



## A STUDY OF PROPHYLACTIC PHENYLEPHRINE INFUSION FOR PREVENTING HYPOTENSION DURING SPINAL ANAESTHESIA FOR CESAREAN SECTION:

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### ABSTRACT

**BACKGROUND:** Hypotension after spinal anaesthesia for Caesarean section still remains a common complication. Various methods have been recommended for prevention and treatment of this problem. However, despite crystalloid or colloid preloading, hypotension remains a common problem. Vasopressors are required to treat the spinal induced hypotension among most of these patients. Studies involving bolus phenylephrine are in plenty but studies pertaining to prophylactic phenylephrine infusion are sparse.

**KEYWORDS :** Prophylactic Phenylephrine; Subarachnoid Block; Bupivacaine; Hypotension, Cesarean section.

### INTRODUCTION:

Delivery of a baby by Caesarean section has become increasingly common. A number of factors account for the increased section rate. It has been commonly accepted that serious trauma to the baby can be eliminated by avoiding potentially difficult midforceps or vaginal breech delivery and performing a Caesarean section instead. The widespread use of electronic and biochemical foetal monitoring prior to and during labour has made it easier to identify a foetus in jeopardy and promptly deliver the baby by the abdominal route. The clinical impression that Caesarean section is less traumatic for the tiny foetus and concerns over potential lawsuits in cases of poor neonatal outcome, have also encouraged obstetricians to perform Caesarean sections with less positive indication than in the past. Conduction anaesthesia is the most commonly used anaesthetic for Caesarean section. Spinal anaesthesia appears to be the preferred technique.<sup>1</sup>

Although the spinal block offers several advantages like sensory block, muscle relaxation, minimal risk of aspiration, and a well awake patient to assess clinical condition, it is often associated with significant adverse effects like hypotension. Hypotension is one of the commonest problems following spinal anaesthesia for Caesarean section, potentially endangering both mother and child. Measures to decrease the incidence and severity of maternal hypotension include left uterine displacement, fluid preload, prophylactic vasoconstrictors, trendelenburg position and leg compression etc.<sup>2</sup> Traditionally, ephedrine has been the vasopressor of choice in pregnant women. The use of  $\alpha$ -agonists has generally been avoided since the 1970s because of concerns<sup>2</sup> about their potential adverse effect on uterine blood flow. However, in a quantitative, systematic review of randomized controlled trials of ephedrine versus phenylephrine for the management of hypotension during spinal anaesthesia for cesarean delivery, Lee and colleagues showed that there was no difference between ephedrine and phenylephrine in efficacy. They did find, however, that women given phenylephrine had neonates with higher umbilical cord blood pH values than women given ephedrine, although the risk of true fetal acidosis (umbilical pH value of 7.20) was similar in both groups. Because acidotic changes in the umbilical arterial pH are sensitive indicators of reduced uteroplacental perfusion, the authors concluded that their finding was indirect evidence that uterine blood flow may in fact be better with phenylephrine compared with ephedrine.<sup>3-6</sup> So this randomized study is performed to determine the efficacy of prophylactic phenylephrine infusion in preventing spinal hypotension following subarachnoid block for cesarean section in our patient group.

### AIMS AND OBJECTIVES

1. To determine the efficacy of prophylactic phenylephrine on the

incidence of hypotension in patients receiving spinal anaesthesia for elective cesarean section

### MATERIALS AND METHODS:

Patients posted for elective cesarean section under spinal anaesthesia in A.J. Institute of medical sciences.

### METHOD OF COLLECTION OF DATA

This is a randomized controlled study performed over a period of one year from November 2015 to November 2016. The study was carried out on 50 patients between the age group of 20-35 years belonging to American society of Anesthesiologist (ASA) grade II who were scheduled for elective Caesarean section during the study period under spinal anaesthesia.

Patients were allotted into 2 groups on basis of random sampling method. In Group I the patients received intravenous prophylactic phenylephrine infusion at 100 $\mu$ g/min for 3min after completion of intrathecal injection. Then each min SAP was measured and infusion stopped if SAP > baseline and continued or restarted if less than or equal to baseline SAP. Intravenous phenylephrine bolus 100 $\mu$ g was given when SAP is decreased to <80% of baseline. In Group II- the patients received intravenous phenylephrine bolus 100 $\mu$ g when SAP is decreased to <80% of baseline

### INCLUSION CRITERIA:

1. Singleton full term pregnant patients, age 20- 35yrs of ASA grade II scheduled for elective cesarean section under spinal anaesthesia

