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Comparison of Vasopressor Effects of Phenylephrine and Mephenteramine during Spinal Anaesthesia for Ceasarian Section

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Abstract

Caesarian sections are mostly done under regional anaesthesia, especially spinal anaesthesia, in many places. Many of the patients develop hypotension after spinal anaesthesia. A fall in blood pressure of more than 20% from baseline value is hazardous to both mother and the baby. Various methods had been tried to alleviate this response. Preloading with crystalloid solution, maintaining a left lateral tilt, elevating the foot end, and pharmacological therapy using vasopressors are all tried. Common vasopressors used are Mephenteramine and Ephedrine. Now Phenyl ephrine is the vasopressor of choice. Here we are looking at the prophylactic effect of phenylephrine given intravenously along with spinal anaesthesia, and comparing the property with intravenous Mephenteramine given prophylactically along with spinal anaesthesia in full term pregnant subjects. All our subjects were aged between 18 to 40 years, weighing less than 70 kg, satisfying ASA1 criteria. Development of side effects like nausea, vomiting, retrosternal discomfort was also noted. Our subjects who received prophylactic vasopressors supported haemodynamic status of the subjects effectively till the delivery of the baby. Subjects who received intravenous phenyl ephrine developed a transient fall in heart rate which got corrected by itself. None of our subjects developed any hazardous side effects.

Keywords: Phenylephrine; Mephenteramine; Subarachnoid block; Cesarian section.

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Introduction

Choice of anaesthesia for delivering the baby by Caesarian section can be regional anaesthesia or general anaesthesia. More than 80% of pregnant patients coming for Caesarian section under subarachnoid block develop hypotension. More than 20% fall in blood pressure from baseline value is hazardous to mother and baby. A decrease in maternal blood pressure compromises foetal oxygenation leading to foetal acidosis and foetal asphyxia. A decrease in cardiac output precipitates symptoms such as nausea, vomiting, dizziness and decreased maternal consciousness. Supine hypotension syndrome and sympathectomy from subarachnoid block exaggerates hypotension.

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Endothelium dependent alteration of vascular smooth muscle function and increased presence of vasodilator prostaglandin and nitric oxide is counter balanced by intrinsic sympathetic vascular tone which is adversely affected by subarachnoid block.[9] Left uterine displacement by placing a wedge under the right buttocks, preloading with crystalloids[2] and use of vasopressors along with 100% oxygen are the standard protocol to support systolic blood pressure under subarachnoid block. Vasopressors commonly used were Mephenteramine or Ephedrine IM or IV. Uterine arterial pressure depends on maternal blood pressure and cardiac output.

Objectives

1. To evaluate the prophylactic effect of phenylephrine as a vasopressor during spinal anaesthesia for caesarian section.
2. To evaluate the prophylactic effect of mephenteramine as a vasopressor during spinal anaesthesia for caesarian section.
3. To compare the vasopressive property of phenylephrine with mephenteramine during spinal anaesthesia for caesarian section.
4. To assess the safety of using phenylephrine as a vasopressor during caesarian section under spinal anaesthesia.

Materials and Methods

Study Design

Randomized prospective study on full term pregnant subjects aged between 18 to 40 years weighing less than 70 kg, satisfying ASA 1 criteria. We have excluded subjects less than 18 years and above 40 years weighing more than 70 kg, subjects with associated systemic illness like diabetes, hypertension, bronchial asthma cardiovascular and respiratory diseases, foetal distress and drug allergies**.**

Sample Size

Sample size was calculated using the formula n= [SD] 2 [z alpha+ z beta] 2/ delta square with reference to similar other studies.[1] The sample size comes around 30 in each group.

Sampling Method

By block randomization and allocation concealed by sealed envelope.

Ethical Clearance

An ethical clearance was obtained from institution and an individual written and informed consent was obtained from each subject before enrolling them.

Procedure

Full term pregnant mothers aged between 18 to 40 years weighing less than 70 kg satisfying ASA 1 criteria were chosen for the study. The subjects were randomly grouped into 2 groups of 30 each. All elective subjects received oral Ranitidine 150mgm and oral Metaclopropamide 10 mg 2 hours before surgery. All emergency subjects received Inj. Ranitidine 50 mgm and inj. Metaclopropamide 10 mgm intravenously 30 mts before anaesthesia. All our subjects received 500 ml crystalloid solution through an 18g cannula on non dominant hand. Spinal anaesthesia was given using 23g spinal needle at L3-L4 space in lateral position. 1.6 ml of 0.5% Bupivacaine [H] was given to all our subjects. All our subjects received 100% O_2 by Bains circuit and a left lateral tilt was given using 15 degree wedge under right buttocks. Group 1 patients received 100 ugm phenylephrine and Group 2 received 6 mgm mephenteramine intravenously as prophylactic vasopressor along with spinal anaesthesia. Baseline heart rate, systolic blood pressure, diastolic blood pressure were noted and after prophylactic vasopressor every minute till baby was out. Standard monitors were used to monitor the parameters. Any incidence of nausea, vomiting, headache, chest discomfort were also noted. A fall in heart rate less than 50 /minute and a fall in systolic blood pressure below 90mm of Hg needed rescue drugs. Heart rate, systolic blood pressure, and diastolic blood pressure of both groups were collected and recorded in structured proforma. Mean heart rate, mean systolic blood pressure and mean diastolic blood pressure of both groups were calculated and statistically analyzed.

Analysis

Statistical package of social science was used to analyze data with computer. "T'' test was used to compare the 2 groups. Comparability was analyzed with analysis of ANOVA test, Student t tailed test and chi square test. A p value less than 0.05 was considered statistically significant.

