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CRYSTALLOID PRELOAD VERSUS CRYSTALLOID COLOAD FOR PREVENTION OF SPINAL HYPOTENSION IN ELECTIVE LSCS

Dr Rupali Das* Assistant professor, Department of Anaesthesiology, GBH Medical College, Udaipur, Rajasthan *Corresponding Author

Dr Mary Muanpuii Ralte Head of Department, Civil Hospital, Aizawl, Mizoram

ABSTRACT **Background & Objectives:** Hypotension during spinal anesthesia for cesarean delivery is a common and troublesome complication. Hence the present study evaluated the efficacy of crystalloid preload vs crystalloid coload for prevention of spinal hypotension in elective LSCS. **Materials & Methods:** The study was a randomised controlled trial with two intervention groups (Group P= preload, Group C= coload group). In the Preload group, Ringer lactate 15ml/kg was started 20 minutes before giving spinal. Subsequent vital monitoring was done at an interval of two minutes once spinal was given for 20 minutes. In Coload group, Ringer lactate 15ml/kg was started as soon as spinal is given. Subsequent vital monitoring was done at an interval of two minutes for the next 20 minutes. **Results:** A total of 196 parturients were recruited in the study and were equally distributed among the preload and coload group. In present study, the baseline systolic blood pressure in the preload was 125.46 ± 14.53 and coload was 129.09 ± 12.82. The mean diastolic BP in preload was 76.27 ± 11.27 and in coload was 79.99 ± 9.93. 9. **Conclusion:** No significant differences were observed in the efficacy and safety between crystalloid preload and crystalloid coload for prevention of spinal hypotension in elective LSCS.

KEYWORDS : Spinal Anaesthesia, hypotension, preload, coload.

INTRODUCTION:

Spinal Anaesthesia is considered the technique of choice for elective caesarean delivery due to its technical simplicity, safety, effectiveness and lower cost. However, it commonly results in hypotension which may have significant maternal and fetal adverse effects. Maternal consequences include nausea, vomiting, dyspnea and discomfort. Utero placental perfusion is more closely related to maternal cardiac output rather than blood pressure (BP), with a large placental reserve in normal pregnancy. Nevertheless, prolonged and/or severe maternal hypotension can cause uteroplacental hypo perfusion with deleterious fetal effects. The incidence of post spinal hypotension in parturient without any preventive care taken can be as high as 60-70%.Even with the use of various preventive measures, the incidence of hypotension following spinal anesthesia has been reported as 59.3% to 66.6%. Sustained maternal hypotension has been reported to be associated with fetal hypoxia and acidosis as a result of placental hypo perfusion. Thus, prevention of maternal hypotension following spinal anaesthesia for cesarean section may be beneficial for both the mother and the fetus. Various techniques to prevent hypotension include fluid loading, vasopressor administration and lower limb compression etc. All these techniques have been shown to decrease the incidence of spinal-induced hypotension during caesarean section. But no single regimen has eliminated clinically significant maternal hypotension, and a combination of techniques may be beneficial. Both crystalloids and colloids have been used for circulatory support during spinal anesthesia for caesarean section.

In a recent systematic review including ten randomized controlled trials of crystalloid preload for the prevention of hypotension, Morgan et al.[8] have reported a median incidence of hypotension as 46%. In the recent past, co-loading has generated interest in the prevention of spinal-induced hypotension. Mercier et al[9] suggested that applying fluid loading at the time of administering the intrathecal local anesthetic (coload) may be a more rational approach for the prevention of post spinal hypotension. Co-loading might be physiologically more appropriate because the maximal effect can be achieved during the time of the block. This might increase intravascular volume expansion during vasodilatation from the sympathetic blockade and limit fluid redistribution and excretion.

MATERIALS & METHODS:

STUDY DESIGN: The study was a randomised controlled trial with two intervention groups

1. Group P= preload
2. Group C= coload group

STUDY POPULATION: parturients undergoing elective lower segment caesarean section under spinal anesthesia in the department of anaesthesia, at civil hospital Aizwal were considered as the study population.

