Original Research Paper

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COMPARATIVE ANALYSIS OF HEMODYNAMIC RESPONSE FOLLOWING SPINAL ANAESTHESIA BETWEEN NORMOTENSIVE AND SEVER PREGNANCY INDUCED HYPERTENSIVE PARTURIENTS FOR ELECTIVE CAESARIAN SECTION.

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ABSTRACT **Aim-** The aim of present study was to compare heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), vasopressor requirement, and neonatal outcome of normotensive and sever pre-eclamptic parturients undergoing cesarean section after spinal anaesthesia

Material and method- In this study 30 normotensive parturients (Group I) and 30 sever pre-eclamptic parturients (Group II) above 18 years of age undergoing elective cesarean section were included. Subarachnoid block was given with 12.5 mg of hyperbaric bupivacaine injection. Baseline heart rate (HR), Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) were recorded and then recording was done at every 2 minute interval after spinal anaesthesia till 10 minutes then at 5 minutes interval till 30 minutes and then at 10 minute interval till 60 minutes. Injection Mephentermin was given whenever SBP falls below 30% of baseline, total dose of mephentermin required was recorded. APGAR score was noted at 1 and 5 min after birth.

Results: The percentage of fall of SBP and DBP calculated from baseline in Pre-eclamptic parturients were (20.26% and 18.33%) which was less as compare to normotensive parturients (22.73% and 19.82%) respectively. Mephentermin requirement was significantly higher in normotensive parturients compared to pre-eclamptic parturients. APGAR score was good in both group.

Conclusion: Subarachnoid block is safe in sever pre-eclamptic parturients with good neonatal outcome. As these patients experience very less hypotension and require less vasopressor.

Summary- Subarachnoid block can be safely given to sever pre-eclamptic posted for ceaserian section.

KEYWORDS : Pre-eclamptic, hypotension, spinal anaesthesia, ceaserian section

INTRODUCTION

Pregnancy induced hypertension constitutes major cause of morbidity and mortality in developing countries and it is 5%-10% of all pregnancies.[1] Hypertensive disorders during pregnancy is defined as a diastolic pressure more than 90 mm of Hg taken on two occasions more than 4 hours apart or a single diastolic blood pressure reading more than 110 mm of Hg.[2] Anesthetic managements of these patients remains a challenge.

Although general anesthesia can be used safely in pre-eclampsia parturients, but with greater maternal morbidity and mortality. The risk associated with general anaesthesia include airway difficulties due to edema (often aggravated by tracheal intubation) the pressure response to laryngoscopy and extubation , chances of pulmonary aspiration lead to delayed recovery and bad outcome of baby and mother.[3]

Currently safety of regional anesthesia techniques are well established and they can provide better obstetric outcome. Thus, regional anaesthesia is extensively used for the management in women with sever PIH.

Epidural was the choice of anaesthesia, but in emergency situation epidural has its own limitations. The disadvantages of epidural anaesthesia are that delayed onset, poor muscle relaxation often giving poor anaesthesia for ceaserian delivery.[4] There is documented evidence of conversion of epidural to GA due to patchy anaesthesia and there is increasing evidence to show that spinal may be the anaesthesia of choice for severe PIH which is quick to perform, takes less time to be effective and failure rate is less than epidural.

Previous data showed that subarachnoid block (SAB) was controversial in sever PIH. The anticipated potentials risks of pulmonary edema, profound cardiovascular instability, suggested that it was not a technique to be recommended in sever PIH. However during the last decades, after the advent of pencil point spinal needles and newer local anaesthetics agents, it has been tried with favorable results. In most of the obstetrical centers it is now being used as anaesthesia of first choice for pre-eclamptic patients. The present study was initiated to further validate the safety of SAB in sever PIH.

MATERIALS AND METHODOLOGY:

Following approval of Institutional ethics committee, 60 non-laboring parturients included in this prospective observational study over a period of 6 months.

Inclusion criteria- ASA physical status I and II, age 18 to 25 year, weight 45 to 70 kg, carrying singleton pregnancy, scheduled for elective caesarian section were included in this study. Procedure is explained to each and every parturients in their respective language and informed consent was taken.

Group I: 30 normotensive parturients

Group II: 30 were sever hypertensive parturients having BP > 160/100 mm Hg requiring antihypertensive therapy such as labetalol, nifidepin.

