

HEART RATE PREDICTIONS AS A SYMPTOMATIC PARAMETER OF HYPOTENSION FOR CAESAREAN SECTION PATIENTS

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ABSTRACT

BACKGROUND

The current day anaesthetist faces a myriad of challenges in conditions of be it like elective or emergency like caesarean section. The administration of sedative results in the physiological consequence, which might complicate the deliveries. The selection of the drug might or might not be the significant outcome in handling the situation.

MATERIALS AND METHODS

The Mean Blood Pressures variation would be the indicative parameters as prediction upon the constrictive confirmation resulted from the rise in heart rates from baseline for the complications during or prior the procedure of deliveries. However, the significance is emphasised irrespective of the analgesic usage postoperative. The current article has made us understand the preparation and parameter predictions for successful foetal handling, post the study for the successful handling of the caesarean deliveries.

RESULTS

The drug used has shown the advantage of avoiding the usage of inhalation agents in addition to the dosage level used safety for even the neonates. The efficacy and safety is also marked by the study.

CONCLUSIONS

The duration of induction has also given a procedural significance for future studies. The drug safety for mother and foetus is also evaluated through the current study, which was also one of the aims prior to our design of study.

KEYWORDS

Anaesthesia (General/Neuraxial), Hypotension, Heart rate, Caesarean section, Mean Blood pressures, Tramadol.

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INTRODUCTION: Caesarean deliveries rate is 30% of all the deliveries, the rate is remaining unchanged during the last decade period. The widely opted choice during caesarean deliveries across the world is general or neuraxial anaesthesia. Hypotension is the physiologic consequence of anaesthesia, which might have potential deleterious maternal and foetal impact. For the management of hypotension after neuraxial anaesthesia, usage of vasopressors has been the classic option, which results in increase of systemic vascular resistance and also rise in mean blood pressures. However, over the last few years, the understanding of hypotension after neuraxial anaesthesia in obstetrics and the use of vasopressors to counteract it is steadily evolving.

The perplexity resulting from the neuraxial blockade is implicated by the physiological changes of pregnancy and puerperium leading to hypotension on an average in 85% of the mothers receiving spinal anaesthesia for caesarean section. Anaesthesia administration in particular to the parturient is to be performed with utmost cautious and carefulness along with expertise as the anaesthetist has to consider his skill in both the mother and the foetus. It is also evident that during caesarean section complications might occur from surgical and/or anaesthetic conditions.^[1] Additionally, complications could be encountered in early postoperative period and very rarely in the long term in obstetric outcomes. Sharwood-Smith et al, based on their studies in pre-eclamptic women, challenged the understanding that reduced central venous pressure led to decreased cardiac output and arterial pressures. They concluded that "Venous Capacitance" rather than venous pressure maybe the determinant in causing hypotension after anaesthesia in obstetrics.^[2,3] The "endothelium-dependent alteration of vascular smooth muscle function" and increased presence of "vasodilator prostaglandins and nitric oxide" during pregnancy have a vasodilatory effect, which is counteracted by the intrinsic sympathetic vascular tone.^[4]

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This intrinsic vascular tone is adversely effected after spinal anaesthesia resulting a fall in blood pressure. Studies show that cardiac output remains nearly unchanged even after sympathetic blockade^[5] challenging the concept that in parturients, spinal anaesthesia results in decrease in cardiac output.^[6] Despite the varied understanding of hypotension following neuraxial anaesthesia in pregnancy, vasopressors are the only catalyst packs in regaining the arterial pressure and mitigating the possible adverse maternal and foetal impact.^[7] This article explores the present understanding of the mechanism causing hypotension before discussing the few vasoconstriction agents use in current day obstetric anaesthesia. Hypotension and bradycardia after conduction of spinal anaesthesia are common and may lead to few complications. Any incidences or risk factors of bradycardia, which in turn reflect to the result of hypotensive conditions in the patients receiving anaesthesia was the purpose of this present study.

MATERIAL AND METHODS: The authors study design was prospective in a single-blind and hospital-based study considering 80 patients, post anaesthetic procedure studied to identify the incidence of hypotension (>30% decreased systolic blood pressure) and bradycardia (Heart rate <60 beats/min.). Correlation of the historical, clinical and physiologic data was performed with the incidences by univariate analysis. Logistic regression was performed to identify the variables with a forward stepwise algorithm. A p value >0.05 was considered significant. Patients were selected irrespective of the American Society of Anaesthesiologists (ASA PS) physical status classification and also irrespective of their medical condition. Within this pool of patients were 2 with asthma and 1 patient was diabetic and 2 of them were obese. The patients were divided into 2 groups.
 Group 1: Those given Tramadol 1 mg/Kg, 10-15 minutes before induction of anaesthesia.
 Group 2: Those given Tramadol 2 mg/Kg IV, 10-15 minutes before induction of anaesthesia.

Inclusion Criteria:

Patient's Age: 18-35.

