

Comparison of Spinal Anaesthesia with General Anaesthesia in Pre Eclamptic Parturients Undergoing Caeseriation SectionParth Patel¹, Dipti Anandani², Palakben Parikh³, Bhumi Chokshi⁴, Komal Patel⁵¹Third Year Resident, Department of Anaesthesia, SMT NHL Medical College and SVP Hospital, Ahmedabad, Gujarat, India²Associate Professor, Department of Anaesthesia, Narendra Modi Medical College, Ahmedabad, Gujarat, India^{3*}Assistant Professor, Department of Anaesthesia, SMT NHL Medical College and SVP Hospital, Ahmedabad, Gujarat, India⁴Second Year Resident, Department of Anaesthesia, SMT NHL Medical College and SVP Hospital, Ahmedabad, Gujarat, India⁵Second Year Resident, Department of Anaesthesia, SMT NHL Medical College and SVP Hospital, Ahmedabad, Gujarat, India

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Abstract:**Background:** Both Spinal anaesthesia and General anaesthesia commonly used for operating management for pre eclamptic parturients. The present study was designed to compare hemodynamic changes as well as maternal and neonatal outcome in both the groups.**Materials and Methods:** In this comparative, prospective and observational study total 60 pre eclamptic parturients were enrolled undergoing elective cesarean section and divided into 2 groups. Group S received Spinal Anaesthesia with Inj.0.5% heavy Bupivacaine 10 mg. Group G received General Anaesthesia with Inj. thiopentone sodium 6 mg/kg and Inj. Succinyl choline 1.5 mg/kg. Both the groups were observed for socio demographic factors, hemodynamic parameters, sedation along with maternal and neonatal outcomes in both groups.**Results:** The demographic data including age, weight, height, gestational age, parity, ASA grading was comparable between two groups ($P > 0.05$). The mean heart rate was higher in group G throughout surgery compared with group S ($P < 0.05$). The mean blood pressure (SBP, DBP and MAP) of all others were high although within the acceptable range for preeclampsia ($p > 0.05$) while the mean blood pressure (SBP, DBP and MAP) of parturients in group G was higher than group S throughout intraoperative period ($p < 0.05$). The mean birth weight of neonates in group S was 2.56 ± 0.63 kg and in group G was 2.34 ± 0.53 kg ($p = 0.14$). The difference in APGAR score at 1 minute was statistically significant ($p < 0.05$) but it was comparable in both groups at 5 minutes. Patients in group S were awake throughout the surgery and 100% patients from group S did not have any pain. Overall difference in maternal and neonatal complications was not significant.**Conclusion:** From the results of our study it can be concluded that Spinal Anaesthesia is considered as a better alternative to General Anaesthesia for pre-eclampsia parturients undergoing elective cesarean section in terms of hemodynamic stability, awareness and postoperative analgesia and good neonatal outcome.**Keywords:** Pre eclampsia, Parturients, General anaesthesia, Spinal anaesthesia, Hemodynamic stability, Maternal and neonatal outcome.

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Introduction

Preeclampsia is a potentially fatal and multi-system disorder with significant maternal, fetal and neonatal morbidity and mortality [1]. Anaesthesia for cesarean section in preeclampsia is still debatable since decades. According to pathophysiology of preeclampsia due to spinal anaesthesia there are more chances of hypotension, decrease cardiac output and associated placental

hypoperfusion [2,3]. On the other hand in general anaesthesia risk of failed intubation, pulmonary aspiration, drug related fetal depression, hemodynamic changes during intubation and extubation and risk of cerebral hemorrhage is more grater in pre eclamptic parturients than normal parturients [4]. Recently done studies show that spinal anaesthesia in patients with pre eclampsia

experiences less hypotension during spinal anaesthesia than healthy parturients [5]. Therefore we decided to study hemodynamic changes, perioperative complications, maternal and neonatal outcome in pre eclamptic parturients undergoing spinal anaesthesia or general anaesthesia for elective cesarean section.

