

TO COMPARE THE EFFICACY OF INTRAMUSCULAR PHENYLEPHRINE AND EPHEDRINE IN LSCS TO AVOID POST SPINAL HYPOTENSION

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HOW TO CITE THIS ARTICLE:

Jaideep Singh, Pallavi Singh, Aditya Agarwal, Pooja Ahuja. "To Compare the Efficacy of Intramuscular Phenylephrine and Ephedrine in LSCS to Avoid Post Spinal Hypotension". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 19, March 05; Page: 3247-3253, DOI: 10.14260/jemds/2015/470

ABSTRACT: INTRODUCTION: Hypotension during Spinal Anesthesia Subarachnoid block for LSCS is secondary to the sympathetic blockade and aorto-caval compression by the uterus and it can be deleterious to both fetus and mother. Ephedrine and phenylephrine improve venous return after sympathetic blockade during Subarachnoid block. **AIMS AND OBJECTIVES:** The objective of this study was to assess the role of Intramuscular phenylephrine and ephedrine and to compare the efficacy of Intra muscular Phenylephrine and ephedrine in LSCS to avoid post spinal hypotension. **MATERIALS AND METHODS:** Ninety patients undergoing subarachnoid block with 0.5% Bupivacaine heavy for LSCS in Left Lateral Position in L₃ - L₄ Interspinous space via 25 G Spinal Needle under full asepsis were randomly divided into 3 groups. **GROUP A:** Received neither i.m. phenylephrine nor i.m. ephedrine. Only Co-loading with crystalloid. **GROUP B:** Received intramuscular ephedrine (25 mg) 10 minute prior to spinal anaesthesia & Co-loading with crystalloid. **GROUP C:** Received intramuscular phenylephrine (2 mg) 10 minute prior to spinal anaesthesia. & Co-loading with crystalloid. **PATIENT SELECTION CRITERIA: INCLUSION CRITERIA:** Full Term Pregnancy, ASA Grade - I and Grade - II. **EXCLUSION CRITERION:** Contraindications for spinal block, coagulopathies, eclamptic and preeclamptic patient. **INVESTIGATION REQUIRED:** Routine Investigation, CBC, PTT, APTT, INR, Urine Investigation. **DISCUSSION:** Phenylephrine and ephedrine are comparable vasopressors when used to treat hypotension during caesarian section after spinal anaesthesia. Significant difference in HR between groups can primarily attributed to the decline in HR observed with phenylephrine and increase in HR associated with Ephedrine. The incidence of tachycardia was significantly higher in Ephedrine group due to its B₁-agonist property. Furthermore, the incidence of fetal tachycardia with Ephedrine was more significant in another study. This studies shows significant hypotension in Group -A in which no vasopressors were given as compared to Group -B (Ephedrine) and Group-C. (Phenylephrine). If we compare Group-B and Group-C, significant hypotension observed in Group-B as compared to Group C. Ephedrine increases B. P by increasing the release of Norepinephrine and has not been shown to decrease blood flow to uterus. However, many recent studies shows decrease in fetal umbilical PH while phenylephrine doesn't. This again corroborates the conclusions drawn from extensive review article by Lee et al. that fetal umbilical pH was lower in parturients who received ephedrine than in those who received phenylephrine. Furthermore our results are in concurrence with a number of recent studies indicating nausea and vomiting more with Ephedrine usage. **RESULT:** Decline from the basal heart rate was observed in phenylephrine group but was not significant across all measured times except at T=4, T=6 and T=8 min. An increase in heart rate from basal levels was seen in ephedrine group across all times and this at each time was significant. No significant difference in SBP between the groups was recorded at all measured points except at T = 4 min and T= 6 min, where SBP of patients in group B was significantly lower than SBP of patients in group C (p < 0.05). Diastolic blood pressure was comparable between

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the ephedrine and phenylephrine groups for all measured times. Overall, phenylephrine was associated with a significantly better maintained systolic blood pressure ($p < 0.05$) and mean blood pressure ($p < 0.05$) as compared to ephedrine. **CONCLUSION:** Both ephedrine and phenylephrine can safely be employed to combat hypotension in patient undergoing caesarian section under spinal anaesthesia. My study reports Phenylephrine as better vasopressors compared to Ephedrine regarding prevention and control of maternal hypotension. The incidence of nausea, vomiting, maternal tachycardia are more with ephedrine usage than phenylephrine.

KEYWORDS: Intramuscular, Phenylephrine, Ephedrine, LSCS, Post Spinal Hypotension.