ASA Grade: I and II.

Healthy Single-term foetus.

Exclusion Criteria:

- Prevalence of cardiac or respiratory disorders/diseases.
- Neurological and Endocrine disorders.

The general anaesthesia was standardised to induction with thiopentone 3 mg/kg intravenously. Maintenance was done with mixture of oxygen and nitrous oxide. Ventilation balancing and controlling was with Atracurium 0.5 mg/kg intravenously. The baseline heart rate, systolic, diastolic and mean blood pressures were monitored in the patients. Condition of baby was observed using APGAR score after 1 min., 5 mins., 12 hrs. and 24 hrs.

RESULTS: The observations during the study for the parameters are given in Table - 1.

Sl. No.	Parameters	Results	
		Group - I	Group - II
1	Peak Heart Rates at 120/min.	34	37
2	Rise in Heart rates <20 from baseline	28	30
3	Peak SBP up to 140 mmHg	27	35
4	Variations in Mean BP	30	38
5	Uterine Requirements	7	5
6	1 st Analgesic dose postoperative	3 hrs.	4.5 hrs.
7	Blood Transfusion due to blood loss	1	0

Table 1

Time Interval	APGAR Scale	Results	
		Group - I	Group - II
1 Min.	5-7	7	4
	8-10	32	35
5 Mins.	5-7	1	0
	8-10	40	40
12 Hrs.	5-7	0	0
	8-10	40	40
24 Hrs.*	5-7	0	0
	8-10	40	40

Table 2

The APGAR score findings among the time intervals observed is tabulated in TABLE - 2.

*- After 24 hrs., neurobehavioural response of the neonates was observed and no depression was found in both the groups. Group (n=40).

The observance of requirement of first dose of analgesic on postoperative ward had a 60-90 mins. window demarcation among the two study groups. The dose requirement was earlier being in group I than compared to group II.

DISCUSSION: Though, several established preloading methods in several reviews of literature proves that hypotension is prevented from spinal anaesthesia. The discussion is still contraindicative about the route of anaesthetic administration for caesarean deliveries. Globally, there is an increasing uptrend in the caesarean deliveries rates. The effect of anaesthesia on the cardiovascular system is because of the anaesthetic agent injected in the subarachnoid space resulting in the blockade of preganglionic fibres.^[8] There might be considerable variation in the normal haemodynamic status based upon the degree of anaesthetics administered.

The factors like age, health, concurrent medications if any and vascular fluid status might play a role in the hypotension differences also.^[9,10] The haemodynamic changes give the predictions of the depth of anaesthesia during the intraoperative duration. A rise in heart rate and SBP drop from baseline up to a range of 20 was considered acceptable given the peak values of SBP to be up to 140 mmHg and heart rates to be at 120/min. where the variation was <0.05 and considered insignificant. The heart rate variations in either of the groups resulted in hypotension. A total of 35% patients in Group I and 20% in Group II showed hypotension levels intraoperatively. Significantly, no uterine tone was affected in any patient because volatile inhalation agent was totally avoided or used in very low concentration in the case(s). One patient in each Group had atrial fibrillation and presented with a heart rate of 160/min., preoperatively. Blood loss was found significant in only one patient who required blood transfusion. It is better to prevent than treat hypotension as it is hazardous to both the foetus and the mother. Though, it is controversial about the degree of hypotension, which requires treatment.^[11] A widely accepted and standardised classification or scaling system is required to scientifically study the degree of hypotension assessment and heart rates variations to be observed for prediction accuracy during the deliveries.^[11,12] The safety and efficacy of the drug dosage for the pain relief effects post caesarean deliveries is widely discussed as per Jyotsna et al and Mabu Shareef et al.^[13,14] The drug at clinically relevant doses it is devoid of significant sedative and respiratory depressant, hence the advantage of drug has been used by administering 15 minutes before induction of anaesthesia. In case of emergencies, the drug was given in the preoperative room before shifting the patient to the labour room. It has been observed that the average drug injection to delivery interval is around 25 minutes. Additionally, it is also emphasised that there were no untoward effects on neonate due to the drug dosage and usage. The babies were found to be rigorous post 15-20 mins. of delivery when they were sent to Neonatal Intensive Care Unit (NICU).

CONCLUSION: The variation in blood pressure from systolic to mean values was the outcome to predict the hypotensive effect. The variations in heart rate of all the subjects eventually also showed the differences in blood pressures also emphasising to the issue of leading to predictions of hypotension. Usually, patients also fail to cooperate, which may complicate the surgical procedure due to the hypotension. It is also a valuable adjunct to supplement analgesic balanced anaesthesia for caesarean and emergency alike. Only baseline heart rate variation could also give elusive information in early awareness to the anaesthetic for safety with respect to the foetal outcome. As

widely evident, bradycardia leads to hypotension, the variations in heart rate in the study can be the predictive hypotensive factor for preparing for the preventive measures during the surgeries.

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