Materials and Methods

After approval of IRB total 60 pre eclamptic parturients undergoing elective cesarean section included and randomly divided into Spinal anaesthesia (group S) and General anaesthesia (group G) with 30 parturients in each group. Inclusion criteria were pre eclampsia with bp > 140/90 mmhg, proteinuria > 0.3gm/24 hrs urine⁶, age between 18 to 40 years, singleton pregnancy, term gestational age, elective cesarean section. Exclusion criteria were patients with cardiovascular and pulmonary disease, HELLP syndrome, patient's refusal, history of allergy to drugs, coagulopathy, spinal disorders, sepsis, severe hemorrhage, patient with diabetes, thyroid and seizure disorder, severe anemia < 6gm/dl. All the patients underwent a thorough pre-anaesthetic check up with necessary investigations. After taking written informed consent in the operation theatre baseline vital parameters HR, BP, SPO2 were recorded. Spinal anaesthesia group (group S, n=30) received 2 ml of 0.5 % heavy bupivacaine (10 mg) intrathecally into the L3-L4 or L4-L5 interspace with 25 quincke spinal needle in sitting position. Upper sensory level was checked by pin prick sensation and motor level of anaesthesia was checked by Bromage's scale. General anaesthesia group (group G, n=30) received pre-oxygenation with 100% O₂ for 3 minutes. Induction was done with 6 mg/kg of thiopentone sodium and 1.5 mg/kg of succinylcholine and endotracheal intubation was performed while using the sellick's maneuver and mallampati class and grading of laryngoscopy were determined in Group G. Anaesthesia continued with oxygen, 50% nitrous oxide in oxygen, 0.8% sevoflurane loading dose of atracurium 0.5 mg/kg and maintained by 0.1 mg/kg. After delivery of the baby 2 mcg/kg of fentanyl was administered intravenously. At the end of cesarean section the

muscle relaxant was reversed with inj. glycopyrrolate 0.02 mg/kg and inj. neostigmine 0.05 mg/kg, extubated and transferred to the recovery room. All parturients also received intravenous oxytocin 5 IU intravenously after delivery of the baby and continuous infusion at 10 IU/L at 60-100 ml/hr. Demographic data including age, weight, height, parity, gestational age, ASA grading in both groups and mallampati grading and laryngoscopic grading in General anaesthesia group were recorded. Vital signs HR, MAP, SBP, DBP, SPO2 were recorded before anaesthesia and immediately after anaesthesia every minute until neonatal delivery and every 5 min till completion of surgery. Any decrease in BP more than 20 % from baseline was treated with inj. Ephedrine 3-5 mg iv bolus and any increase in BP more than 20% from baseline was treated with inj. Labetalol 10-20 mg iv bolus followed by infusion. Any fall in heart rate < 20% from baseline was treated with inj. Atropine 0.6 mg intravenously. After neonatal delivery 1st and 5th minute APGAR scores were assessed and an umbilical artery blood sample was taken for blood gas analysis. In the postoperative period postoperative sedation with Ramsay sedation scale (RSS) and postoperative analgesia with visual analogue scale (VAS), maternal hemodynamic changes and any complications were recorded and treated as needed.

Statistical analysis

Results of continuous (quantitative data) measurement were presented on Mean \pm SD and results on categorical (qualitative data) measurements were presented in percentage and proportions (%). Comparison of qualitative variables was analyzed by the chi-square test. Wherever necessary between groups, comparison of quantitative variables was analyzed by independent student 't' test according to distribution. A p value of 0.05 was taken as level of significance. Data analysis was done by SPSS Software version 26.

Results:

Total 60 preeclamptic parturients undergoing elective cesarean section were studied.

Table 1: Demographic data

	Group S (n=30)	Group G (n=30)
Age(Years)	26.26 \pm 5.48	27.96 \pm 5.91
Height(Cm)	155.1 \pm 4.79	153.46 \pm 7.63
Weight(Kg)	74.66 \pm 8.91	78.6 \pm 12.20
Gestational age(WEEKS)	34.8	34.9
Parity, Median (range)	1(0-5)	0.5(0-3)
ASA Grading(II/III)	16/14	18/12

There was no significant difference in demographic data between two groups as shown in table 1.

