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ORIGINAL ARTICLE

Intravenous norepinephrine and mephentermine for maintenance of blood pressure during spinal anaesthesia for caesarean section

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ABSTRACT:
Background: Spinal anaesthesia is the method of choice for caesarean section, especially in case of elective procedures, because it avoids the most common risks associated with general anaesthesia, such as aspiration, difficult intubation and negative effects of general anaesthetics on the foetus. The present study was compared intravenous norepinephrine and mephentermine for maintenance of blood pressure during spinal anaesthesia for caesarean section. **Materials & Methods:** 100parturientsselected for elective caesarean section (CS) under SAB (subarachnoid block) were divided into 2 groups of 50 each. Group I received boluses of intravenous norepinephrine 8 µg and group II received mephentermine 6 mg for SAIH. **Results:** The mean age in group I was 28.5 years and in group II was 27.3 years, height was 156.2 cm in group I and 158.1 cm in group II, weight was 64.4 kgs in group I and 65.1 kgs in group II, duration of surgery was 47.3 minutes in group I and 48.2 minutes in group II, APGAR score at 1st minute was 7.25 in group I and 7.22 in group II and at 5 minutes was 9.04 in group I and 9.02 in group II. The difference was non- significant (P> 0.05). Number of requirement of doses were 1 time seen in 5in group I and 17 in group II, 2 times seen 10 in group I and 12 in group II, 3 times seen 14 in group I and 9 in group II, 4 times seen 8 in group I and 5 in group II, 5 times seen 4in group I and 6 times seen 3 in group I. The difference was significant (P< 0.05). A non- significant difference in change in systolic blood pressure in both groups (P> 0.05). A non-significant difference in change in diastolic blood pressure in both groups (P> 0.05). Side effects reported were shivering seen 5 in group I and 4 in group II, hypertension seen in 2 in group I and 1 in group II.Nausea/ vomiting seen 6 in group I and 5 in group II and headache was seen 8 in group I and 7 in group II. The difference was non- significant (P> 0.05). **Conclusion:** Intravenous norepinephrine was comparable with mephentermine in maintenance of blood pressure in caesarean section.
Key words: Blood pressure, Caesarean section,Norepinephrine

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INTRODUCTION

Spinal anaesthesia is the method of choice for caesarean section, especially in case of elective procedures, because it avoids the most common risks associated with general anaesthesia, such as aspiration, difficult intubation and negative effects of general anaesthetics on the foetus.[1]

Spinal anaesthesia induced hypotension (SAIH) is reported in 80% parturients during cesarean section (CS) because of anaesthetic blockade up to T4 level.[2] Severe and sustained SAIH is detrimental to both mother and baby. The choice of the most effective management strategy for SAIH during CS continues to be one of the main challenges in obstetric anaesthesia.[3] Many techniques and various vasopressors have been tried and studied for SAIH, but no single method was found to be adequate or superior.[4]Spinal anaesthesia causes hypotension via several pathophysiological mechanisms, the most significant being rapid onset of sympatholysis due to increased sensitivity of nerve fibres to local anaesthetics during pregnancy.[4] The level of blockage of the sympathetic chain is connected to the degree of cranial spread of the local anaesthetic within the subarachnoid space, it is often difficult to predict and usually reaches several dermatomes above than the sensory block level.[5]

Mephentermine is one of the most commonly used drugs in our institute and India. It has been shown to be as effective and safe as ephedrine for SAIH. Norepinephrine, a potent α-agonist and a weak β-agonist, commonly used in septic shock has been showing promising results in many studies for SAIH with respect to maternal haemodynamic stability.[6] The present study was compared intravenous norepinephrine and mephentermine for maintenance of blood pressure during spinal anaesthesia for caesarean section.

MATERIALS & METHODS

The present study comprised of 100parturientsselected for elective caesarean section (CS) under SAB (subarachnoid block). All were informed regarding the study and their written consent was obtained.

