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A Comparative Study of Effects of General Anaesthesia and subarachnoid Block for LSCS in Terms of Maternal Outcome in Pre-eclamptic Patients

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Abstract

Background

Preeclampsia is a hypertensive and multisystem illness of pregnancy. It is the primary cause of maternal mortality and morbidity. There is a higher rate of lower segment caesarean section (LSCS) in the pre-eclamptic parturient. So, we designed a comparative analysis to assess the influences of general anaesthesia and subarachnoid block on maternal outcome in pre-eclamptic patients.

Materials and Methods

One hundred consenting patients of age 16 to 32 years with serious pre-eclampsia posted for elective or emergency LSCS were randomly allotted to one of the two groups; group GA, group SA who received general anaesthesia, and subarachnoid block respectively.

Variables in mother like Diastolic Blood Pressure (DBP),Mean Arterial Pressure (MAP),Systolic Blood Pressure (SBP), and Heart Rate (HR)were measured before induction, just after induction then 5, 10, 30, 60 minutes after induction and postoperatively at 15, 30, 60, 90, 120 minutes after the completion of the operation.

Result

No maternal mortality is noted in either of the two groups. Hypertension (10% group GA), hypotension (14% group SA), and pulmonary edema

were 4% in the GA group whereas none in the SA group was seen intraoperatively.

Conclusion

The subarachnoid block serves well as a mode of anaesthesia for LSCS in severe preeclamptic parturients in terms of both intraoperative and postoperative morbidities.

Keywords

Preeclampsia; Lower Segment Caesarian Section; Subarachnoid Block; General Anaesthesia; Maternal Morbidity.

Introduction

Preeclampsia is a pregnancy-related hypertension multisystem disease. On the side of the mother, it is the main cause of mortality and morbidity. Hepatic failure or rupture, respiratory failure, acute pulmonary edema, cerebral infarction, and intracranial hemorrhage are the leading cause of maternal death.[1,2] Pre-eclampsia women have a higher chance of developing a cerebrovascular illness, hypertension, and ischemic heart disorder later in life. [3-8] Preeclampsia can complicate eclampsia and convulsions can occur. Primigravidae are at greater risk than multigravidae [9]. Pre-eclampsia women have a higher rate of LSCS. The maternal death risk of 0.2/100000 for a vaginal birth and 2.2/100000 for caesarean delivery was causally associated with mode of delivery [10].General anaesthesia (GA) in severe pre-eclampsia, as well as eclampsia, is associated with the risk of failed endotracheal intubation, gastric contents aspiration. The risk is present in both subarachnoid block and general anaesthesia. In caesarean section, studies demonstrated that subarachnoid block (SAB), epidural and combined subarachnoid-epidural (CSE) anaesthesia are safer than GA for parturients and their newborns [11-13]. Studies comparing GA and SAB in severe pre-eclampsia are scarce. Hence present work was conducted to compare the influences of two modes of anaesthesia i.e., GA and SAB on maternal outcome in severe pre-eclamptic parturients undergoing LSCS. The objective of this research was to compare the impacts of GA and SAB in severe pre-eclamptic patients who underwent LSCS, in respect of maternal outcome.

Materials & Methods

After approval from the institutional ethical committee, this research was carried out on 100 consenting parturients with serious preeclampsia with diastolic blood pressure≥110mm Hg, systolic blood pressure≥160mm Hg and proteinuria +++ on dipstick test posted for elective or emergency lower segment caesarean section under GA or SAB were included in the study. Gestational age <32 weeks, multiple pregnancies, parturient with intrauterine death (IUD), diabetes mellitus, renal, hepatic, neurological, endocrinal impairment and bleeding diathesis, impending eclampsia, antepartum hemorrhage, and cases of the failed subarachnoid block that were reverted to general anaesthesia were excluded from the research and an equivalent number of new cases were added to complete the research.

Patients were randomly divided into two groups:

Group GA (n=50): Parturient receiving general anaesthesia.

Group SA (n=50): Parturient receiving subarachnoid block.