The required sample size would be 93 subjects in each of the study group. To account for a 5% loss to follow up another 5 subjects will be included in each of the study groups. Hence the total sample size would be 196 subjects, with 98 subjects in each of the study groups. Randomization, Allocation, concealment, or the use and distribution blinding applied as per requirements of study.

INCLUSION CRITERIA:

1. all uncomplicated cases posted for elective LSCS
2. ASA I and ASA II patients

EXCLUSION CRITERIA:

1. Mothers with pregnancy induced hypertension/known hypertensive/any cardiac condition/ renal disease.

2. In the Preload group: Ringer lactate 15ml/kg was started 20 minutes before giving spinal. Subsequent vital monitoring was done at an interval of two minutes once spinal was given for 20 minutes.

3. In Coload group: Ringer lactate 15ml/kg was started as soon as spinal is given.

Subsequent vital monitoring was done at an interval of two minutes for the next 20 minutes.

MEASUREMENT OF THE OUTCOME OF INTEREST: The hypotension was considered as any reduction in the systolic pressure more than 20% from the baseline in the intraoperative and post-operative period. The systolic and diastolic blood pressure was measured at baseline and at 2 minute intervals until the delivery of the baby after administration of the intervention.

STATISTICAL METHODS: Vital signs parameters (SBP, DBP, heart rate, mean pressure, SPO2) were considered as primary outcome variables. Parity, gestational age, anthropometric parameters were considered secondary outcome variables. Study group (preload Vs coload) was considered as Primary explanatory variable. Descriptive analysis was carried out by mean and standard deviation for quantitative variables, frequency and proportion for categorical variables.

RESULT AND DISCUSSION

Spinal anesthesia in cesarean delivery is advantageous due it its rapid onset and provides a dense neural block. However, this technique also has a certain disadvantage of limited duration anaesthesia and a higher incidence of hypotension.[14]

Commonly used methods for the prevention of hypotension, for example, leg wrapping, anti- thromboembolic stockings, patient positioning, and fluid and vasopressor administration have met with mixed success. Traditionally, crystalloid IV fluids are administered in the 20 min before the induction of spinal anesthesia for cesarean delivery.[13] With the same objective the present study compared the efficacy of crystalloid preload vs crystalloid coload for prevention of spinal hypotension in elective LSCS.

The current study involved a total of 196 parturients, and equally distributed among the preload and the coload group. The difference in the mean age between the 2 groups was very minimal (preload 29.79 ± 5.83years, coload 28.29 ± 5.54years) In preload group, 27 (27.55%) participants were with primi parity and 71 (72.44%) participants were with multi parity. In coload group, 39 (39.79%) participants were with primi parity and 59 (60.20%) participants were with multi parity. The median gestational age between the groups was 40 weeks. The groups were not different with respect to age, weight (63.02 ± 10.4 kg) and height (155.74± 5.56) or anesthetic or surgical characteristics.

The present study the baseline systolic blood pressure in the preload was 125.46 ± 14.53 and coload was 129.09 ± 12.82. The mean diastolic BP in preload was76.27 ± 11.27 and in coload was 79.99 ± 9.93. Similar findings were observed in a study by Wendy et al, were the Baseline heart rate (bpm) preload 88 ± 12 and coload was87 ± 14 and Minimum SBP (mm Hg) showed 91 ± 12 in preload and coload was 93 ±17 Maximum SBP (mm Hg)a 122 ± 11 in the preload and coload displayed 127 ± 12. But the diastolic BP was not recorded in that study.
The current study groups showed no difference in the baseline systolic and diastolic blood pressure and even at 2 mins intervals. Though the statistical difference was noticed in the mean SBP and mean DP at 30 mins interval between the groups, the difference is very minimal to be considered as the variation may not influence the clinical outcome. Similarly, the groups were not different in the mean arterial pressure. The median dose of me phentermine (6mg) administered during c-section was not different between the groups.

