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Ephedrine Versus Phenylephrine In Controlling Spinal Anaesthesia Induced Maternal Hypotension During Cesarean Section.

Paikray Elisha , Samal R, Mohapatra S
(Department of Pharmacology, S.C.B Medical College & Hospital, India)

Abstract: Maternal hemodynamic changes are common after spinal anaesthesia during caesarean section. Our study aims to compare efficacy of ephedrine and phenylephrine in treatment of hypotension secondary to spinal anaesthesia for caesarean section and their effects on foetal outcome. This observational cross-sectional study was conducted in parturient attending Obs. & Gynae OPD from August 20.A total of 50 patients 18 to Nov 2018.A total of 60 patients were included in study. Assessment was done in terms of BP & HR (recorded every 2 mins for 20 mins and every 5 min till the end of surgery.), neonatal Apgar score(at 1 & 5 mins of delivery). All data were tabulated as mean ± SD. P value <0.001 was considered statistically significant
Ephedrine & Phenylephrine are efficient in treating spinal anaesthesia induced maternal hypotension during caesarean section without any adverse effects on neonates.

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I. INTRODUCTION

Spinal anaesthesia is widely used for caesarean section because of better patient compliance, cheap, efficacious and safe. Hypotension induced by spinal anaesthesia has been estimated to occur in approximately 80 to 90 % of the patients. Sustained hypotension may be detrimental to both mother and foetus. Vasopressors like ephedrine, phenylephrine & mephentermine are used for managing hypotension. Traditionally, Ephedrine "which has stronger β –adrenergic and weaker α –adrenergic effects" has been used to manage hypotension.[2] But its position has been challenged because of potential complications like supraventricular tachycardia, vomiting and foetal acidosis. [1] Phenylephrine, an α - adrenergic agonist is being used for treatment of maternal hypotension[2] The main aim is to compare the efficacy of Ephedrine and Phenylephrine in controlling maternal hypotension after spinal anaesthesia during caesarean section and secondarily to see the side effects of above vasopressors on neonatal outcome was assessed using Apgar score at 1 & 5 minutes of birth..

II. MATERIAL AND METHODS

This observational cross-sectional study was carried out on patients of Department of Obstetrics and Gynaecology in collaboration with Department of Pharmacology at S.C.B Medical College and Hospital, Odisha from August 2018 to November 2018.A total of 50 patients aged >18 years were included in this study.
Study Design: Observational cross-sectional study
Study location: This was a tertiary care teaching hospital-based study done in of Department of Obstetrics and Gynaecology in collaboration with Department of Pharmacology at S.C.B Medical College and Hospital, Cuttack, Odisha.
Study Duration: August 2018 to November 2018
Sample size: 50 patients

Subjects & selection method: The study population was selected from the patients attending the Obs. & Gynae OPD, S.C.B MCH for confinement through caesarean section using spinal anaesthesia.

Inclusion criteria:

- ASA Grade I parturient.
- Age 18- 35 years.
- Normal singleton pregnancy.
- >36 weeks of gestation.

Exclusion criteria:

- Pregnancy induced hypertension.
- History of diabetes mellitus, cerebro-vascular & cardiovascular disease.
- Contraindication to spinal anaesthesia.
- History of taking medication that could influence hemodynamic parameters were excluded

Procedure methodology:

After written informed consent was obtained, a well-designed study proforma was used to collect the data of the recruited patients. The proforma included socio - demographic characteristics such as name, contact number, registration number, maternal age, maternal weight(kg), maternal height (cm), gestational age (weeks), gravida, duration of anaesthesia, duration of surgery, total fluids during anaesthesia, total no. of vasopressors given and incidence of nausea and vomiting.

In this study maternal hypotension was defined as a decrease in systolic blood pressure ***> 20 % of baseline value.*** Vasopressors – Ephedrine or Phenylephrine was administered to treat hypotension. The patients were divided into 2 Groups, 25 each. Group E & P received 6mg/ml bolus increments and 100µg/ml bolus increments respectively.