Table 2: Patients characteristics according to anaesthesia technique

	Group S (No. of Patients)	Group G (No. of Patients)
Sensory Block Level		
T4	4(13.3%)	
T6	26(86.6%)	-
Motor Block		
1	20(66.6%)	-
2	10(33.3%)	
3	-	
Mallampati grading		
1	4(13.3%)	4(13.3%)
2	20(66.6%)	18(60%)
3	6(20%)	8(26.6%)
4	-	-
Laryngoscopy Grading (Cormack lehane Grading)		
1		12(40%)
2		14(46.6%)
3		4(13.3%)
4	-	-

According to technique of anaesthesia as shown in table 2 all the parturients in the group- S had satisfactory sensory block level for cesarean section and no parturients required additional analgesia or anaesthesia. In group-G the majority of parturients were in mallampati class 1 or 2 and laryngoscopy grading of 1 or 2. 4 parturients had laryngoscopy grading of grade 3 so were intubated using bougie. Failed or esophageal intubation were not seen.

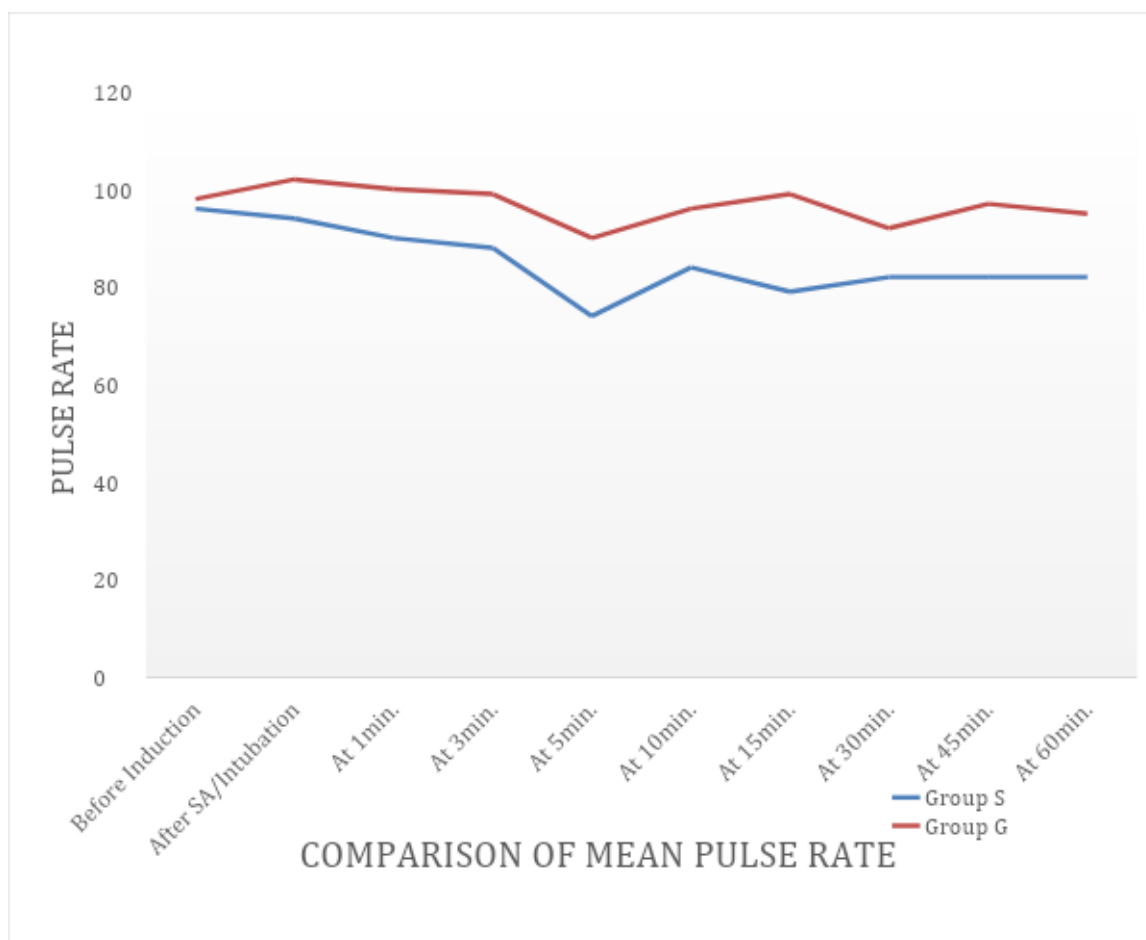


Figure 1: Comparison of mean pulse rate in group S and group G

Figure 1 Shows that mean baseline heart rate was comparable in both groups S and G. After anaesthesia in group G significant tachycardia was seen than group S throughout surgery.

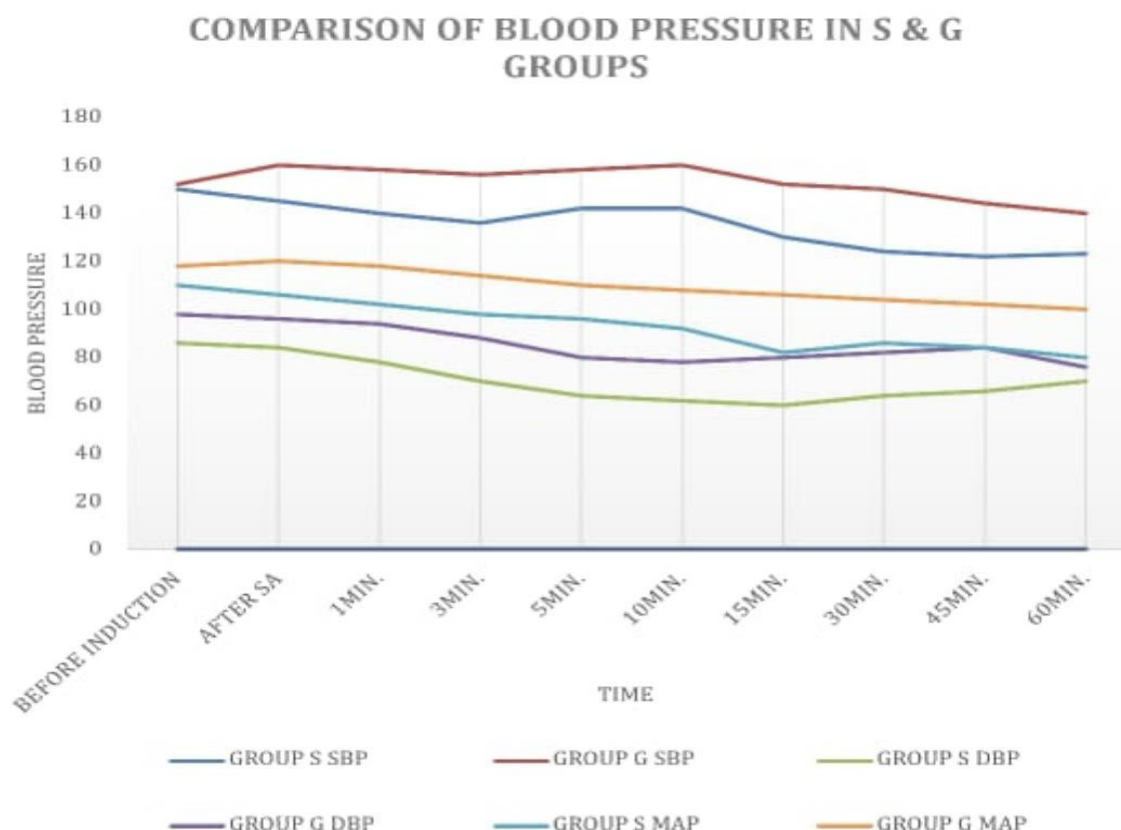


Figure 2: Comparison of blood pressure in group S and group G

Figure 2 shows the mean baseline SBP, DBP, MAP of all parturients was high within acceptable range of preeclampsia and found not statistically significant. ($p > 0.05$). SBP, DBP, MAP in group G were higher than group S throughout the intra operative period ($p < 0.05$).