Researches comparing colloid co-load with preload[13,15] and crystalloid co-load with colloid co-load,[16] have not demonstrated an advantage of one technique over another. In contrast, Ngan Kee et al.[17] and Gunusen et al.[12]have shown the effectiveness of crystalloid co-load when combined with the vasopressor infusion. However, in this study the efficacy of crystalloid co-load combined with a vasopressor could not be studied as both the groups were given with an equal dose of vasopressor.Few studies[10,18], suggest, coload of RL solution during spinal and general anaesthesia was more apt in maintaining the arterial pressure than by preloading. These studies suggested that co-loading would be more appropriate physiologically and as well a rational approach as the maximum effect could be achieved during the time of the block. Dyer et al. suggested that co-loading might increase intravascular volume expansion during vasodilatation from the sympathetic blockade and limit fluid redistribution and excretion. Rapid crystalloid co- loading soon after induction of spinal anaesthesia rather than as preload over 20 min before spinal anaesthesia for elective caesarean section was reported to be advantageous in terms of managing maternal blood pressure prior to delivery.[10] However the present study showed no marked difference in the blood pressure by preload or coload of RL solution.

Few studies have also assessed the neonatal outcomes with the use of preload and coload in spinal anaesthesia. The neonatal outcomes studied by Twafik et al, were unaffected by the technique of fluid administration as long as maternal hypotension was rapidly and effectively treated.

A study by Wendy et al, concluded that Intravascular volume expansion with 15 mL/kg HES 130/0.4 given as a preload, but not coload, significantly increased maternal Cardiac Output for the first 5 min after spinal anesthesia for cesarean delivery.
The present study showed mean SBP 30 mins of subjects in preload group was 117.45 ±

13.38 and it was 112.91 ± 13.18 in subjects with the coload group, the difference of SBP 30 mins between two groups was statistically significant (P value 0.018). The mean DBP 30 mins of subjects in preload group were 68.89 ± 12.11and it was 65.57 ± 11.15 in subjects with the coload group, the difference of DBP 30 mins between two groups was statistically significant (P value 0.048). Although, the present study showed statistical significance in blood pressure between preload and coload groups, the difference was minimal and did notresult in marked hypotensive condition between the groups. Similar results were reported by Jacob J et al, were the study showed the incidence of hypotension was lesser in the coload group as compared to the preload group (46% cf 60%) but this difference was not significant statistically. Identically another study by Bannerjee et al. reported the incidence of hypotension in the coload group as 59.3% compared with 62.4% in the preload group in a meta -analysis of the use of coload or preload during spinal anaesthesia for caesarean section. They found the difference between the two groups to be statistically insignificant. Hence the present study showed that the preload or coload of crystalloid combined with a vasopressor was comparatively efficient in maintaining hypotension.

CONCLUSIONS:

Spinal anesthesia is considered the technique of choice for elective cesarean delivery due to its technical simplicity, safety, effectiveness and reduced cost. The most common complication of spinal anesthesia is hypotension and the higher incidence of hypotension was recorded by various studies. Crystalloid and colloids IV fluids administered in the 20 min before the induction of spinal anesthesia for cesarean delivery have shown to decrease the incidence of hypotension. A total of 196 parturients were recruited in the study and they were equally distributed among the preload and coload groups. The difference in the mean age between the 2 groups was very minimal (preload 29.79 ± 5.83years, coload 28.29 ± 5.54years) In the preload group, 27 (27.55%) participants were with primi parity and 71 (72.44%) participants were with multi parity. In coload group, 39 (39.79%) participants were with primi parity and 59 (60.20%) participants were with multi parity. The baseline systolic blood pressure in the preload was 125.46 ± 14.53 and coload was 129.09 ± 12.82. The mean diastolic BP in preload was76.27 ± 11.27 and in coload was79.99 ± 9.93. The study groups showed no difference in the baseline systolic and diastolic blood pressure and even at 2 minsintervals. Though the statistical difference was noticed in the mean SBP and mean DP at 30 mins interval between the groups, the difference is very minimal to be considered as the variation may not influence the clinical outcome. Similarly, the groups were not different in the mean arterial pressure. The median dose of mephentermine (6mg) administered during c-section was not different between the groups. The efficacy of crystalloid preload vs crystalloid coload for prevention of spinal hypotension in elective LSCS was comparatively same in this.

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