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Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 50 each. Group I patients received boluses of intravenous norepinephrine 8 µg and group II received mephentermine 6 mg for SAIH. Parameters such as systolic blood pressure (SBP), diastolic blood pressure (DBP), Apgar score and maternal complications were recorded. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

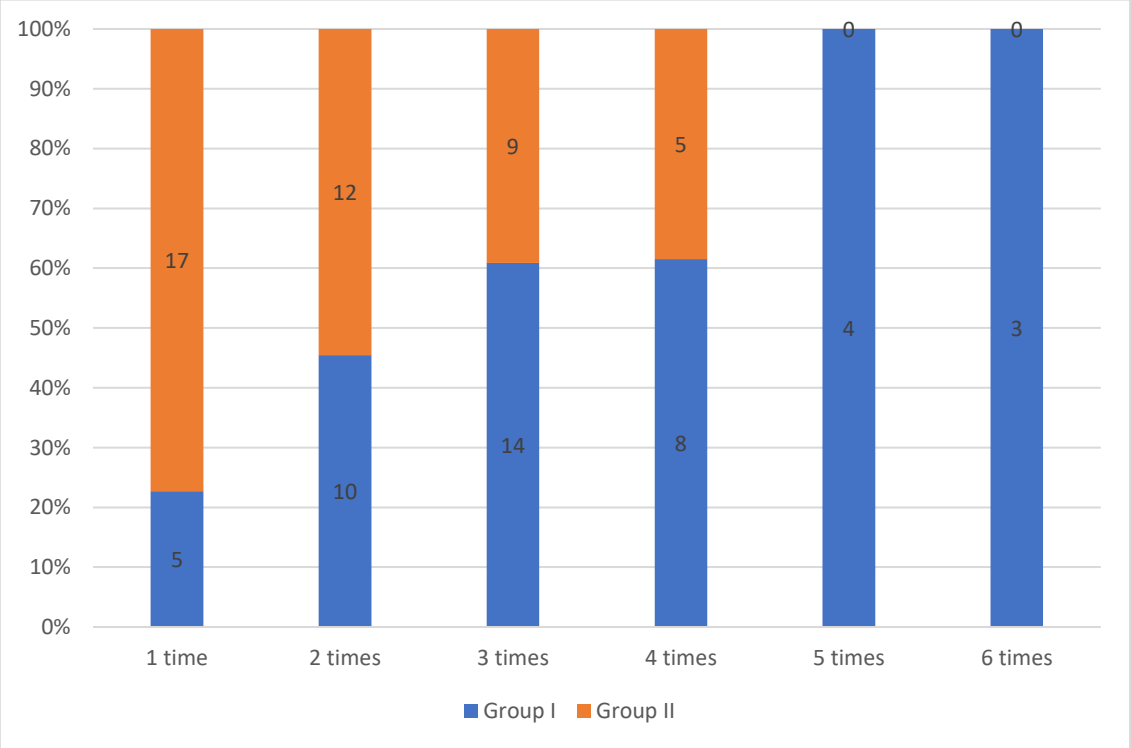
RESULTS

Table I: Comparison of parameters

Parameters	Group I	Group II	P value
Age (years)	28.5	27.3	0.82
Height (cm)	156.2	158.1	0.47
Weight (Kgs)	64.4	65.1	0.17
Duration of surgery (mins)	47.3	48.2	0.09
APGAR score at 1st minute	7.25	7.22	0.91
APGAR score at 5 minutes	9.04	9.02	0.95

Table I shows that mean age in group I was 28.5 years and in group II was 27.3 years, height was 156.2 cm in group I and 158.1 cm in group II, weight was 64.4 kgs in group I and 65.1 kgs in group II, duration of surgery was 47.3 minutes in group I and 48.2 minutes in group II, APGAR score at 1st minute was 7.25 in group I and 7.22 in group II and at 5 minutes was 9.04 in group I and 9.02 in group II. The difference was non- significant (P> 0.05).

Graph I: Number of boluses of norepinephrine and mephentermine administered



Graph I shows that number of requirement of doses were 1 time seen in 5 in group I and 17 in group II, 2 times seen 10 in group I and 12 in group II, 3 times seen 14 in group I and 9 in group II, 4 times seen 8 in group I and 5 in group II, 5 times seen 4 in group I and 6 times seen 3 in group I. The difference was significant (P< 0.05).