INTRODUCTION:

- Spinal anaesthesia is now a days considered the standard anaesthetic technique for elective caesarian section [1] because of the introduction of small gauge, non-cutting spinal needles.
- However, the chance of hypotension is a major limitation of this technique. The incidence of hypotension is more than 80% without any prophylactic measures. [2,3]
- The hypotension with or without bradycardia has detrimental effects on both mother and foetus.[4,5]
- Maternal symptoms include nausea, vomiting and a sense of “impending doom” from inadequate cerebral perfusion. Inadequate treatment of hypotension can ultimately end with the loss of consciousness and cardiovascular collapse.
- The fetus is indirectly affected by the development of hypotension, because of its dependency on maternal uterine artery pressure for adequate uterine blood flow.
- With a persistent reduction in uterine blood flow, fetal acidosis will occur. The incidence of hypotension can be lowered by several ways but till date, no single method completely prevents hypotension.[4,5]
- Over the last few years, there is a trend to rely more on vasopressors than either crystalloid or colloid alone.[4,6,7]
- Different vasopressors are commonly used at present with varying degree of success like ephedrine phenylephrine, epinephrine, mephentermine.[6]

METHODS AND MATERIAL:

INCLUSION CRITERIA:

- Older than 18 years.
- A.S.A physical status I or II weighing more than 50 kg and less than 90 kg uncomplicated singleton pregnancy beyond 36 weeks scheduled to have elective caesarean section under spinal anaesthesia.

EXCLUSION CRITERIA:

- Pregnancy induced hypertension.
- Chronic hypertension.
- Cardiac disease.
- Renal disease.
- Foetal anomaly.
- Diabetes mellitus.
- Patients on chronic medication.

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TYPE OF STUDY:

- Prospective, Randomised, double blind study.
- ECG, NIBP, urine output and SPO2 were monitored.
- Baseline maternal hemodynamic variables were recorded.
- Intravenous preloading was done with 15 ml/kg Ringer's lactate solution.
- Spinal anaesthesia was administered at L3-L4 interspinous space with Quinke's spinal needle 25G in left lateral position under full asepsis.
- A dose of 12.5 mg hyperbaric bupivacaine was given over 10-13 sec.
- Patients were randomly allocated by block randomization method, where one patient had every chance to get allocated in any group by randomized method.
- 90 Patients were divided into 3 groups, 30 each.

GROUP-A: Received no vasopressor.

GROUP-B: Received 15 mg of intramuscular ephedrine 10 min before spinal anesthesia.

GROUP-C: Received 2mg of intramuscular phenylephrine 10 min before spinal anesthesia.

- Patients were given either intramuscular phenylephrine or Ephedrine by anaesthesiologist who was blinded about the drug in the labeled syringe.
- Patients were placed supine with 15 degree left-tilt immediately after the spinal injection.
- If hypotension occurred, defined as fall of SBP < 90 mmHg or 20% less than the basal SBP, patients were given either intramuscular phenylephrine or Ephedrine by anaesthesiologist who was blinded about the drug in the labeled syringe.
- Time of vasopressor administration, duration of surgery and time of neonate extraction were recorded after the start of surgery.
- SBP, DBP and Heart rate were taken every 2 min after the spinal until cord clamping and thereafter every 5 min till surgery completed.
- All incidences of bradycardia, tachycardia, nausea and vomiting noted. Neonatal well-being was taking care by attending neonatologist.
- Patients were monitored postoperatively for 24 hr for adverse effects.

STATISTICAL ANALYSIS:

- Summary statistics of age, weight for all the 3 groups were reported as mean +SD
- Intra and intergroup analysis for HR, SBP, DBP, MAP were statistically evaluated using one way ANOVA and paired T-test, where $p=0.05$ was considered significant and $p<0.001$ highly significant.
- Complications nausea, vomiting, tachycardia and bradycardia were evaluated with Fisher's Exact test, where $p<0.05$ was considered significant and $p<0.001$ highly significant.

RESULTS:

- Decline from the basal heart rate was observed in phenylephrine group but was not significant across all measured times except at T=4, T=6 and T=8 min.
- An increase in heart rate from base levels was seen in ephedrine group across all times and this at each time was significant.

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- No significant difference in SBP between the groups was recorded at all measured points except at T = 4 min and T= 6 min, where SBP of patients in group B was significantly lower than SBP of patients in group C ($p < 0.05$).
- Diastolic blood pressure was comparable between the ephedrine and phenylephrine groups for all measured times.
- Overall, phenylephrine was associated with a significantly better maintained systolic blood pressure ($p < 0.05$) and mean arterial pressure ($p < 0.05$) as compared to ephedrine.

Time (min)	Control group means(SD) (beats/min)	Ephedrine group means(SD) (beats/min)	Phenylephrinegroup means(SD) (beats/min)	p value
Basal	87(16.92)	82.8(18.32)	87.85(13.62)	0.3989
0	83(14.05)	86.5(20.01)	81.45(13.35)	0.4633
2	85(8.04)	86.1(8.03)	85(14.48)	0.8985
4	83(7.58)	89.7(17.42)	77(10.72)	0.0009
6	89(11.41)	86.1(9.84)	80(7.45)	0.0019
8	95(12.08)	97.77 (12.88)	87.30 (14.23)	0.0077
10	86(9.08)	101.18 (12.93)	92.78 (13.78)	0.019
15	99(11.89)	101.86 (11.96)	92.68 (11.88)	0.0119
20	98.02(9.91)	101.09 (11.89)	94 (12.32)	0.015
25	102(8.33)	102.98 (11.99)	95.54 (11.09)	0.0155
30	102.43(11.23)	101.87 (12.93)	94.23 (11.09)	0.0134
45	103.11(10.87)	101.09 (12.29)	94.87 (11.09)	0.176
60	101.88(11.23)	98.75 (11.87)	95.34 (10.87)	0.088

