Original Article

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A Comparative Study of Effects of General Anaesthesia and Subarachnoid Block For LSCS in Terms of Maternal and Foetal Outcome in Preeclmaptic Patient

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Abstract

Background: Preeclampsia is hypertensive and multisystem disorder of pregnancy. It is a leading cause of maternal and foetal morbidity and mortality. There is increased rate of lower segment caesarean section in preeclamptic parturient. So we designed a comparative study to assess the effects of general anaesthesia and subarachnoid block on maternal and foetal outcome in preeclamptic patients. *Materials and Methods:* One hundred consenting patients of age 16 to 32 years with severe preeclampsia posted for elective or emergency lower segment caesarean section were randomly assigned to one of the two groups; group GA, group SA who received general anaesthesia and subarachnoid block respectively. Variables in mother like systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP) and heart rate (HR) was recorded 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 operation. After delivery of the baby the APGAR score at 1 min and 5 min was recorded. *Result:* No maternal mortality is noted in either of the two groups. Hypertension (10% group GA), hypotension (14% group SA), and pulmonary oedema 4% in GA group whereas none in SA group was seen intraoperatively. Birth asphyxia was developed in foetus 8% in group GA and 2% in group SA. Foetal APGAR score at one minute was 7.42±1.16 & 8.96±0.66 in GA and SAB respectively higher with subarachnoid block. *Conclusion:* subarachnoid block serves better as a mode of anaesthesia for LSCS in severe preclamptic parturients in terms of both intraoperative and postoperative morbidities.

Keywords: Preeclampsia; Lower Segment Caesarian Section; Subarachnoid Block; General Anaesthesia; Maternal and Foetal Morbidity.

Introduction

Preeclampsia is the leading cause of foetal growth retardation, intrauterine foetal demise and preterm birth [1,2]. This disease is a hypertensive, multi system disorder of pregnancy. On the side of mother, it is responsible for considerable morbidity and mortality. Maternal deaths are mostly due to intracranial hemorrhage, cerebral infarction, acute pulmonary oedema, respiratory failure and hepatic failure or rupture [2,3]. Women who experience pre-eclampsia are at increased risk of hypertension, cerebrovascular disease and ischaemic heart disease in later life [4-9].

Preeclampsia can complicate into eclampsia and convulsions can occur. Primigravidae are at greater risk than multigravidae [10]. Women with pre-eclampsia have an increased rate of lower segment caesarean section (LSCS). The risk of maternal death causally related to mode of delivery was 0.2/100000 for vaginal birth and 2.2/100000 for caesarean delivery [11].

General anaesthesia (GA) in severe pre-eclampsia and eclampsia is associated with the risk of failed endotracheal intubation, aspiration of gastric contents

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and is also associated with increased morbidity of neonates.

The risk is present in both subarachnoid block and general anaesthesia. In caesarean section, studies demonstrated that subarachnoid block (SAB), epidural and combined sub arachnoid-epidural (CSE) anaesthesia are safer than GA for parturients and their new borns [12,13,14].

Study comparing GA and SAB in severe preaclamsia are scarce. Hence this study was conducted to compare the effects of two modes of anaesthesia i.e. GA and SAB on maternal and foetal outcome in severe pre-eclamptic parturients undergoing LSCS.

The aim of this study was to compare the effects of GA and SAB in severe pre-eclamptic patients underwent LSCS, in respect of:

1. Maternal outcome: maternal morbidity and mortality
2. Foetal outcome: foetal morbidity and perinatal mortality.

Materials and Methods

After approval from the institute ethical committee, this study was carried out in the Department of Anaesthesiology, G. R. Medical College and J.A. Group of hospitals, Gwalior (M.P.). Hundred consenting parturients with severe preeclampsia with systolic blood pressure ≥ 160 mm Hg and diastolic blood pressure ≥ 110 mm 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 pregnancy, parturient with intra uterine death (IUD), diabetes mellitus, renal, hepatic, neurological, endocrinal impairment and bleeding diathesis, impending eclampsia, antepartum haemorrhage and cases of failed subarachnoid block that were reverted to general anaesthesia were excluded from the study and equal number of new cases were added to complete the study.

Patients were divided into the following groups by computer generated random number table

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

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

All the elective patients were carried out with complete history, general examination, airway assessment, systemic examination along with routine blood investigation if present. Elective patients were asked not to take solids for at least 8 h and water for at least 2 h before procedure. Patients posted for emergency LSCS were asked a short relevant history and 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 started at the rate of 10ml/kg body weight.

Premedication

All elective patients were uniformly premedicated with Injection Ranitidine 50mg IV and injection Metoclopramide 10mg IV half an hour before surgery. In 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 transferred to operating room.

Anaesthesia Management

On arrival of patient in the operating room (OR) non-invasive monitoring such as non-invasive blood pressure, pulse oxymeter, 5 leads ECG were connected and basal HR, SBP, DBP, MAP were measured and recorded.

Group GA (General Anaesthesia)

Patient was preoxygenated with 100% 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 trachea was intubated with appropriate sized endotracheal tube. Tube was secured after confirming bilateral equal air entry on auscultation. Intermittent positive pressure ventilation was started with tidal volume 6 ml/kg body weight and frequency suitable to maintain end tidal carbon di oxide within normal range. Anaesthesia was maintained with 50% oxygen in air and isoflurane up to 1 minimum alveolar concentration with intermittent doses of inj. Atracurium 0.25mg/kg body weight, fentanyl 1mcg/kg was given after delivery of the baby.

