Section: Anaesthesia

Research

# ASSESSMENT OF INTRAVENOUS NOREPINEPHRINE AND MEPHENTERMINE FOR MAINTENANCE OF BLOOD PRESSURE DURING SPINAL ANAESTHESIA FOR CAESAREAN SECTION

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## Abstract

**Background:** To compare intravenous norepinephrine and mephentermine for maintenance of blood pressure during spinal anaesthesia for caesarean section. **Materials and Methods:** One hundred six parturients selected for elective caesarean section (CS) under subarachnoid block (SAB) were selected and group I subject received boluses of intravenous 8 µg norepinephrine and group II received 6 mg mephentermine for SAIH. Parameters such as systolic blood pressure (SBP), diastolic blood pressure (DBP), Apgar score and adverse effects were recorded and compared in both groups. **Result:** The mean age in group I subject was 24.8 years and in group II was 25.1 years, height was 158.2 cm in group I and 160.5 cm in group II, weight was 63.7 kgs in group I and 63.2 kgs in group II, duration of surgery was 47.3 minutes in group I and 47.2 minutes in group II, APGAR score at 1st minute was 7.31 in group I and 7.38 in group II and at 5 minutes was 9.07 in group I and 9.09 in group II. The difference was non- significant (P> 0.05). There was a non- significant difference in change in systolic and diastolic blood pressure in both groups (P> 0.05). The number of requirement of doses were 1 time seen in 4 in group I and 20 in group II, 2 times seen 11 in group I and 14 in group II, 3 times seen 17 in group I and 11 in group II, 4 times seen 10 in group I and 7 in group II, 5 times seen in 6 in group I and 1 in group II and 6 times seen 4 subjects in group I. The difference was significant (P< 0.05). Side effects reported were nausea/ vomiting seen 4 in group I and 5 in group II, headache seen 8 in group I and 9 in group II, shivering seen 3 in group I and 2 in group II and hypertension seen in 2 in group I and 1 in group II subjects. The difference was non- significant (P> 0.05). **Conclusion:** Intravenous norepinephrine was comparable with mephentermine in maintenance of blood pressure during spinal anaesthesia for caesarean section.

## INTRODUCTION

Spinal anaesthesia induced hypotension (SAIH) is reported in 80% parturients during caeserean section (CS) due to anaesthetic blockade up to T4 level.[1] Severe and sustained SAIH is harmful to both mother and baby. The main challenges in obstetric anaesthesia are selection of the most effective management strategy for SAIH during CS. Many techniques and various vasopressors were studied for SAIH, but no single method was found to be adequate or superior.[2] Spinal block-induced sympatholysis leads to vasodilatation and consequently causes hypotension in mothers. A decrease in systolic pressure can compromise uterine blood flow and foetal circulation, and thus cause foetal hypoxia and acidosis.[3]

Mephentermine is a mixed sympathomimetic with mainly indirect β stimulation effect. It is one of the most commonly used drugs shown to be as effective and safe as ephedrine for SAIH.[4] Norepinephrine is commonly used in septic shock has been showing promising results in many studies for SAIH with respect to maternal haemodynamic stability. It is a potent α-agonist and a weak β-agonist.[5] Considering this, the present study compared intravenous norepinephrine and mephentermine for maintenance of blood pressure during spinal anaesthesia for caesarean section.


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## MATERIALS AND METHODS

One hundred six parturients selected for elective caesarean section (CS) under subarachnoid block (SAB) were selected after considering the utility of the study and obtaining approval from ethical review committee of the institute. All subjects voluntarily gave their written consent for the participation in the study.

Demographic profile such as name, age, gender etc. was recorded. They were randomly divided into 2 groups by convenient sampling method. Group I subject received boluses of intravenous 8 µg norepinephrine and group II received 6 mg mephentermine for SAIH. Parameters such as systolic blood pressure (SBP), diastolic blood pressure (DBP), Apgar score and adverse effects were recorded and compared in both groups. The results were compiled and subjected for statistical analysis using Mann Whitney U test. P value less than 0.05 was set significant.

## RESULTS

Group I subject received intravenous 8 µg norepinephrine and group II received 6 mg mephentermine [Table 1].

