PROPHYLACTIC PHENYLEPHRINE REDUCES THE RISK OF HYPOTENSION AFTER SPINAL ANAESTHESIA IN PARTURIENT PATIENTS UNDERGOING CESAREAN SECTION

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ABSTRACT

Objective: To demonstrate the stability of blood pressure in parturient patients undergoing caesarean section in spinal anaesthesia after prophylactic dose of phenylephrine.

Study Design: Quasi experimental study.

Place and Duration of Study: The study was carried out at Combined Military Hospital Bahawalpur, from Jan 2018 to Jun 2018.

Methodology: In this study a total of 100 patients were taken, (only females) divided in two equal groups, fulfilling the inclusional criteria. Group A was given Inj phenylephrine 50 micrograms (50ug) intravenously right after spinal block and group B was not given anything until required. Non invasive blood pressure was monitored before Spinal anaesthesia then at 01, 03 and 05 mins after the Spinal anaesthesia. Digital monitor was used for noninvasive blood pressure monitoring. The result of non invasive blood pressure was recorded in mmHg. Detailed procedure was explained to patients.

Results: In our study, baseline interval non invasive blood pressure was 107.5 ± 4.75/67.5 ± 7.20 mmHg in group A and 118.3 ± 5.64/78.6 ± 3.94 mmHg in group B. After 01 min it was 112 ± 5.22/70 ± 6.3 mmHg in group A and group B had 103.6 ± 4.94/59.8 ± 2.79mmHg. After 03 mins group A had 108 ± 4.25/74 ± 5.62 mmHg and group B had 85.3 ± 3.14/49.6 ± 2.90 mmHg. Finally, at 05 mins, non invasive blood pressure in group A was 99.5 ± 4.11/63.6 ± 3.34 mmHg and group B had 77.1 ± 3.26/47.8 ± 3.67 mmHg. Group A has significant results (p<0.05) while statistically significant decreased in group B when compared with group A.

Conclusion: When phenylephrine was given prophylactically immediately after spinal anaesthesia, patients remained hemodynamically stable with less incidence of hypotension.

Keywords: Caesarean section, Hypotension, Non invasive blood pressure, Phenylephrine.

INTRODUCTION

Spinal anaesthesia is considered to be safer than general anaesthesia especially in parturient patients who are candidates for caesarean section as it reduces the risk of failed endotracheal intubation and risk of pulmonary aspiration[1]. Spinal anaesthesia has been shown to reduce the requirement of oxytocin,time to first analgesic requirement, lesser hospital stay, reduce bleeding and improved hematocrit as compared to parturient undergoing undergoing caesarean section under general anaesthesia[2]. As every procedure has pros and cons; spinal anaesthesia is associated with risk of hypotension which can be catastrophic in parturients with limited cardio-vascular reserve or hypovolemia[3]. Hence post-spinal hypotention requires preemptive measures, early recognition and prompt management to prevent maternal morbidity and mortality[4]. An anaesthetist has sole responsibility for keeping patient comfortable and hemodynamically stable. Various methods are used for prevention of maternal hypotension. These include fluid preload or coload, mechanical leg compression, reduced dose of local anaesthetic combined with adjuvants and prophylactic ephedrine or

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phenylephrine[5]. Phenylephrine is considered to be safer and potent which is a selective alpha-1 receptor blocker and can be administered as prophylactic as well as treatment of hypotension[6].

The objective of this study was to find out whether hypotension after spinal anaesthesia can be prevented with prophylactic phenylephrine. It will enable us to prevent fall in blood pressure which is due to sympathectomy after spinal anaesthesia.

METHODOLOGY

This study was carried out at the department of Anaesthesiology, Combined Military Hospital Bahawalpur from 1st July 2017 till 31st December 2017. After approval from Hospital Ethics Committee. Sample size was calculated by using WHO sample size calculator, one hundred (n=100) ASA I and II female patients aged between 20 to 45 years fulfilling the inclusion and exclusion criteria were selected by non probability purposive sampling. The anticipated population proportion was 26% and 81.6% hypotension in the two groups[7]. Selected patients were assigned randomly by lottery method either to group A (n=50) or B (n=50) and they were kept blinded to the intervention.