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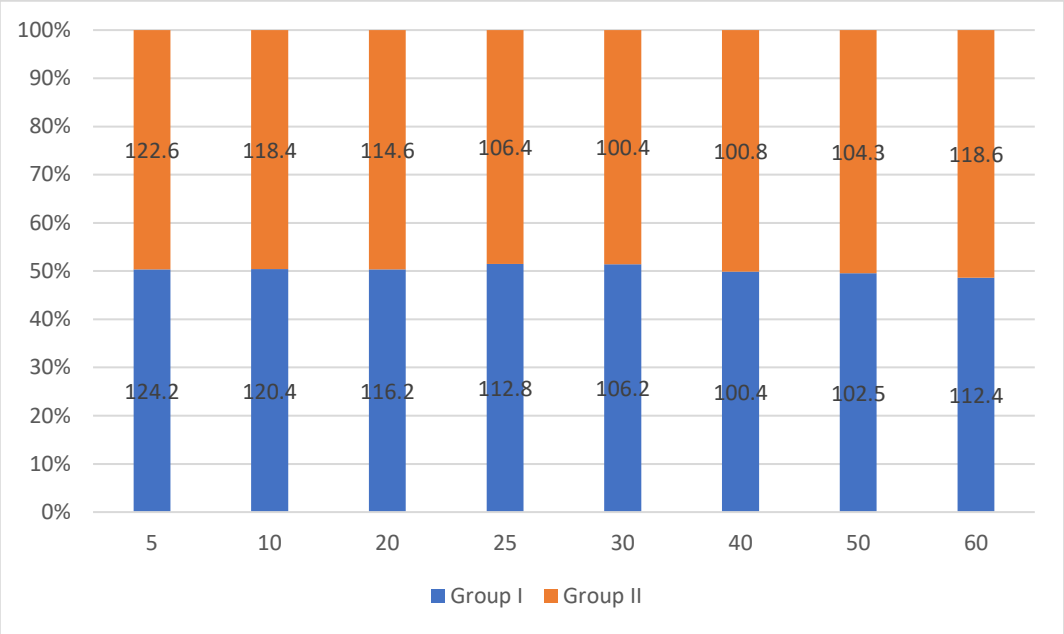
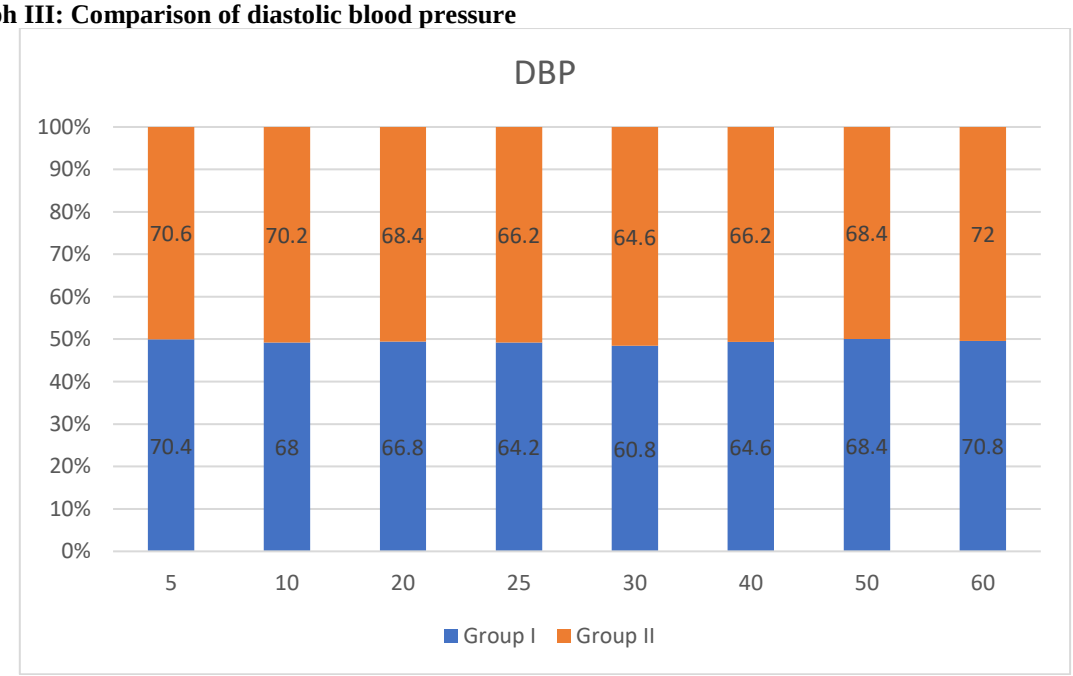
Graph II: Comparison of systolic blood pressure



Graph IIshows non- significant difference in change in systolic blood pressure in both groups (P> 0.05).

Graph III: Comparison of diastolic blood pressure



Graph III shows non- significant difference in change in diastolic blood pressure in both groups (P> 0.05).

Table II: Assessment of side effects

Side effects	Group I	Group II	P value
Shivering	5	4	0.12
Hypertension	2	1	0.05
Nausea/ vomiting	6	5	0.42
Headache	8	7	0.84

Table II shows that side effects reported were shivering seen 5 in group I and 4 in group II, hypertension seen in 2 in group I and 1 in group II.Nausea/ vomiting seen 6 in group I and 5 in group II and headache was seen 8 in group I and 7 in group II. The difference was non- significant (P> 0.05).

