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COMPARISON OF EPHEDRINE VERSUS FLUID PRELOAD IN PREVENTION OF HYPOTENSION AFTER SPINAL ANAESTHESIA FOR CAESAREAN SECTION

Sajid Munir*, Muhammad Boota, Faran Kiyani**

Military Hospital Rawalpindi, *Combined Military Hospital Badin, **Combined Military Hospital Gilgit

ABSTRACT

Objective: To compare the effect of crystalloid preload versus prophylactic ephedrine on blood pressure after spinal anesthesia for elective caesarean section.

Study Design: Randomized control trails (RCT).

Place and Duration of Study: The study was carried out at Combined Military Hospital Peshawar, which is a tertiary care hospital from January 2007 to January 2008.

Methodology: One hundred patients fulfilling the inclusion criteria were selected for this study and randomly divided into two groups of 50 each. Patients of group A were preloaded with Hartman's solution 15ml/kg body weight. Patients in group B received prophylactic intravenous ephedrine 0.25mg/kg body weight just before administration of spinal anesthesia. Blood pressure was recorded before and 03 minutes after administration of spinal anesthesia.

Results: The mean age in group A was 25.54 ± 3.06 years and in group B was 25.34±2.94 years. In group A, there were 6(12%) patients with no/mild hypotension 10(20%) patients of moderate while 34(68%) patients had severe hypotension. In group B 24(48%) patients had no/mild hypotension. Ten (20%) patients had moderate while 16(32%) patients had severe hypotension (p=0.001).

Conclusion: Prophylactic administration of ephedrine is better than crystalloid preload in prevention of significant hypotension in spinal anesthesia for elective caesarean section.

Keywords: Caesarean Section, Ephedrine, Fluid Preload, Hypotension, Spinal Anesthesia.

INTRODUCTION

Spinal anesthesia is considered to be safe as compared to general anaesthesia for caesarean section. Hypotension after spinal anaesthesia for caesarean delivery remains the major clinical problem. The hypotension is caused by an increase in venous capacitance and a reduction in systemic vascular resistance[1,2,3].

Various methods have been employed in preventing the hypotension produced during spinal anaesthesia. These methods include preloading with crystalloids, colloids, prophylactic administration of ephedrine and phenylephrine and physical methods such as wrapping of legs, significantly reduces the incidence of hypotension. All these methods have been employed and tested over time. Jackson et a[l4] compared the protective effect of 1000 ml preload with 200 ml preload of crystalloid solution, administered during and 10 min before spinal anaesthesia. He found no significant difference between the two groups. Hypotension due to spinal anaesthesia is usually prevented by preloading the patient with intravenous fluids[4,5].

The volume preloading is not essential to prevent spinal induced hypotension during caesarean section. Chan et al[5] compared the efficacy of prophylactic ephedrine infusion over fluid preloading in prevention of maternal hypotension during spinal anaesthesia for caesarean section. Other studies compare leg wrapping with phenylephrine for reduction of hypotension, during epidural anaesthesia for caesarean section. It was concluded that prophylactic ephedrine infusion alone is at least as good as fluid preload alone in combating the hypotension associated with spinal anaesthesia for caesarean section. Vasopressors have been shown to be more effective at limiting spinal hypotension than other treatments of hypotension like preloading and left uterine displacement[6,7,8].

Correspondence: Major Sajid Munir, Graded Anesthetist, CMH Badin
Email: terror4400@yahoo.com
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This study was designed to compare ephedrine and crystalloid preload in preventing spinal induced hypotension during caesarean section. The purposed significance of this study is that if it proves that prophylactic administration of ephedrine is better than fluid preload in spinal anaesthesia, it will enable us to prevent significant hypotension in patients undergoing elective caesarean section under spinal anaesthesia as well as avoid unnecessary delay in waiting for preload with fluids.

METHODS

These randomized control trails were carried out at Combined Military Hospital Peshawar which is a tertiary care hospital from January 2007 to January 2008. American Society of Anesthesiology (ASA) status of all the patients undergoing elective caesarean section were assessed. All patients with ASA status 1, aged between 20-30 years and under going elective caesarean section were included in the study. All patients under going emergency caesarean section, with multiple pregnancy, having cardiovascular, pulmonary, renal or liver disease, having history of drug allergy or were unwilling were excluded from the study. One hundred patients fulfilling the inclusion/exclusion criteria were included in this study and they were divided into two groups of 50 each. After seeking permission from the hospital ethics committee, the purpose, procedure and risk benefit ratio of the study were explained to the patients and informed consent was obtained. Those who were willing for the study were divided into two groups (A and B) randomly using random number.

Patients assigned to group A were preloaded with Hartmann's solution 15ml/kg body weight. Patients in group B received prophylactic intravenous ephedrine 0.25mg/kg body weight just before administration of spinal anaesthesia. Blood pressure was recorded before the administration of spinal anaesthesia. Spinal anaesthesia was administered in sitting position with 2 ml of bupivacaine 0.75%, using 25 guage spinal needle. Patients were then placed supine with 15 degree left lateral tilt of operating table to prevent aortocaval compression. Blood pressure was recorded 03 minutes only once after administration of spinal anaesthesia to see the incidence of hypotension.

Patients who developed hypotension in both groups(A and B) received additional doses of 10 mg of ephedrine and intravenous fluids were rushed to treat hypotension.