All the elective patients were carried out with the whole history, general examination, airway assessment, systemic examination along routine blood investigation if present. Elective patients were asked not to take solids for at least 8 h and water for atleast 2 h before the procedure. Patients posted for emergency LSCS were asked a short relevant history

and a brief general and systemic examination was undertaken wherever possible. Intravenous access with 18G cannula was established in those who didn't already have and Ringer's Lactate infusion was began at the bodyweight rate of 10ml/kg.

All elective patients were uniformly premedicated with Injection Ranitidine 50mg IV and injection Metoclopramide 10mg IV half an hour before surgery. In an emergency, both premedication drugs were given whenever possible. Blood pressure was checked, and if the blood pressure was >160/110 mm of Hg then was lowered by administering anti-hypertensives (inj. Labetolol 20 mg IV over 2 minutes). After reducing the blood pressure patient was moved to the Operating Room (OR).

On arrival of patient in the OR non-invasive monitoring such as non-invasive blood pressure, pulse oximeter, 5 lead ECG were connected and basal HR, SBP, DBP, MAP was measured and recorded.

Group GA (General Anaesthesia) Patient was pre-oxygenated with 100percent oxygen and anaesthesia was induced with inj. Thiopentone sodium 5mg/kg and Inj. succinylcholine 1mg/kg, with rapid sequence induction technique, laryngoscopy was done with Macintosh laryngoscope blade and the trachea was intubated with a suitable sized endotracheal tube. After validating bilateral equal air entry on auscultation, the tube was secured. Intermittent positive pressure ventilation was started with tidal volume 6ml/kg body weight and frequency suitable to keep end-tidal carbon dioxide in the standard range. Anaesthesia was kept with 50percent oxygen in air & Isoflurane up to 1 minimum alveolar concentration with intermittent doses of inj. Atracurium 0.25mg/kg body weight, fentanyl 1mcg/kg was given after baby delivery. After intubation till the conclusion of surgery and reversal of anaesthesia, both continual and continuous monitoring of vital parameters was done. After the end of surgery and assessing the spontaneous respiratory efforts by the patient, inj. Neostigmine 0.06mg/kg and inj. Glycopyrrolate 0.01mg/kg body weight was given to reverse the residual muscular blockade and oral suction was done. The trachea was extubated only when mothers were conscious, cough present, and had satisfactory SpO2 at room air.

Group SA (Subarachnoid Block) Parturient was placed in the left lateral position, cleaning painting and draping was done, L3-L4 inter-vertebral space was identified. Subarachnoid space was accessed with a 25G spinal needle and 2ml of inj. Bupivacaine heavy 0.5% (10mg) injected after validating free flow of cerebrospinal fluid. After injecting the drug patient was positioned in the supine position and the level of anaesthesia was achieved up to T4-T6.

Outcome Variables

Maternal Aspects

Haemodynamic parameters such as SBP, MAP, DBP, and HR were noted before induction, just after induction then 5, 10, 30, 60 minutes after induction. The same parameters were also monitored postoperatively in all mothers at 15, 30, 60, 90, and 120minutes after the completion of the operation. Any intraoperative and postoperative complications like hypertension (BP more than 20% of baseline), hypotension (BP less than 30% of baseline), and pulmonary edema (pink frothy sputum, bilateral crepts, and fall in oxygen saturation) if occurred were also noted.

Statistical Analysis

On the basis of previous studies [14-16] with subarachnoid block for LSCS in preeclamptic patients, the sample size was determined with the power of 80

percent and 95 percent confidence levels. The sample size came to be 30in all groups. To avoid sampling bias, the sample size was multiplied by 1.5, and then comes to 45 in each group. As there were chances of incomplete data collection and no difficulty in subject recruitment, we added 5 patients more in each group. Hence there were 50 patients in every group. Statistical analysis was conducted with "IBM SPSS Statistics" version 19

Statistical software. The study data was represented as mean±standard deviation. Demographic data were examined with the "Chi-square test" and independent t-test.(Value of p more than 0.05 was taken to be statistically insignificant whereas a value of p less than 0.05 was considered statistically significant).

