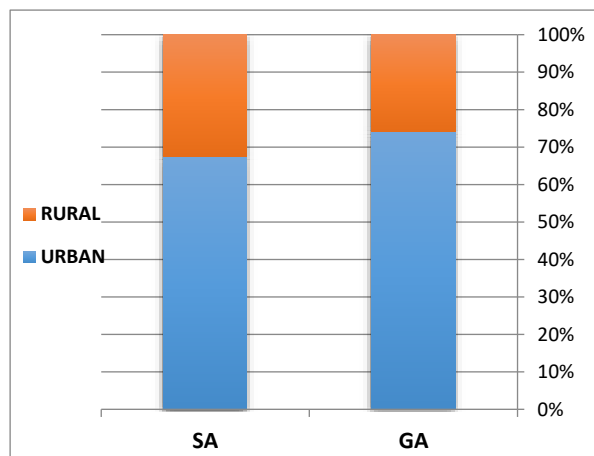|	Group A (GA)	Group B (SA)	P-value
Mean (yrs)	28.2	27.7	
Max (yrs)	37	45	0.7
Min (yrs)	17	15	

Figure 1. The comparison between groups A & B regarding their residency.

Table 3. The comparison between groups A & B regarding the delivery time, APGAR score for 1st and 5th min and MAP.

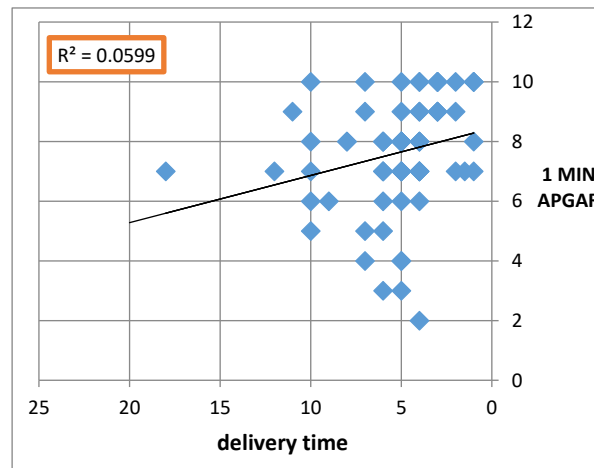| Parameters	GROUP	N	Mean	Std. Deviation	P-value
Delivery Time	A	36	4.6	2.75	0.5
	B	38	5.9	2.83	
1 min APGAR	A	36	7.7	1.93	0.6
	B	38	7.5	1.76	
5 MIN APGAR	A	36	9.4	0.84	0.2
	B	38	8.9	0.85	
MAP	A	36	103.9	11.85	0.00
	B	38	84.7	18.96	

Figure 2. The correlation between delivery time and 1st min APGAR score for the both groups.

Discussion

There has been a general impression in Iraqi pregnant women that spinal anesthesia has been harmful, so they have always preferred general anesthesia. However, there should be an evidence-based clue to support each type of anesthesia against the other. In this paper, it was tried to show which type of anesthesia was superior considering mothers and babies.

In delivery time, it was found that GA anesthesia group delivered by a mean time of 4.6 minutes (STD 2.75), which was shorter than SA group (5.9 minutes, STD 2.83). However, this difference was not statistically significant. [6] in his study concluded that, in case of a delay in delivery, 6-8 minutes of delivery time in GA prevents the neonatal respiratory depression, due to the inhalant nitrous oxide crossing the placenta [6]. This finding agreed with the results of this study (figure.2) which showed that APGAR score was adversely affected by the increment in the delivery time for the both groups.

There was no significant difference with regard to APGAR score (1 & 5 minutes) in the both groups. This finding agreed with [7] who found a higher APGAR score with SA group, but again, it was not statistically significant. However, this was against the results of [8] who found a significant improvement in APGAR score in SA group (P value < 0.0005) for the first minute. [8] unlike the study of [7], enrolled a smaller cohort, which might be attributed to this difference.

Spinal anesthesia has been commonly associated with the systemic hypotension as a result of anesthesia of sympathetic nerves. SA also caused a decrease in cardiac preload and volume, both with bradycardia to decrease the arterial blood pressure [9].

The MAP in this study was much lower for SA anesthesia than GA group (84.7±18.96 versus 103.9±11.85 mmHg, respectively). However, this mean drop in MAP in SA group remained within the acceptable range and did not adversely affect the neonates (P-values 0.6 & 0.2 for 1 & 5 minutes; respectively).

Studying other maternal outcomes in both types of anesthesia such as bowel sound, gas discharge, urine output and hematocrit, have been suggested by the researchers.

Conclusion

It was concluded that SA in cesarean section, when compared to GA group, gives longer delivery time, but higher APGAR score for both 1 & 5 minutes, although these finding were not statistically significant. Again SA group sustained lower MAP than those delivered by GA, but it remained within the acceptable limit.

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