All the data collected through proforma was entered in the Statistical Package for Social Sciences (SPSS) Version 12.0 and analyzed. The study variables were age, blood pressure before the administration of spinal anaesthesia, blood pressure 3 minutes after the administration of spinal anaesthesia and hypotension. Descriptive statistics was calculated. Mean and standard deviation were calculated for quantitative variable like age, blood pressure before the administration of spinal anaesthesia and blood pressure 3 minutes after the administration of spinal anaesthesia.

Frequencies and percentages were calculated for qualitative variables i.e severity of hypotension (mild/no hypotension is 10% reduction of systolic blood pressure, moderate hypotension defined as 20% reduction in systolic blood pressure or more, severe hypotension is defined as 30% reduction in blood pressure or more).

Independent samples t-test was applied as test of significance for quantitative variables. Chi Square test was applied for qualitative variables. Level of significance was taken as $p<0.05$.

RESULTS

Total 100 patients were included in the study and randomly divided into two equal groups. The mean age in group A was 25.54±3.06 years while the mean age in group B was 25.34±2.94 years. The mean systolic blood pressure before spinal anaesthesia in group A was 128.04±5.19 mmHg while in group B it was 126.06±6.92 mmHg (p=0.08).

The mean diastolic blood pressure before spinal anaesthesia in group A was 76.62±5.57 and in group B it was 74.48±6.38 mmHg (p=0.09).

The mean systolic blood pressure after spinal anaesthesia in group A was 93.20±11.08 mmHg while in group B it was 101.22±11.64 mmHg (p=0.001).

The mean diastolic blood pressure after spinal anaesthesia in group A was 55.64±6.04 mmHg while in group B it was 56.80±7.48 mmHg (p=0.40).

In group A, there were 6(12%) patients with no/mild hypotension 10(20%) patients had moderate while 34 (68%) patients had severe hypertension. In group B there were 24(48%) patients of no/mild hypotension. Ten(20%) patients had moderate. This difference is statistically signifincant (Table-1).

DISCUSSION

Spinal anaesthesia is considered to be safe as compared to general anaesthesia for caesarean section. Hypotension during caesarean section under spinal anaesthesia is very frequent and if not prevented, it can induce complication for the mother and/ or the fetus[1,3].

Prevention and treatment of maternal hypotension associated with spinal anaesthesia for caesarean section remains a problem. Chan *et al*[5] compared the efficacy of prophylactic ephedrine infusion over fluid preloading in prevention of maternal hypotension during spinal anaesthesia for caesarean section. It was concluded that prophylactic ephedrine infusion alone is at least as good as fluid preload alone in combating the hypotension associated with spinal anaesthesia for caesarean section[5].

Table-1: Distribution of patients by hypotension.

Hypotension	Group A (n=50)	Group B (n=50)
	Frequency (%)	Frequency (%)
No / mild hypotension	6 (12.0)	24 (48.0)
Moderate hypotension	10 (20.0)	10 (20.0)
Severe hypotension	34 (68.0)	16 (32.0)

p-value=0.001

Maternal hypotension, the most frequent complication of spinal anaesthesia for caesarean section, can be associated with severe nausea or vomiting which can pose serious risks to the mother. Ephedrine is significantly more effective than crystalloid in preventing hypotension. Interventions such as prophylactic administration of ephedrine, phenylephrine infusion, or lower leg compression can reduce the incidence of hypotension. Regardless of the fluid loading strategy, the incidence of maternal hypotension is high. Prophylactic or therapeutic vasopressors may be required in a significant proportion of patients. It is un-necessary to delay surgery in order to deliver a preload of fluid[9].

Hanss *et al*[10] demonstrated that mean systolic blood pressure was 105±14 mmHg. But in control patients with high baseline demonstrated hypotension lowest SBP was 78±15 mmHg. But in our study after spinal anaesthesia the mean systolic blood pressure was 93.20±11.08 mmHg in group A while the mean systolic blood pressure after spinal anaesthesia in group B was 101.22±11.64 mmHg. The mean diastolic blood pressure after spinal anaesthesia in group A was 55.64±6.04 mmHg while the mean diastolic blood pressure in group B was 57.80±6.49 mmHg.

In our study, moderate hypotension occurred in 20% patients in group A as well as in group B, while severe hypotension occurred in 68% patients in group A and 32% patients in group B. As compared with the results of Desalu and Kushimo[11] the systolic blood pressure decreases five minutes after spinal block. Ephedrine group had higher mean values of systolic pressure throughout most of the study period than saline group. Hypotension occurred in 70% of patients in saline group and 40% of patients in ephedrine group. Severe hypotension occurred in 40% of saline group and 13.3% of ephedrine group. So these results are very close and comparable with our study. A combination of ephedrine with crystalloid co-load was more effective than fluid preloading with crystalloid or colloid in the prevention of moderate and severe hypotension[12].

In a study conducted by Chan *et al*[5] there was a lower incidence of severe hypotension in the ephedrine group compared with the fluid group (35% vs 65%), although the incidence of moderate hypotension was similar[5]. As compared with our study, the moderate hypotension occurred in 20% in group A as well as in group B while severe hypotension occurred in 68% patients in group A and 32% patients in group B.

Hypotension during spinal anesthesia for caesarean section must be systematically detected, prevented and treated without delay. The volume preloading is not essential to prevent spinal induced hypotension during caesarean section. Ephedrine can be given prophylactically to prevent significant hypotension, and is useful in preventing hypotension as compared to crystalloid preload[6, 7, 8].

CONCLUSION

It is concluded from our study that prophylactic administration of ephedrine is significantly better than crystalloid preload in prevention of hypotension in spinal anaesthesia for elective caesarean section.

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