Table 3: Comparison of RSS and VAS between group S and group G

RSS	Group S	Group G	P value
1	30(100%)	9(30%)	0.0001
2	-	6(20%)	0.0001
3	-	5(16.6%)	0.0001
4	-	4(13.3%)	0.0001
5	-	3(10%)	0.0001
6	-	2(6.6%)	0.0001
7	-	1(3.3%)	0.0001

VAS	Group S	Group G	P value
1	30(100%)	13(43.3%)	0.0001
2	-	7(23.3%)	0.0001
3	-	7(23.3%)	0.0001
4	-	3(10%)	0.0001

Parturients in group S were awake throughout procedure (Ramsey sedation scale 1) while parturients in group G had varying degree of sedation in postoperative period. It was observed that 100% parturients from group S with no pain as compared to 30% parturients in group G (Visual analogue scale 1) in early postoperative period as shown in table 3.

Table 4: Intraoperative complications

Complications	Group S	Group G
Bradycardia	3(10%)	-
Tachycardia	1(3.33%)	5(16.6%)
Hypotension	8(26.66%)	-
Hypertension	-	11(36.66%)
Aspiration pneumonitis	-	-
Failed intubation	-	-
Convulsion	-	-
Nausea and Vomiting	1(3.33%)	3(10%)

Table 4 shows that in group G there was significant tachycardia and hypertension. 11 parturients had significant hypertension who received treatment inj. Labetalol 10-20 mg iv slowly. In group S hypotension seen in 8 parturients and treated with inj. Ephedrine 3-6 mg iv slowly, while bradycardia seen in 3 patients, who treated with inj. Atropine 0.6 mg iv. There was no case reported with failed intubation or other complications like aspiration pneumonitis, failed spinal, convulsions.

Table 5: APGAR Score

	Group S	Group G	P-Value
Apgar Score at 1 Minute	8.13±0.47	7.06±0.73	p<0.0001
Apgar Score at 5 Minute	9.066±0.78	9.06±0.73	p>0.05
Mean Birth Weight(Kg)	2.56±0.63	2.34±0.53	p=0.14
1 st Apgar Score<7	3 pts (10%)	7 pts (23.3%)	
1 st Apgar score > 7	27 pts (90%)	23 pts (76.6%)	
PH	7.22±0.08	7.24±0.03	0.08
PCO2 (mmhg)	53.06±8.14	50.80±5.31	0.13
PO2 (mmhg)	21.42±4.4	23.69±3.57	0.04
BE (mEq/ml)	-5.492±2.4	-4.35±1.91	0.04
HCO3 (mmol/l)	21.21±1.6	20.94±2.43	0.76

Table 5 shows that difference in APGAR score at 1 min was less in group-G than in group-S (P<0.05) but it was not significant at 5 minutes (p>0.05). Mean birth rate was comparable in both groups. Blood gas value of neonatal umbilical artery was comparable in both groups. Newborn delivered in spinal anaesthesia had 1st APGAR score >7 in 27 parturients (90%) which was higher than group G (23 parturients (76.6%)).

Discussion

Preeclampsia is a multi-system disorder unique to human pregnancy complicating 5-8% of pregnancies [7]. Women with preeclampsia have an increased rate of cesarean section due to high incidence of IUGR, fetal distress and prematurity [8].