After written informed consent was obtained, a well-designed study proforma was used to collect the data of the recruited patients. The proforma included socio - demographic characteristics such as name, contact number, registration number, maternal age, maternal weight(kg), maternal height (cm), gestational age (weeks), gravida, duration of anaesthesia, duration of surgery, total fluids during anaesthesia, total no. of vasopressors given and incidence of nausea and vomiting. Blood pressure, heart rate were recorded from the baseline value then after giving vasopressors every 2 minutes till the end of surgery. Neonatal APGAR score was recorded at 1 & 5 minutes of birth

Changes in systolic blood pressure, diastolic blood pressure & heart rate from the basal values, after giving bolus dose of ephedrine and phenylephrine was recorded every 2 mins till the end of surgery. Neonatal APGAR scoring was done at 1 and 5 minutes of birth.

Statistical analysis:

Data were expressed as mean ± SD. Intergroup comparison was done by student t –test (unpaired) . P value < 0.05 was considered statistically significant

III. Result

Table no 1: Patient's characteristics and intraoperative variables in two groups.

PARAMETERS	GROUPE (n=25) Mean ± SD	GROUP P (n=25) Mean ± SD	P Value
Age (years)	28 ± 3.1	29 ± 4.2	0.72
Height (inch)	63.9 ± 1.4	62.7 ± 4.8	0.62
Weight (kg)	61.9 ± 6.8	63.2 ± 2.6	0.62
Gestational age (weeks)	38 (37 -39)	39 (37 -39)	1.0
Duration of anaesthesia (min)	67.5 ± 9.56	65.2 ± 9.23	0.65
Total no. of vasopressors	2 (1-3)	2(1-2)	0.25
Incidence of vomiting	5(20%)	2(8%)	0.34

Table no 2: Changes in Systolic blood pressure (mean ± SD)

- The systolic blood pressure decreased 2 -5 min after induction of spinal anaesthesia. The Vasopressors (bolus dose) were administered immediately and SBP increased significantly in both group. On intergroup comparison, the systolic blood pressure was significantly higher after Phenylephrine at 2,4 and 6 min than after Ephedrine (P < 0.001).

Intervals	Systolic BP (mm Hg)		P Value
	Group E	Group P	
Basal value	122.3 ± 16	124.3 ± 14.6	>0.05
HP* (VP given)	94.8 ± 12.4	95.1 ± 10.15	>0.05
2 min after VP#	108.2 ± 11.98	118.3 ± 8.29 ^	0.001
4 min "	109.5 ± 14.28	122.5 ± 10.2 ^	0.001
6 min "	113.5 ± 13.4	122.6 ± 13.5 ^	0.001
8 min "	116.8 ± 15.8	121 ± 13.8	>0.05
10 min "	119.9 ± 13.5	120.3 ± 13.7	>0.05
14 min "	116.9 ± 10.38	120.1 ± 10.4	>0.05
20 min "	115.1 ± 9.04	119.7 ± 8.3	>0.05
30 min "	117.1 ± 8.8	122.5 ± 7.5	>0.05
*HP- Hypotension : #VP- Vasopressor			