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DISCUSSION

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.[7]Hypotension during caesarean section performed under spinal anaesthesia has been the subject of medical research for more than 50 years. The incidence of hypotension during spinal anaesthesia for caesarean section varies in different studies, ranging from 7.4% to 74.1%.[8] Higher sensitivity to local anaesthetics combined with aortocaval compression of the pregnant uterus are the main reasons for increased incidence and higher levels of hypotension in pregnant women, compared to non-obstetric patients.[9] Pregnant women also exhibit an increased level of sympathetic activity compared to parasympathetic activity. Sympatholysis therefore leads to a higher degree of peripheral vasodilatation and a predominance of parasympathetic activity, consequently reducing the venous return and cardiac pre-load, and resulting in bradycardia, nausea and vomiting.[10]The present study was compared intravenous norepinephrine and mephentermine for maintenance of blood pressure during spinal anaesthesia for caesarean section.

We found that the mean age in group I was 28.5 years and in group II was 27.3 years, height was 156.2 cm in group I and 158.1 cm in group II, weight was 64.4 kgs in group I and 65.1 kgs in group II, duration of surgery was 47.3 minutes in group I and 48.2 minutes in group II, APGAR score at 1st minute was 7.25

in group I and 7.22 in group II and at 5 minutes was 9.04 in group I and 9.02 in group II. Loughrey et al[11] in their study forty-three term parturients were randomized to receive a bolus of ephedrine 10 mg +/- phenylephrine 40 microg (groups E and EP, respectively) simultaneously with spinal anesthesia. Hypotension was defined as a systolic blood pressure below 100 mmHg or a decrease of 20% from a baseline value. Rescue boluses comprised of ephedrine 5 mg +/- phenylephrine 20 microg.For groups E and EP, respectively, the incidence of hypotension was 80% vs. 95% (P=0.339), with the mean number of rescue boluses being 3.85+/-3.7 and 3.05+/-1.7 and the mean umbilical artery pH being 7.246+/-0.081 vs. 7.244+/-0.106. All comparisons were not significant (NS).The combination of ephedrine and phenylephrine given as an intravenous bolus at the doses selected is not superior to ephedrine alone in preventing or treating hypotension in healthy parturients undergoing cesarean delivery.

We observed that number of requirement of doses were 1 time seen in 5 in group I and 17 in group II, 2 times seen 10 in group I and 12 in group II, 3 times seen 14 in group I and 9 in group II, 4 times seen 8 in group I and 5 in group II, 5 times seen 4 in group I and 6 times seen 3 in group I. Thomas et al[12] in their study thirty-eight healthy women undergoing elective caesarean section under spinal anaesthesia at term were allocated randomly to receive boluses of either phenylephrine 100 micrograms or ephedrine 5 mg for maintenance of maternal arterial pressure. The indication for administration of vasopressor was a reduction in systolic pressure to < or = 90% of baseline values. Maternal arterial pressure (BP) and heart rate (HR) were measured every minute by automated oscillometry. The median (range) number of boluses of phenylephrine and ephedrine was similar; 6 (1-10) vs 4 (1-8) respectively. Maternal systolic BP and CO changes were similar in both groups, but the mean [95% CI] maximum percentage change in maternal HR was larger in the phenylephrine group (-28.5 [-24.2, -32.9]%) than in the ephedrine group (-14.4 [-10.6, -18.2]%). As a consequences atropine was required in 11/19 women in the phenylephrine group compared with 2/19 in the ephedrine group (P < 0.01). Mean umbilical artery pH [95% CI] was higher in the phenylephrine group (7.29 [7.28-7.30]) than in the ephedrine group (7.27 [7.25-7.28]).

We found that there was anon- significant difference in change in systolic and diastolic blood pressure in both groups (P> 0.05). Side effects reported were shivering seen 5 in group I and 4 in group II, hypertension seen in 2 in group I and 1 in group II.Nausea/ vomiting seen 6 in group I and 5 in group II and headache was seen 8 in group I and 7 in group II.Mohta et al[13] compared 5µg norepinephrine with 5mg ephedrine to prevent SAIH in lower limb orthopaedic surgery and coronary artery disease patients undergoing knee arthroscopy. They found that norepinephrine is more effective compared with ephedrine in the maintenance of blood pressure and has less adverse effects on HR in patients. These results are in agreement with the results obtained in our study although we conducted our study in parturients. Ganeshanavar et al[14]in their study showed that 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.

CONCLUSION

Authors found that intravenous norepinephrine was comparable with mephentermine in maintenance of blood pressure in caesarean section.

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