In this study, all the patients were explained with the protocols of the procedure in detail and informed written consent was taken. Inclusion criteria: Age (20-45 years), Single intrauterine pregnancy, ASA (American society of Anaesthesiologists) class I and II. Exclusion Criteria: Patients refusal for participating in study, patients with PIH (Pregnancy induced Hypertension) or other comorbids, ASA class III and above, contraindication to Spinal block, multiple intrauterine pregnancy. Baseline vitals were recorded in the preoperative holding area[18]. intravenous cannulae was passed in right arm of the patients and were preloaded with 1000 ml Ringer lactate solution 15 minutes prior to surgery. Patients were taken to operation theatre after following all the operation theatre protocols.

On operation table; ECG electrodes were placed, BP cuff was applied which was then attached to the cardiac monitor and baseline NIBP was measured by oscillatory method electronically. Patients were made to sit for Spinal anaesthesia. Patient's back was cleaned and draped with pyodine solution; 2 ml of 2% inj lignocaine is locally infiltrated into the skin before inserting spinal needle and 25 G spinal needles was introduced in L3-L4 vertebral space with midline approach. After establishing a good free flow of cerebrospinal fluid, 1.5 ml (11.25mg) of hyperbaric inj bupivacaine 0.75% was injected using barbotage technique.

In group A injection phenylephrine 50ug was given intravenously immediately after spinal anaesthesia and patients were lied down again in supine position with a wedge under right buttock for uterine displacement and oxygen was given through face mask. Effectiveness of spinal anaesthesia was determined by temperature sensitivity and motor response.

NIBP was recorded after 1 mins, then after 3 mins and finally after 5 mins in mmHg. In group B some patients who developed hypotension even after the preloading were given bolus intravenous doses of phenylephrine to prevent any further complication.

Data was analyzed by Statistical Package for Social Sciences (SPSS) version-19. Descriptive statistics i.e. Means and standard deviations were computed for difference NIBP (systolic and diastolic blood pressure) between two groups and then independent sample t-test was applied to compare means and 95% confidence interval. *p*-value of ≤0.05 considered significant.

RESULTS

Demographic characteristics of patients in each group are summarized and compared in (table-I). The groups were comparable to each other in demographic characters as shown by their respective *p*-values.

Comparison of Mean non-invasive systolic blood pressure of both groups showing statistically significant *p*-value (<0.05) systolic blood

pressure at baseline and at regular intervals (table-II).

Comparison of Mean non-invasive diastolic blood pressure of both groups showing statistically significant *p*-value (<0.05) diastolic blood pressure at baseline and at regular intervals (table-III).

Table-I: Comparison of demographic characteristics of both the groups.

Number (n)	Group A (n=50)	Group A (n=50)	*p*-value
Age (years)	26.80 ± 6.395	28.54 ± 5.650	0.01
American Society of Anesthesiologist-Status-1	41 (82%)	37 (74%)	
American Society of Anesthesiologist -Status-2	9 (18%)	13 (26%)	

Table-II: Comparison of mean non-invasive systolic blood pressure of both groups.

Non-Invasive Blood Pressure	Group A (n=50)	Group B (n=50)	*p*-value
Time Interval	Mean non-invasive systolic blood pressure Scores (Mean ± SD)	Mean non-invasive systolic blood pressure Scores (Mean ± SD)	
Baseline	107.5 ± 4.75 mmHg	118.3 ± 5.64 mmHg	<0.01
After 1 min	112 ± 5.22 mmHg	103.6 ± 4.94 mmHg	
After 3 mins	108 ± 4.25 mmHg	85.3 ± 3.14 mmHg	
After 5 mins	99.5 ± 4.11 mmHg	77.1 ± 3.26 mmHg	

Table-III: Comparison of mean non-invasive diastolic blood pressure of both groups.