Exclusion Criteria- Parturients with cardiac diseases, chronic hypertension, renal diseases, Diabetes mellitus, coagulopathy, antepartum hemorrhage, local infection, impeding eclampsia and those who refused SAB were excluded from study.

All parturient were premeditated with Inj. Ondensetron 4 mg and prior to surgery. In addition; in pre-eclamptic parturient, antihypertensive medication was continued. After establishing IV access with 18 G cannula preloading was done with 10 ml/kg body weight of lactated ringer (RL) solution.

Standard multichannel monitor was attached and the baseline hemodynamic variables (HR, SBP, DBP) were recorded. After proper asepsis and draping subarachnoid block was given with 26 G spinal needle at L3-L4 interspace in sitting position with 10 to 12.5 mg hyperbaric 0.5% Bupivacaine[1] (depending upon height of patients). Patients then made supine with 10 cm wedge under right buttock to prevent aortocaval compression. Infusion of Ringer Lactate was continued at the rate of 5 ml/kg/hr. Surgery was allowed as soon as upper level of sensory block reached T6. Inj. Oxytocin 10 IU was given over 5 min immediately after delivery of the head of the baby.

After spinal anaesthesia SBP, DBP and HR was recorded every 2 min

for 10 min and every 5 min thereafter until one hour after SAB. Hypotension (defined as MAP < 30% of the baseline) was treated with 6 mg of mephentermin iv bolus and dose will be repeated at 5 min interval if required to maintain MAP within 30% of baseline. Bradycardia (HR < 60 beats/min.) treated with 0.6 mg IV Atropine (maximum 1.8 mg). Lowest SBP, DBP and MAP were noted for each parturient and for HR both the lowest and highest values recorded. The total amount of mephentermin consumed was recorded and also noted Apgar score at 1 and 5 min of the baby delivery.

At the end of surgery patients were shifted to Recovery room and monitored for one hour and then shifted to ward. Adverse effects if any was noted.

STASTICALANALYSIS:

Data was compiled in Microsoft Excel sheet and by using analysis of variances and chi square test. Value of $p < 0.05$ would be significant and < 0.001 would be highly significant.

RESULTS:

Two groups are there- Group I Normotensive parturients and Group II includes sever pre-eclamptic parturients.

Parturients in two groups were comparable in respect to age, weight and height, ASA grading and gestational age of fetus.

Table 1 and 2 shows that there is significant difference in baseline values of SBP and DBP of both groups and there is fall in SBP and DBP in both group of patients after spinal anesthesia but maximum fall seen in normotensive parturients as compared to hypertensive parturients. Minimum SBP recorded in hypertensive parturients and normotensive parturients was 135.93±12.666 mm of Hg and 98.66±12.121 mm of Hg respectively and minimum value of DBP hypertensive parturients and normotensive parturients was 81.13±8.148 mm of Hg and 66.46±11.224 mm of Hg respectively which was statistically significant. ($p < 0.0001$). The percentage of fall of SBP and DBP calculated from baseline in Pre-eclamptic parturients were (20.26% and 18.33%) which was less as compare to normotensive parturients 22.73% and 19.82% respectively.

Table 3 shows heart rate changes after spinal anaesthesia in both group. Baseline heart rate is comparable in both group and we found that there is no significant difference in heart rate of both group of patients after spinal anaesthesia.

Pre-eclamptic parturients were require significantly less vasopressor (mephentermin) as compare to normotensive parturients (total required in normotensive parturients is 69 mg and in pre-eclamptic parturients is 12mg), but there was no significant difference in APGAR score of babies from both group.

Discussion:

In past General anesthesia was preferred over regional anaesthesia and in regional, epidural anaesthesia was considered safe over spinal anaesthesia in pre-eclamptic patient undergoing cesarean section due to fear of dangerous hypotension which can hamper maternal and fetal outcome.