Results

In this work the average age, gravida and parity were comparable in the group's p-value>0.05 (Table 1, 2 and 3). The hemodynamic variability was greater in the GA group as compared to the SA group. Hypertension (10% group GA), hypotension (14% group SA), and pulmonary edema (4% in GA group whereas none in SA group) were seen intraoperatively. No maternal mortality is noted in either of the two groups.

Table 1: Age distribution in both groups

Age(years)	Group GA	Group SA	P-value
16-32	50	50	
Mean±SD	23.7±3.60	24.2±4.47	0.53

Table 2: Distribution of parturients according to Gravida

Gravida	Group GA	Group SA
1	28	27
2	13	17
3	09	06
Statistical Analysis	Chisquare (X^2) = 1.152	p-value = 0.56

Table 3: Distribution of patients according to Parity

Parity	Group GA	Group SA
0	23	28
1	20	15
2	07	07
Statistical Analysis	Chisquare (X^2) = 1.20	p-value = 0.54

Table 4: Comparison of Mean Heart Rate (beats per minute) in both the groups

Mean Heart Rate (bpm)	Group GA Mean ±SD	Group SA Mean ±SD	P-value
Before Induction	92.5±8.27	92.1±8.17	0.80
After Induction	118.22±11.23	97.22±10.20	0.00
5 min intraoperative	111.00±10.88	94.28±7.72	0.00
10 min intraoperative	103.56±10.21	92.82±7.74	0.00
15 min intraoperative	98.92±9.44	92.16±7.03	0.00
30 min intraoperative	92.14±8.89	87.88±6.13	0.00
60 min intraoperative	87.5±9.19	83.82±6.42	0.00
15 min postoperative	85.1±8.49	84.12±5.79	0.50
30 min postoperative	84.16±8.2	83.36±4.50	0.53
60 min postoperative	82.16±7.20	83.12±5.45	0.45
90 min postoperative	83.16±9.67	82.02±3.45	0.42
120 min postoperative	85.34±8.27	85.2±4.82	0.91

Table 5: Comparison of Mean Systolic Blood Pressure (mm Hg) in Group GA and Group SA

Mean Systolic Blood Pressure (mmHg)	Group GA Mean ±SD	Group SA Mean ±SD	P-value
Before Induction	155.32±8.86	157.00±6.44	0.27
After Induction	171.44±9.91	154.66±6.65	0.00
5 min intraoperative	162.32±10.04	145.32±6.88	0.00
10 min intraoperative	151.98±13.28	128.78±12.64	0.00
15 min intraoperative	135.54±19.39	117.66±9.47	0.00
30 min intraoperative	132.32±16.99	115.52±6.78	0.00
60 min intraoperative	122.42±16.81	114.70±5.55	0.00
15 min postoperative	120.08±7.42	118.16±4.01	0.11
30 min postoperative	121.10±6.03	120.04±4.11	0.30
60 min postoperative	122.08±5.29	121.12±4.60	0.33
90 min postoperative	124.20±5.55	124.16±5.21	0.97
120 min postoperative	132.04±5.15	131.04±3.55	0.26

Table 6: Comparison of Mean Systolic Blood Pressure (mm Hg) in Group GA and Group SA

Mean Diastolic Blood Pressure (mmHg)	Group GA Mean ±SD	Group SA Mean ±SD	P-value
Before Induction	96.16±7.30	95.80±5.99	0.78
After Induction	103.40±6.27	91.64±5.78	0.00
5 min intraoperative	99.86±6.84	88.76±6.80	0.00
10 min intraoperative	96.16±±6.83	83.46±11.87	0.00
15 min intraoperative	88.04±9.95	79.48±11.56	0.00
30 min intraoperative	84.84±10.11	78.92±7.24	0.00
60 min intraoperative	81.60±11.43	78.24±5.78	0.04
15 min postoperative	80.08±3.76	80.68±3.49	0.41
30 min postoperative	82.12±2.81	81.42±3.47	0.27
60 min postoperative	83.24±2.45	83.04±3.03	0.71
90 min postoperative	84.12±2.53	85.00±3.05	0.11
120 min postoperative	85.16±2.99	85.16±2.74	1.00