Anaesthesia for cesarean delivery in parturients with preeclampsia has been a debated issue over years. Main concerns to anaesthetics are an oedematous airway, dysfunctions of cardiorespiratory system, cerebrovascular system and coagulation system [9]. Previously it was shown that spinal anaesthesia causes more hypotension in preeclamptic parturients which decreases uteroplacental blood flow and leads to fetal hypoxia due to hypotension. Recent studies prove that spinal anaesthesia causes less hypotension in pre eclamptic parturients than

normal parturients [10]. Preeclamptic parturients having increased sensitivity to vasoconstrictors so less vasopressors required [11]. General anaesthesia has advantages of good oxygenation and maintenance of utero-placental blood flow but potential complications such as hypertensive crisis, stroke, difficult airway management and risk of pulmonary aspiration causes higher incidence of fetal and maternal morbidity and mortality. Peripartum pharyngeal and glottic oedema also accentuated in preeclampsia [12] leading to risk of difficult or failed intubation so we decided to compare between spinal and general anaesthesia in pre eclamptic parturients for elective cesarean section. In present study we included total 60 parturients and there were no significant difference between two groups with respect to demographic data including age, weight, height, parity, gestational age, ASA grading. The mean age of the parturient was 26.26±5.48 years in group S and 27.96±5.91 years in group G similar to Aungna et al. Gestational age and parity also comparable in both groups which is similar with study done by Dyer et al [3,13] and Obi et al [14].

In our study the mean pulse rate before induction was comparable in both groups. In group S mean pulse rate was 95.66±8.85 and in group G mean pulse rate was 98.97±7.45. In group S pulse rate was decreased after SA while in group G it was

increased during intubation and extubation ($p < 0.05$). The mean pulse rate throughout the intraoperative period was significantly higher among group G compared to Group S which was clinically highly significant ($p \leq 0.001$). This was comparable with study done by Tsehay terefe et al [15] and Muhammad ahsan-ul-haq [16]. In our study baseline SBP, DBP and MAP was higher which was within acceptable range of preeclampsia. In group S there was fall in SBP, DBP and MAP which was within 20% of baseline and only 8 parturients required treatment for hypotension in form of inj. Ephedrine 3-6 mg iv. In group G after intubation there was significant rise in SBP, DBP and MAP and it remains elevated throughout surgery. [11] Parturients in Group G developed hypertension which was treated with inj. Labetalol 10-20 mg iv slowly followed by infusion. These results were comparable with previous studies done by Muhammad ahsan-ul-haq [16] and Pacharla indira et al [17] In present study parturients in group S were awake throughout the procedure (Ramsey sedation score 1) while parturients in group G had varying degree of sedation in postoperative period and only 30% Ramsay sedation scale 1.

It was observed that 30 % parturients from group G did not have pain (Visual analogue scale 1) compared to 100% parturients from group S with no pain as shown in table 3. These results were comparable with study done by Shailendra a satpute et al [18]. SpO₂ remained within normal range and was comparable in both the groups throughout the surgery. In group S only one parturient developed nausea and vomiting while in group G 3 parturients developed nausea and vomiting. These data was comparable to study done by Shailendra et al. The Apgar score at one minute was lower in group G ($p < 0.005$) than Group S but there was no difference in Apgar score at 5 minutes.

An Apgar score of < 7 was recorded in 7 (23.33%) patients in group G as compared to 3 (10%) in group S. The mean birth weight was 2.65 ± 0.63 and 2.34 ± 0.53 kg in group S and group G respectively which was comparable in both the groups ($p > 0.05$). Overall fetal outcome was better in group S than group G. These results were comparable with previous studies done by Muhammad ahsan-ul-haq [16], Keerath k et al [19] and Suman Chattopadhyay et al [20]. Blood gas analysis of the umbilical artery was comparable in both groups [21].

Conclusion

In present study significantly higher intraoperative blood pressure and pulse rate observed in General anaesthesia group. Although 5 min APGAR score is comparable in both groups it was better in spinal

anaesthesia group at 1 min. Therefore Spinal anaesthesia can be considered as a better alternative to General anaesthesia for preeclamptic parturients undergoing elective cesarean section in terms of hemodynamic stability in perioperative period, awareness, postoperative analgesia and also for better outcome of newborns.

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