Results

Table 1: Showing baseline characters of full term mothers in study group 1 and 2

	Group 1	Group 2
Mean Age	27	27
Mean Weight	52	51
Mean SBP	119	115
Mean DBP	79	77
Mean HR	88	85

Data collected from group 1 and group2 were comparable not only with respect to age, body weight, and gravid status of patients and also in terms of baseline heart rate, systolic blood pressure and diastolic blood pressure (Table 1).

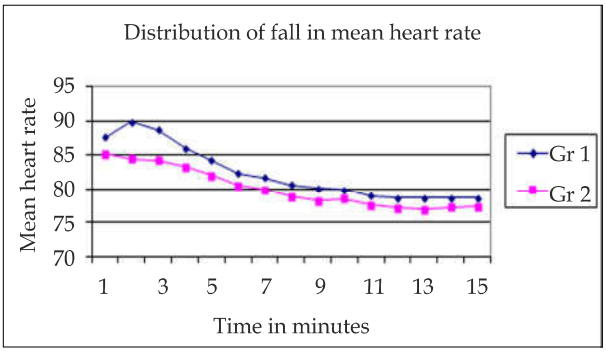

Fig. 1: Distribution of Heart Rate in Group 1 and Group 2

Group statistics of mean heart rate in group 1 and group 2 subjects were compared and presented above. There was a significant fall in mean heart from baseline to 15th minute of prophylactic drug in both groups [$p \leq 0.001$] (Fig. 1).

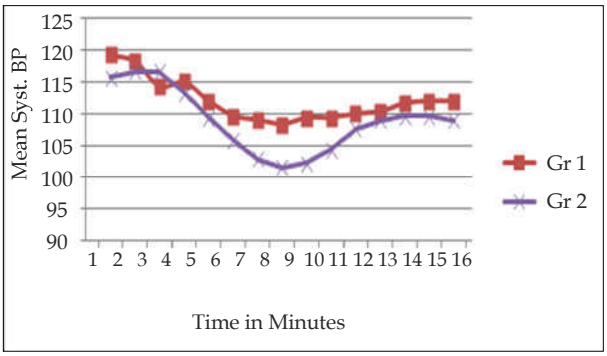

Fig. 2: Mean Systolic Blood Pressure in Group 1 and Group 2

Both vasopressors maintained mean systolic blood pressure at the time of delivery. The difference between the 2 groups was not significant [$p = 0.129$] (Fig. 2).

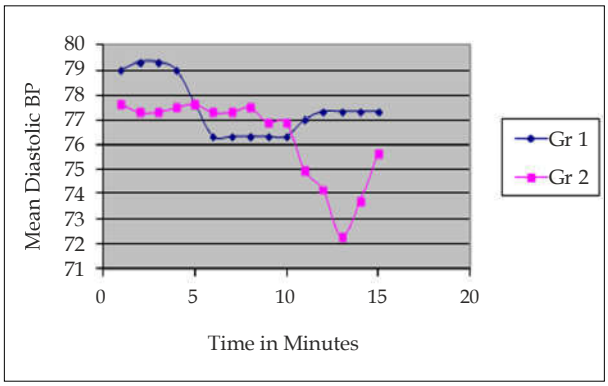

Fig. 3. Mean Diastolic Blood Pressure in Group 1 and Group 2

Mean diastolic blood pressure in group 1 and group 2 were compared and represented in the above figure. The mean diastolic blood pressure was significant in group 1 from12 th to 14 th minute in group 1. [$p = 0.008$] (Fig. 3).

Discussion

The groups were comparable with regards to distribution of age, weight, gravid status, mean systolic blood pressure, mean diastolic blood pressure and heart rate as shown in the table and figures given above. There was a significant fall in heart rate from baseline to 15th minute of prophylactic vasopressor in both groups [$p \leq 0.001$]. Sahoo[1] noted a rise in heart rate in the mephenteramine group, and a fall in heart rate in the phenylephrine group. Here vasopressors were given at the time of hypotension. We had given both vasopressors prohylactically in the study. Maternal bradycardia was more with phenylephrine.[4,5] In our study the heart rate did not fall below 50/mt in both groups. Sahoo et al had one patient who developed bradycardia.[1]

Both vasopressors effectively maintained systolic and diastolic blood pressure in our study. Sahoo had noted that 80% of patients in phenylephrine group required only single dose of the drug. All our subjects maintained a systolic blood pressure above 90 mm of Hg with single intravenous bolus dose of vasopressors in both groups. The diastolic blood pressure in group 1 was better maintained than in group 2,[3] and Cooper and others[5,7,8,9,10,11] state that phenylephrine is the most effective and safe vasopressor for caesarian section under spinal anaesthesia.

Sahoo[1] had noticed nausea and vomiting in 10% of subjects who received phenylephrine and 15% patients who received mephenteramine. None of our patients complained of nausea and vomiting.

Ngan kee found that 100 micrgm phenylephrine effectively supported maternal blood pressure during caesarian section under spinal anaesthesia.[5,7-19] David Cooper et al.[3], in their study state that phenylephrine is most effective vasopressor for caesarian section under spinal anaesthesia. Nausea and vomiting was also less with phenylephrine. Many other studies[5,7-11] state that phenylephrine is a better vasopressor in caesarian section. We also found phenylephrine is an effective vasopressor with minimum side effects.

Conclusion

Phenylephrine can be used safely to alleviate hypotension under spinal anaesthesia for caesarian section. Both Mephenteramine and phenylephrine supported the blood pressure during delivery of the baby. None of our subjects developed nausea and vomiting.

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