Non-Invasive Blood Pressure	Group A (n=50)	Group B (n=50)	*p*-value
Time Interval	Mean non-invasive diastolic blood pressure Scores (Mean ± SD)	Mean non-invasive diastolic blood pressure Scores (Mean ± SD)	
Baseline	67.5 ± 7.2	78.6 ± 3.94	<0.01
After 1 min	70.5 ± 6.3	59.8 ± 2.79	
After 3 mins	74 ± 5.62	49.6 ± 2.9	
After 5 mins	63.6 ± 3.39	47.8 ± 3.67	

DISCUSSION

Spinal anaesthesia is considered a safer technique than general anaesthesia[7], it still has certain complications due to effects on central nervous system, most of them are minor and self resolving. These side effects involves relative hypotension, bradycardia, patient anxiety, post-dural puncture headache and even cardiac arrest in some patients[8]. Relative hypotension is very significant and common complication in parturient patients almost occurring in 25%-75% population[9]. There are certain other risk factors that may also contribute to hypotension; such as increased maternal/patient age, obesity, NPO for longer periods which contribute to hypovolemia and concurrent general anaesthesia[10]. To avoid this dreadful complication a variety of methodologies have been adopted by the anaesthetists such as fluid preloading or co loading, use of vasopressor drugs so that patient remains hemodynamically stable and comfortable during and after surgery[11]. Mercier *et al*[12], stated in his study that the incidence of hypotension can be as high as 70 to 80% when pharmacological prophylaxis is not used. Intravenous administration of phenylephrine increases both systolic and diastolic pressure, a slight decrease in cardiac output and a substantial increase in peripheral resistance[13]. The elimination half life of phenylephrine is 2.5 to 3.0 hours. The bolus dose of phenylephrine lasts for 15 mins and is therefore needs to be repeated every 15 min. Jennifer *et al* states in her study that phenylephrine is a vasopressor of choice in obstetric patients[14]. Mitra *et al*[15], noted that among vasopressors, phenylephrine is now established

as a first line drug to prevent postspinal hypotension,

This study was carried out to test the hypothesis that the incidence of hypotension can be reduced by giving prophylactic dose of phenylephrine immediately after spinal anaesthesia in a parturient for elective caesarean section. In our study 24% patients of group A and 70% patients of group B developed hypotension. The findings of our study are comparable with the study published in Journal of Anaesthesia & Clinical Research in 2017 in which it was stated that prophylactic phenylephrine reduces the risk of hypotension (26% vs 81.6%) *p*-value <0.001 in parturient patients undergoing elective caesarean section[16].

Ortiz-Gomez *et al*[17], observed postspinal hypotension in 50.8% patients of control group, 20.9% patients in group who received phenylephrine and 25.0% patients who received phenylephrine and ondansetron. Mohta *et al*[18], suggested initial bolus dose of phenylephrine of 100 microgram for treatment of hypotension, however we prefer to use 50 microgram of phenylephrine for the prevention of hypotension to balance the risk of hypotension versus reactive hypertension showing phenylephrine being vasopressor of choice both for prevention and treatment of postspinal hypotension. Zwane *et al*[19], observed that the incidence of hypotension was 34%,49% and 61% at MAP thresholds of 60, 65 and 70 mmHg. Hernandez *et al*[20], noticed hypotension SBP <90 in 38.01% patients (*p*=0.000).

The limitation of our study was that patients were given 50 microgram of phenylephrine, study was not conducted with multiple doses. Our study didn't include the number of times patients were given phenylephrine.

CONCLUSION

Parturient patients undergoing caesarean section if given prophylactic bolus dose of phenylephrine immediately after spinal block will have less incidence of hypotension thus decreasing morbidity and mortality.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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