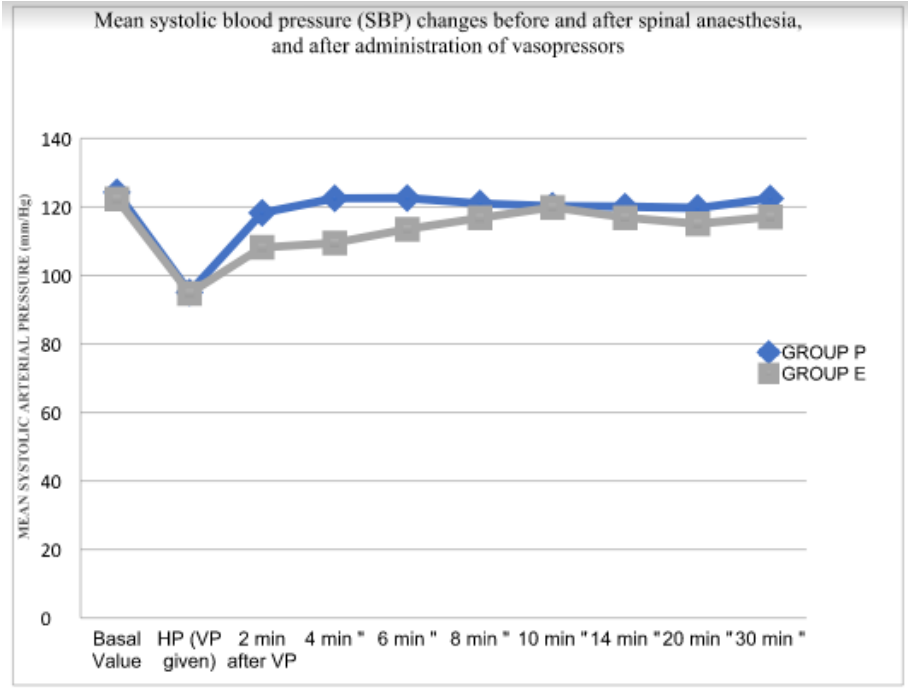

Table no 3: Changes in diastolic blood pressure (Mean ± SD)

- There was a fall in DBP after spinal anaesthesia. The DBP increased significantly after vasopressors administration. However there was no significant difference in diastolic blood pressure at all time intervals ($p>0.05$) in both groups.

Intervals	Diastolic BP (mm Hg)		INTERGROUP Comparison
	Group E	Group P	
Basal value	81.7 ± 8.3	82.5 ± 8.1	>0.05
HP* (VP Given)	67.1 ± 7.8	67.1 ± 5.8	>0.05
2 min after VP#	66.1 ± 8.3	68.3 ± 7.2	>0.05
4 min "	70.1 ± 7.1	72.3 ± 7	>0.05
6 min "	72.9 ± 8.5	75.9 ± 8.2	>0.05
8 min "	76.4 ± 8.8	76.7 ± 4.4	>0.05
10 min "	80.2 ± 9.5	78.6 ± 6.4	>0.05
14 min	80.5 ± 6.4	79.3 ± 4	>0.05
20 min "	80.6 ± 6.4	81 ± 5.7	>0.05
30 min "	78.7 ± 5.5	80 ± 4.6	>0.05
*HP- Hypotension : #VP- Vasopressor unpaired t- test			

Table no 4: Changes in Heart Rate (Mean ± SD)

- Heart rate increased in both groups during hypotension induced by spinal anaesthesia. In group E, there was no change in post-drug HR till the end of surgery. .In group P, there was a significant decline in post-drug HR at 2 min and continued till end of surgery .On intergroup comparison there was a significantly increase in HR in Group E at 2, 4 & 6 minutes, in comparison to Group P.

Intervals	Group E (n=25)	Group P (n=25)	P value
Basal value	96.7 ± 21	99.6 ± 17	>0.05
HP (VP Given)	108.1 ± 18	114.8 ± 22	>0.05
2 min after VP	111.3 ± 23	91.5 ± 17 ^	<0.001
4 MIN "	108.1 ± 24	88.6 ± 17 ^	<0.001
6 min "	103.2 ± 27	93.9 ± 19 ^	<0.001
8 min "	102.8 ± 25	97.6 ± 16	>0.05
10 min "	104.2 ± 18	97.6 ± 17	>0.05
14 min "	106.4 ± 16	98.4 ± 13	>0.05
20 min "	108.9 ± 16	98.4 ± 13	>0.05
30 min "	106.6 ± 12	101 ± 12	>0.05