The mean age in group I subject was 24.8 years and in group II was 25.1 years, height was 158.2 cm in group I and 160.5 cm in group II, weight was 63.7 kgs in group I and 63.2 kgs in group II, duration of surgery was 47.3 minutes in group I and 47.2 minutes in group II, APGAR score at 1st minute was 7.31 in group I and 7.38 in group II and at 5 minutes was 9.07 in group I and 9.09 in group II. The difference was non- significant (P> 0.05) [Table 2].

There was a non- significant difference in change in systolic and diastolic blood pressure in both groups (P> 0.05) [Table 3].

The number of requirement of doses were 1 time seen in 4 in group I and 20 in group II, 2 times seen 11 in group I and 14 in group II, 3 times seen 17 in group I and 11 in group II, 4 times seen 10 in group I and 7 in group II, 5 times seen in 6 in group I and 1 in group II and 6 times seen 4 subjects in group I. The difference was significant (P< 0.05) [Table 4, Figure 1].

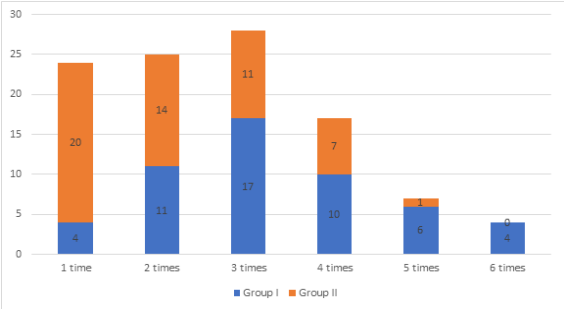


**Figure 1: Number of boluses of norepinephrine and mephentermine administered in both groups**

**Table 1: Patients distribution**

| Groups | Group I | Group II |
|---|---|---|
| Agent | 8 µg norepinephrine | 6 mg mephentermine |
| Number | 53 | 53 |

**Table 2: Comparison of parameters**

| Parameters | | Group I | Group II | P value |
|---|---|---|---|---|
| Age (years) | | 24.8 | 25.1 | 0.19 |
| Height (cm) | | 158.2 | 160.5 | 0.12 |
| Weight (Kgs) | | 63.7 | 63.2 | 0.18 |
| Duration of surgery (mins) | | 47.3 | 47.2 | 0.94 |
| APGAR score | At 1st minute | 7.31 | 7.38 | 0.81 |
| | At 5 minutes | 9.07 | 9.09 | 0.87 |

**Table 3: Comparison of systolic and diastolic blood pressure.**

| Minutes | Blood pressure | Group I | Group II | P value |
|---|---|---|---|---|
| 5 | SBP | 121.2 | 120.4 | 0.94 |
| | DBP | 72.6 | 76.6 | 0.72 |
| 10 | SBP | 120.4 | 116.4 | 0.83 |
| | DBP | 68.0 | 70.2 | 0.15 |
| 20 | SBP | 118.4 | 114.8 | 0.21 |
| | DBP | 67.8 | 68.4 | 0.56 |
| 25 | SBP | 114.8 | 104.4 | 0.92 |
| | DBP | 65.2 | 68.2 | 0.42 |
| 30 | SBP | 108.2 | 100.4 | 0.78 |
| | DBP | 62.8 | 65.6 | 0.41 |
| 40 | SBP | 100.5 | 102.6 | 0.32 |
| | DBP | 63.6 | 67.2 | 0.95 |
| 50 | SBP | 104.7 | 104.6 | 0.81 |
| | DBP | 67.4 | 69.4 | 0.74 |
| 60 | SBP | 112.4 | 118.6 | 0.95 |
| | DBP | 72.8 | 72.0 | 0.65 |


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**Table 4: Number of boluses of norepinephrine and mephentermine administered in both groups**

| Number | Group I | Group II | P value |
|---|---|---|---|
| 1 time | 4 | 20 | 0.01 |
| 2 times | 11 | 14 | 0.17 |
| 3 times | 17 | 11 | 0.05 |
| 4 times | 10 | 7 | 0.94 |
| 5 times | 6 | 1 | 0.01 |
| 6 times | 4 | 0 | 0.03 |

**Table 5: Assessment of side effects in both groups**

| Side effects | Group I | Group II | P value |
|---|---|---|---|
| Nausea/ vomiting | 4 | 5 | 0.94 |
| Headache | 8 | 9 | 0.97 |
| Shivering | 3 | 2 | 0.81 |
| Hypertension | 2 | 1 | 0.85 |

Side effects reported were nausea/ vomiting seen 4 in group I and 5 in group II, headache seen 8 in group I and 9 in group II, shivering seen 3 in group I and 2 in group II and hypertension seen in 2 in group I and 1 in group II subjects. The difference was non- significant (P> 0.05) [Table 5].