### EXCLUSION CRITERIA:

1. Patients above 35yrs
2. Patients below 20 yrs
3. Patients having resting blood pressure >140/90mm Hg, history of hypertension, preeclampsia / eclampsia, hyperthyroidism
4. Patients having co- existing neurological, cerebrovascular, cardiovascular, renal, metabolic, psychiatric disorder
5. Patients with glaucoma, occlusive vascular disorder
6. History of hypersensitivity to local anesthetics and any contraindications to spinal anaesthesia or having known fetal abnormalities
7. Fetal distress

### Parameters to be studied:

1. Systolic and diastolic blood pressure every minute after induction of spinal anaesthesia up to the extraction of the baby.
2. Incidence of hemodynamic adverse effects

This is a prospective randomized comparative study conducted at the Department of Anaesthesia, A.J. Institute of Medical Sciences, Mangalore. 50 patients aged between 20 to 35 years belonging to

ASA grade II, scheduled for elective cesarean sections were randomly allocated into one of the two groups. Group I (n=25) received intravenous prophylactic phenylephrine infusion at 100µg/min for 3min after spinal anaesthesia. Then each min SAP was measured and infusion stopped if SAP> baseline and continued or restarted, if less than or equal to baseline SAP. Intravenous phenylephrine bolus 100µg was given when SAP is decreased to <80% of baseline. Group II (n=25) received only intravenous phenylephrine bolus 100µg when SAP decreased to <80% of baseline. After 1 minute of SAP and DBP were recorded every minute till the extraction of the baby.

## RESULTS:

**Table 1: Comparison of basic parameters between two groups**

Basic characteristics	Group I	Group II	P value	t value
Age	25.84 ± 2.89	25.04 ± 2.28	0.2855	1.08
Weight	64.20±5.63	64.88±2.33	0.5794	0.558
Height	157.72±4.83	155.68±2.64	0.0705	1.85

The variations in mean systolic blood pressure in group I, group II after SAB were in the range of 123.00- 128.47 mm Hg and 98.44-126.84 mm Hg respectively. Both the groups had similar preinduction SBP; however, after SAB the mean systolic blood pressure was higher in the infusion group and was statistically significant.

The variations in mean diastolic blood pressure in group I, group II after SAB were in the range of 72.7600-81.0000 mm Hg and 63.4800-74.2400 mm Hg respectively. Both the groups had similar preinduction DBP; however, after SAB the mean diastolic blood pressure was higher in the infusion group and was statistically significant.

The variations in mean Mean blood pressure in group I, group II after SAB were in the range of 89.6000-95.0000 mm Hg, 76.4000-91.7600 mm Hg respectively. Both the groups had similar preinduction MBP; however, after SAB the mean. Mean blood pressure was higher in the infusion group and was statistically significant.

**Table 2: Comparison of incidence/episodes of hypotension between two groups**

Incidence of Hypotension	Group I (n=25)	Group II (n=25)
Absent	24 (96.42)	25 (100%)
Present	1(3.57)	0
Episodes	2	54
Inference	Number of episodes of Hypotension is significantly less in Group I and significantly more in Group II with p=0.0001	

## DISCUSSION:

In our study, we also observed that the incidence of hypotension is 3.57% (n=1/25) in group I and 100% in group II. It was observed that the incidence of hypotension was higher in group II. This reflects a more stable management of blood pressure can be achieved by phenylephrine infusion as it uniformly maintains the plasma level of this vasopressor. In our study we observed that the difference in systolic blood pressure, diastolic blood pressure and mean blood pressure were highly significant between the two groups.

The SBP, DBP and MBP were consistently higher in the infusion group when compared to the control group. This probably was due to the stimulation of post synaptic  $\alpha$  receptors by phenylephrine resulting in intense arterial and peripheral vasoconstriction causing rise in blood pressure.

However, we found that the required dose of phenylephrine was much higher in the infusion group than the control group. At term, uterine vascular bed is maximally vasodilated and unable to autoregulate when perfusion pressure is reduced. Consequently a higher adrenoceptor density renders uteroplacental blood flow potentially vulnerable to vasoconstriction induced by  $\alpha$  adrenergic agonists. Indeed infusion of phenylephrine @ 8µg/kg/min has

been reported to decrease ovine uteroplacental blood flow by 50% however the relationship between phenylephrine dose and uterine vascular resistance is not linear and dramatic increases in Uterine vascular resistance seen only to appear with doses greater than 100µg/min thus, the satisfactory fetal outcome in human studies may simply reflect the lower doses used. This which is consistent with our study where the infusion rate was 100µg/min.<sup>7</sup>

## CONCLUSION:

A prophylactic infusion of phenylephrine 100 µg/min in patients receiving spinal anaesthesia for elective cesarean delivery decreased the incidence and frequency of hypotension without any deleterious neonatal outcome.

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