Previosly it was considered as sever pre-eclamptic parturients have IUGR fetus because of which there was less inferior vena cava compression and hence venous return is not reduced and there is no hypotension compared to normotensive parturients after spinal anaesthesia. To rule out this concept Antoine GM Aya et al[5] compared hemodynamic response after spinal anaesthesia between sever pre-eclamtic parturients and normotensive parturients undergoing preterm cesarean delivery and they found that still incidence of hypotension was almost two times less in sever pre-eclamptic parturients as compared to normotensive parturients with preterm cesarean delivery. In this study pathophysiology behind this finding is mentioned as in normotensive parturients there is decrease reactivity blood vessels to vasopressors and increase synthesis of vasodialators like nitric oxide therefore in normotensive parturients after spinal anaesthesia causes more hypotension. On other hand in sever pre-eclamptic parturients as there is increase formation of vasopressors like thromboxane, endotheline and increase sensitivity to vasoconstrictors leads to less chances of hypotension after spinal anaesthesia.

Sarvanna P Ankichette[3] et al compared General anaesthesia verses regional anaesthesia in Pre-eclamptic parturients undergoing cesarean section and they found that SAB or combined spinal epidural was more safe and convenient in pre-eclamptic parturients if no coagulopathy. Regional anaesthesia reduces neonatal exposure to depressant drugs, decrease risk of maternal pulmonary aspiration, and promotes early ambulation of mother.

Mashid Nikooseresht et al[6] compared hemodynamic effects of Subarachnoid block in pre-eclamptic and healthy parturients during cesarean section and they found that rate of incidence of hypotension among pre-eclamptic patient was lower despite these group of patient received less intravenous fluid which are comparable with our results.

Ramesh Kumar Khetri, Priyanka sethi et al[7] analysed perioperative hemodynamic response and vasopressor requirement during spinal anaesthesia for cesarean section in sever preeclampsia and healthy parturients and they found number of hypotension episodes were more in normotensive group as compared pre-eclamptic group.

Aya et al[8] observed that the risk of hypotension after spinal anaesthesia was almost six times less in patients with severe pre-eclampsia than healthy parturients. Dyer et al[9] found that pre-eclampsia patient had lower susceptibility to hypotension and probably less impairment of cardiac output than healthy parturients after subarachnoid block for cesarean section.

Mendes FF et al[10] found that there is no significant difference between pre-eclamptic and normotensive parturients after spinal anaesthesia regarding occurrences of hypotension, vasopressor requirement, this is may be due to use of MgSO4, hydralazine in sever pre-eclamptic patients, but Dona Saha, Sharmila Ghosh et al[11] did similar study and they found percentage of fall in DBP and MAP from baseline was less in pre-eclamptic group as compared to normotensive group and significantly less vasopressor required for pre-eclamptic patients compared to normotensive patients so as to our studies.

Other studies of Clark VA et al[12] and Ishart HM et al[13] too have reported similar results.

All these study also found that there is no bad effects on neonatal outcome (APGAR Score) after spinal anaesthesia in sever pre-eclamptic parturients.

So results found in lot of above mentioned studies similar to our study. So subarachnoid block can be given safely in sever pre-eclamptic patients without any coagulopathy associated with very less episodes of hypotension, bradycardia so less vasopressor and vagolytic requirement with good neonatal outcome.

CONCLUSION:

The present study compared hemodynamic response between normotensive and sever pre-eclamptic parturients after spinal anaesthesia.

We found that there was fall in both systolic and diastolic blood pressure after spinal anesthesia but fall from baseline value was more with normotensive parturients, so vasopressor requirement also was more in normotensive parturients. Neonatal outcome was good in both groups. So it is clear that we can safely give spinal anaesthesia in sever pre-eclamptic parturients without any coagulopathy and symptoms of raised intracranial patients.

Table 1 showing changes in SBP in both groups after spinal anaesthesia

	Group I (n = 30) mean±SD (*) Paired p value	Group II (n = 30) mean±SD (*) Paired p value	Unpaired p value
Baseline	124.06 ± 12.367	170.4 6± 14.712	< 0.001
0 min after SAB (†)	119.6 ± 9.390 (0.007)	167.46 ± 14.383 (0.002)	< 0.001
2 min (‡)	109.46 ± 9.507 (0.000)	159.33 ± 15.181 (2.458)	< 0.001
4 min (‡)	104.23 ± 13.257 (0.000)	153.93 ± 15.181(2.688)	< 0.001
6 min (‡)	98.66 ± 12.132 (1.571)	149.26 ± 14.063 (7.586)	< 0.001