TABLE 1: MEAN HEART RATE VALUES



FIG. 1: SYSTOLIC BLOOD PRESSURE

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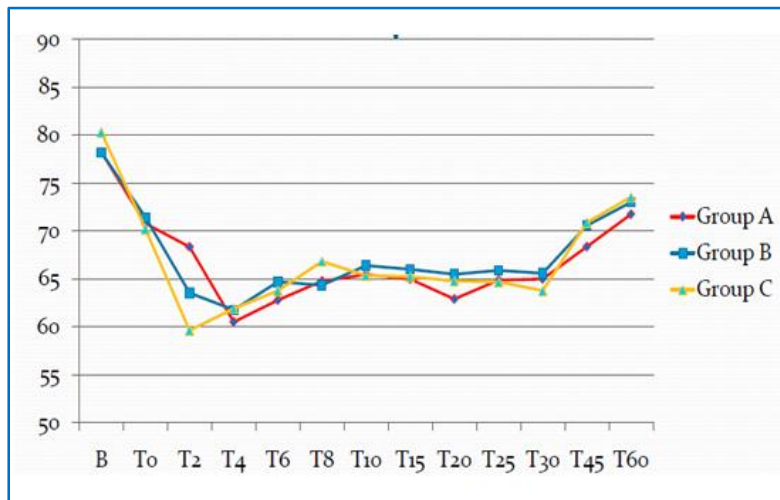


FIG. 2: DIASTOLIC BLOOD PRESSURE

Control group means (SD)	Ephedrine group means (SD)		Phenylephrine group means (SD)	P value
Time of vasopressor administration (min)	4.62 (5.1)	4.66 (4.9)	3.87 (3.76)	0.7581
Maximum HR after vasopressor administration (beats/min)	105.4 (12.44)	110.8 (10.54)	98.78 (8.76)	0.0002
Minimum HR after vasopressor administration (beats/min)	93.76 (12.45)	91.31 (11.97)	75.76 (10.87)	<0.0001
Maximum SBP after vasopressor administration (mmHg)	124.76 (7.99)	125.46 (8.45)	127.87 (8.32)	0.3147
Minimum SBP after vasopressor administration (mmHg)	98.72 (19.78)	99.87 (12.99)	105.01 (9.99)	0.2223

TABLE 2

Complications between groups A Control group, n (%)	B Ephedrine group, n (%)	C Phenylephrine group, n (%)	
Nausea	10(33.3)	6(20)	2(6.6)
Vomiting	10(33.3)	7(21)	2(6.6)
Decline in heart rate	2(6.6)	1(3.3)	12(40)
Tachycardia	4(13.3)	10(33.3)	0(0)

TABLE 3

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DISCUSSION: Phenylephrine and ephedrine are comparable vasopressors when used to treat hypotension during caesarian section after spinal anaesthesia.

Significant difference in HR between groups can primary attributed to the decline in HR observed with phenylephrine and increase in HR associated with Ephedrine.

The incidence of tachycardia was significantly higher in Ephedrine group due to its B1-agonist property.^[8]

Furthermore, the incidence of fetal tachycardia with Ephedrine was more significant in another study. Though FHR was not measured in this study. (mention references).

This studies shows significant hypotension in Group –A in which no vasopressor given as compared to Group –B (Ephedrine) and Group-C. (Phenylephrine). If we compare Group-B and Group-C, significant hypotension observed in Group-B (Ephedrine) as compared to Group C.

Ephedrine increases B.P by increasing the release of Norepinephrine and has not been shown to decrease blood flow to uterus. However, many recent studies shows decrease in fetal umbilical PH while phenylephrine doesn't.^[9,10] This again corroborates the conclusions drawn from extensive review article by Lee et al. that fetal umbilical pH was lower in parturients who received ephedrine than in those who received phenylephrine.

Furthermore our results are in concurrence with a number of recent studies indicating nausea and vomiting more with Ephedrine usage.^[11,12]

CONCLUSION: Both ephedrine and phenylephrine can safely be employed to combat hypotension in patient undergoing caesarian section under spinal anesthesia.

My study reports Phenylephrine as better vasopressoras compared to Ephedrine regarding prevention and control of maternal hypotension.

The incidence of nausea, vomiting, maternal tachycardia are more with ephedrine usage than phenylephrine.

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FINANCIAL OR OTHER

COMPETING INTERESTS: None

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Date of Submission: 05/02/2015.
Date of Peer Review: 06/02/2015.
Date of Acceptance: 23/02/2015.
Date of Publishing: 03/03/2015.