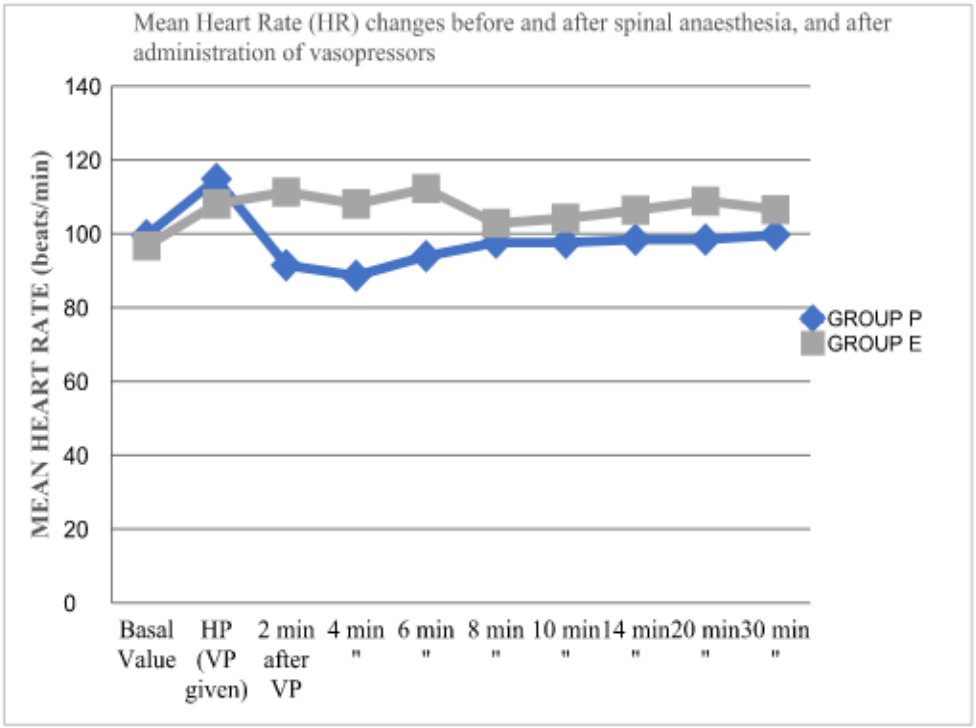

Table no 5: Neonatal outcome in two groups

GROUPS	APGAR SCORE AT DIFFERENT TIME INTERVALS	
	1 min	5 min
Group E (n= 25)	8.32 ± 0.27	9.69 ± 0.31
Group P (n=25)	8.59 ± 0.29	9.76 ± 0.32
P Value	0.23	0.16

IV. Discussion

The most important physiological response to spinal anaesthesia involves the cardiovascular system. In this study both the vasopressors effectively maintained blood pressure within 20 % limit of baseline values.

Phenylephrine maintained SBP better in first six minutes as it has a peak effect within one minute, whereas Ephedrine has a peak effect of 2-5 minutes. The result of this study is in accordance with the study of ***Lee et al & Adigun et al*** but not with ***Magalhaes et al*** as they concluded Ephedrine more effective then Phenylephrine.

There was no statistically significant difference in diastolic blood pressure in both the groups. In this study, there was significant reduction in tachycardia (2, 4 & 6 min.) in patients receiving Phenylephrine than those receiving Ephedrine. This result is in accordance with result of ***Lee et al & Adigun et al.*** In spinal anaesthesia since slowing of the heart rate can be expected on the basis of the Brain -bridge reflex.

There was no difference in Apgar score between both groups, at one and five minutes of birth. This result is in concordance with result of ***Cooper et al & Ngan et al***.

V. Conclusion

Phenylephrine and Ephedrine are both effective vasopressors for treatment of hypotension induced by spinal anaesthesia, though Phenylephrine maintained SBP better than Ephedrine in the first six minutes. Phenylephrine effectively controlled tachycardia, unlike Ephedrine, which may be advantageous in cardiac patients and in patients in whom tachycardia is undesirable. Both the drugs had no deleterious effects on neonatal outcome.

References

[1]. Riley ET, Cohen SE, Rubenstein AJ, Flanagan B. Prevention of hypotension after spinal anaesthesia for caesarean section: 6% hexastarch versus lactated Ringer's solution. .

[2]. Jackson R, Reid JA, Thorburn J. Volume preloading is not essential to prevent spinal induced hypotension at caesarean section. Br J Anaesthesia 1995; 75: 262-5.

[3]. Karinen J, Rasonen J, Alahuhta S, Jouppila R and Jouppila P. Effect of crystalloid and colloid Pre-loading on uteroplacental and maternal haemodynamic state during spinal anaesthesia for caesarean section. Br J Anaesthesia 1998; 75: 531-35.

[4]. Corke BC, Dutta S, Ostheiner GW, Weiss JB, Alper MH. Spinal anaesthesia for caesarean section. The influence of hypotension on neonatal outcome.
[5]. Thomas DG, Robson SC, Redfern N, Hughes D, Boys RJ. Randomized trial of bolus Phenylephrine or Ephedrine for maintenance of arterial pressure during spinal anaesthesia for caesarean section.

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