Table 7: Comparison of Mean Systolic Blood Pressure (mm Hg) in Group GA and Group SA

Mean Arterial Pressure (mmHg)	Group GA Mean ±SD	Group SA Mean ±SD	P-value
Before Induction	115.88±4.97	116.2±5,88	0.76
After Induction	126.08±4.96	112.64±5.59	0.00
5 min intraoperative	120.68±5.37	107.61±6.3	0.00
10 min intraoperative	114.76±6.37	98.56±11.73	0.00
15 min intraoperative	104.11±10.61	92.20±10.59	0.00
30 min intraoperative	100.66±9.99	91.12±6.53	0.00
60 min intraoperative	95.5±10.99	90.39±4.27	0.00
15 min postoperative	93.41±3.14	93.17±2.58	0.67
30 min postoperative	95.11±2.49	94.09±2.66	0.05
60 min postoperative	96.24±2.61	95.73±2.44	0.31
90 min postoperative	97.53±2.74	98.05±2.73	0.34
120 min postoperative	100.78±2.62	100.16±1.93	0.18

Table 8: Comparison of maternal complications in both the groups

S.No.	Complications	GA	SA
1.	Hypertension	5 (10%)	Nil
2.	Pulmonary Edema	2 (4%)	Nil
3.	Hypotension	Nil	7 (14%)

Discussion

In our study, there was a substantial rise in HR in the GA group as compared to the SA group intraoperatively, and the variation was insignificant between the two groups in the postoperative period (Table 4). Our findings were similar to Ahsan-Ul-Haq M [14] who showed that the rise in HR was significant in the GA group after intubation, which settles down towards the pre-induction value at 10 min whereas in the SA group there was a reduction in average heart rate after induction of subarachnoid block.

There was a substantial drop in DBP, SBP, and MAP in the SA group as compared to group GA after induction and during the intraoperative period, whereas the reduction was insignificant in the postoperative period(Table 5, 6, and 7). Ahsan-Ul-Haq M [14] also observed that there was an increase in blood pressure in group GA compared to group SA where there was a significant reduction in blood pressure. Wallace DH et al [15] found that MAP significantly declined over time in regional anaesthesia as compared to GA. The rise in HR, DBP, SBP, and MAP after induction in the GA group might be due to the sympathetic stimulation caused by the stress response to laryngoscopy as well as endotracheal intubation.

In our study, the incidence of hypertension and pulmonary edema was greater in the GA group (10% and 4%) as compared to the SA group (0%). Whereas, the incidence of hypotension is significantly greater in the SA group (14%) as compared to the GA group (0%). (Table 8)

Hypertension was treated with Inj. Labetolol 20mg IV. Pulmonary edema was treated with fluid restriction, diuretics (Inj. Furosemide), and positive pressure ventilation. Hypotension was treated with Inj. Mephentermine accordingly.

Our finding coincides with Ahsan-Ul-Haq M [14] who showed that 73.3% and 16.6% of patients developed intraoperative and postoperative hypertension respectively in the GA group, as compared to the SA group where 33.3% and 3% of patients developed intraoperative and postoperative hypotension respectively. Similarly, 5 (16.6%) patients in group GA in their study had pulmonary edema and none in group SA.

Limitations

The sample size in our study was small to identify the true incidence of mortality, so further studies are required with larger sample size.

Conclusion

We conclude that subarachnoid block serves well as a mode of anaesthesia for LSCS in severe preeclamptic parturients in terms of both intraoperative and postoperative morbidities. Maternal morbidities were

also less with this anaesthesia modality. As there was no maternal mortality noted in either of the two groups, so this study needs to be done in a larger sample size to quantitate the same.

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