8 min (‡)	99.26 ± 9.771 (5.843)	143.93 ± 15.044 (2.646)	< 0.001
10 min (‡)	101.9 ± 8.380 (0.000)	140.8 ± 17.345 (4.905)	< 0.001
15 min (‡)	101.9 ± 8.380 (0.000)	138.6 ± 15.475 (2.302)	< 0.001
20 min (‡)	105.63 ± 6.33 (0.000)	136.6 ± 14.763 (3.784)	< 0.001
25 min (‡)	108.33 ± 5.967 (0.000)	135.93 ± 12.666 (6.483)	< 0.001
30 min (‡)	110.5 ± 6.621 (0.000)	137.266 ± 10.204 (2.620)	< 0.001
40 min (‡)	111.53 ± 4.737 (0.000)	139.53 ± 7.837 (4.884)	< 0.001
50 min (‡)	113.53 ± 4.091 (0.000)	139.13 ± 7.837 (1.150)	< 0.001
60 min (‡)	115.66 ± 8,72 (0.000)	140.73 ± 9,402 (6.505)	< 0.001

SD- * (standard deviation), SAB- † (subarchanoid block), min- ‡ (minutes)

Table 2 is showing changes in DBP in both groups after spinal anaesthesia

	Group I (n = 30) mean±SD*	**Group II (n = 30) mean±SD**	**Unpaired p value**
Baseline	82.9 ± 6.768	100 ± 6.643	< 0.001
0 min after SAB (†)	80 ± 6.389 (0.028)	96.86 ± 6.162(0.000)	< 0.001
2 min (‡)	77.33 ± 6.834 (0.001)	92.8 ± 7.289 (0.000)	< 0.001
4 min (‡)	74 ± 7.464 (0.000)	89.86 ± 6.906(0.000)	< 0.001
6 min (‡)	68 ± 7.912 (0.000)	86.06 ± 7.869 (0.000)	< 0.001
8 mijn (‡)	66.46 ± 11.224 (0.000)	81.66 ± 7.449 (0.000)	< 0.001
10 min (‡)	68.3 ± 9.139 (0.000)	81.66 ± 7.897 (0.000)	< 0.001
15 min (‡)	70.1 ± 9.139 (0.000)	82.13 ± 7.370 (0.000)	< 0.001
20 min (‡)	70.43± 9.813 (0.000)	81.13± 8.148 (0.000)	< 0.001
25 min (‡)	71.56± 9.810 (0.000)	81.73 ± 4.919 (0.000)	< 0.001
30 min (‡)	72.86 ± 8.496 (0.000)	83.13 ± 4.538(0.000)	< 0.001
40 min (‡)	73.4± 7.337 (0.000)	83.8 ± 6.650 9(0.000)	< 0.001
50 min (‡)	74.4 ± 5.997 (0.000)	83.20 ± 6.551 (0.000)	< 0.001
60 min (‡)	75.53 ± 6.941 (0.000)	84.13 ± 6.123(0.000)	< 0.001

SD- * (standard deviation), SAB- † (subarchanoid block), min- ‡ (minutes)

Table 3: Changes in Heart rate after spinal anaesthesia.

	Group I (n = 30) mean±SD *	**Group II (n = 30) mean±SD ***	**Unpaired p value**
Baseline	89.80 ± 8.79	80.78 ± 9.00	0.127
0 min after SAB (†)	85.40 ± 7.26	86.70 ± 7.80	0.005
2 min (‡)	84.40 ± 8.31	82.88 ± 8.60	0.086
4 min (‡)	83.40 ± 9.54	88.20 ± 8.52	0.629
6 min (‡)	80.67 ± 6.00	84.40 ± 9.59	0.284
8 mijn (‡)	81.00 ± 6.58	82.80 ± 8,97	0.684
10 min (‡)	81.87 ± 7.65	81.73 ± 7.31	0.762
15 min (‡)	82.27 ± 7.87	81,27 ± 7.66	0.279
20 min (‡)	80.33 ± 5.66	80.12 ±6.93	0.434
25 min (‡)	80.60 ± 7.14	79.13 ± 6.12	0.436
30 min (‡)	79.00 ± 7.68	79.07 ± 8.40	0.534
40 min (‡)	80.67 ± 7.07	78.73 ± 8.13	0.544
50 min (‡)	82.60 ± 6.80	80.07 ± 7.75	0.652
60 min (‡)	84. 80 ± 5.80	81.87 ± 5.92	0.479

SD- * (standard deviation), SAB- † (subarchanoid block), min- ‡ (minutes)

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