## DISCUSSION

SAB has been the preferred anaesthesia technique for caesarean section due to awake post-operative state for early mother-baby bonding, early initiation of breastfeeding, faster recovery of gastrointestinal functions after surgery, early mobilisation, better postoperative analgesia and lower risk of placental drug transfer.[6] However, associated sympatholysis induces a decrease in systemic vascular resistance and activates Bezold-Jarisch reflex, leading to vasodilation, bradycardia and hypotension which may be deleterious to both parturient and baby.[7] This is further aggravated by aortocaval compression. Severe and sustained SAIH not only increases the risk of nausea-vomiting, aspiration, acute renal failure and altered mental status in parturients but also compromises uteroplacental circulation with consecutive foetal hypoxia, bradycardia, acidosis and neurological injury.[8]

Various measures have been used in clinical practice for prevention and control of SAIH, such as preloading/co-loading with crystalloid/colloid infusion, wrapping lower limbs with compression stockings, left tilt, administering an optimal local anaesthetic to obtain an optimal height and administering vasopressor/inotropes.[9] Considering this, the present study compared intravenous norepinephrine and mephentermine for maintenance of blood pressure during spinal anaesthesia for caesarean section.

Our results showed that the mean age in group I subject was 24.8 years and in group II was 25.1 years, height was 158.2 cm in group I and 160.5 cm in group II, weight was 63.7 kgs in group I and 63.2 kgs in group II, duration of surgery was 47.3 minutes in group I and 47.2 minutes in group II, APGAR score at 1st minute was 7.31 in group I and 7.38 in group II and at 5 minutes was 9.07 in group I and 9.09 in group II. Shah et al,[10] compared the effect of intermittent intravenous boluses of norepinephrine and frequently used mephentermine for management of SAIH in caesarean section (CS) to prove whether norepinephrine produces comparable effects or superior to mephentermine. 256 parturients posted for elective CS under SAB were randomly allocated into Group-N and Group-M (n = 84) who received boluses of intravenous norepinephrine 8µg and mephentermine 6mg for SAIH, respectively. Systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR), Response%, Apgar score and maternal complications were analysed. The changes in SBP and DBP were comparable in both the groups. It was significantly low after SAB compared to baseline and significantly high compared to 1st hypotensive value in both the groups throughout the study period (<0.0001). HR was comparable for initial 10 min, thereafter it was significantly high in Group-M (<0.0001) till 40 min. Response% after the first bolus was significantly high in Group-N (59.30n ± 29.21 vs 39.78 ± 25.6; P = <0.0001).

We observed that there was a non- significant difference in change in systolic and diastolic blood pressure in both groups (P> 0.05). Ganeshanavar et al,[11] conducted a comparative dose-response analysis and revealed relative potency for norepinephrine: phenylephrine when given as a bolus for restoring BP in SAIH in obstetric patients to be 13.1:1.0 and found that phenylephrine 100µg was equivalent to norepinephrine 8 µg, although in the previous dose-finding study bolus injection of 6µg norepinephrine was reported effective. Therefore, we derived the relative potency of norepinephrine vs. mephentermine and used 8µg norepinephrine and 6mg mephentermine as equipotent doses.

Our results revealed that the number of requirement of doses were 1 time seen in 4 in group I and 20 in group II, 2 times seen 11 in group I and 14 in group II, 3 times seen 17 in group I and 11 in group II, 4 times seen 10 in group I and 7 in group II, 5 times seen in 6 in group I and 1 in group II and 6 times seen 4 subjects in group I. Side effects reported were nausea/ vomiting seen 4 in group I and 5 in group II, headache seen 8 in group I and 9 in group II, shivering seen 3 in group I and 2 in group II and


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hypertension seen in 2 in group I and 1 in group II subjects. Onwochei et al,[12] studied the effect of different intermittent i.v. boluses of norepinephrine to prevent SAIH in caesarean delivery. The results obtained were feasible and were not associated with significant maternal or fetal adverse effects.

## CONCLUSION

Intravenous norepinephrine was comparable with mephentermine in maintenance of blood pressure during spinal anaesthesia for caesarean section.

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