After intubation till 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 patient, inj. neostigmine 0.06 mg/kg and inj. glycopyrrolate 0.01 mg/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 left lateral position, cleaning painting and draping was done, L3-L4 inter-vertebral space was identified. Subarachnoid space was accessed with 25G spinal needle and 2 ml of inj. Bupivacaine heavy 0.5% (10mg) injected after confirming free flow of cerebrospinal fluid. After injecting the drug patient was placed in the supine position and the level of anaesthesia was achieved up to T4-T6.

Outcome Variables

Maternal Aspects

Haemodynamic parameters such as SBP, DBP, MAP, and HR was recorded 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, 120 minutes after the completion of operation. Any intraoperative and postoperative complications like hypertension (BP more than 20% of baseline), hypotension (BP less than 30% of baseline) and pulmonary oedema (pink frothy sputum, bilateral crepts and fall in oxygen saturation) if occurred were also noted.

Foetal Aspects

After delivery of the baby the APGAR score at 1 min and 5 min was recorded. Complications like birth asphyxia (low APGAR score 0 to 3 for 5 min) was noted. Resuscitation was done if required. If the baby expired, the day of perinatal period was noted and the cause of death was also recorded.

Statistical Analysis

On the basis of previous studies [15,16,17] with subarachnoid block for LSCS in preeclamptic patients, sample size was calculated with power of 80% and 95% confidence level. The sample size came to be 30 in each group. To avoid sampling bias, sample size was multiplied by 1.5, 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 each group. Statistical analysis was carried out by using IBM SPSS Statistics version 19 statistical software. The study data was presented as mean±standard deviation. Demographic data were analyzed with Chi square test and independent t test. (p-value >0.05 was taken to be statistically insignificant & p-value <0.05 taken statistically significant).

Result

In the present study the mean age, gravida and parity were comparable in both the groups p value >0.05 (Table 1, 2 and 3). The haemodynamic variability was higher in GA group as compared to SA group. Hypertension (10% group GA), hypotension (14% group SA), and pulmonary oedema (4% in GA group whereas none in SA group) was seen intraoperatively. Birth asphyxia was developed in foetus 8% in group GA and 2% in group SA. No maternal mortality is noted in either of the two groups. The APGAR score was significantly higher in SA group as compared to GA group at 1 min, 7.42±1.16 & 8.96± 0.66 in GA and SAB respectively, whereas there was no significant difference between the two groups at 5 min. Parturients who received SAB delivered more alert and less sedated neonates.

Table 1: Distribution of age 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	9	6
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	7	7
Statistical Analysis	**Chisquare value X^2=**1.20	**p-value=**0.54(#)

Table 4: Comparison of mean heart rate/min in both the groups

		Group GA Mean ±SD	Group SA Mean ±SD	P value
Intra operative	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	111.00±10.88	94.28±7.72	0.00
	10 MIN	103.56±10.21	92.82±7.74	0.00
	15 MIN	98.92±9.44	92.16±7.03	0.00
	30 MIN	92.14±8.89	87.88±6.13	0.00
	60 MIN	87.5±9.19	83.82±6.42	0.00
Post operative	15 MIN	85.1±8.49	84.12±5.79	0.50
	30 MIN	84.16±8.27	83.36±4.50	0.53
	60 MIN	82.16±7.20	83.12±5.45	0.45
	90 MIN	83.16±9.67	82.02±3.45	0.42
	120 MIN	85.34±8.27	85.2±4.82	0.91

Table 5: Comparison of mean systolic blood pressure (mm Hg) in both the group

		Group GA Mean ±SD	Group SA Mean ±SD	P value
Intra operative	Before induction	155.32±8.86	157±6.44	0.27
	After induction	171.44±9.91	154.66±6.65	0.00
	5 MIN	162.32±10.04	145.32±6.88	0.00
	10 MIN	151.98±13.28	128.78±12.64	0.00
	15 MIN	135.54±19.39	117.66±9.47	0.00
	30 MIN	132.32±16.99	115.52±6.78	0.00
	60 MIN	122.42±16.81	114.7±5.55	0.00
Postoperative	15 MIN	120.08±7.42	118.16±4.01	0.11
	30 MIN	121.1±6.03	120.04±4.11	0.30
	60 MIN	122.08±5.29	121.12±4.60	0.33
	90 MIN	124.2±5.55	124.16±5.21	0.97
	120 MIN	132.04±5.15	131.04±3.55	0.26

Table 6: Comparison of mean diastolic blood pressure (mm Hg) in both the group

		Group GA Mean ±SD	Group SA Mean ±SD	P value
Intra operative	Before induction	96.16±7.30	95.8±5.99	0.78
	After induction	103.4±6.27	91.64±5.78	0.00
	5 MIN	99.86±6.84	88.76±6.80	0.00
	10 MIN	96.16±±6.83	83.46±11.87	0.00
	15 MIN	88.4±9.95	79.48±11.56	0.00
	30 MIN	84.84±10.11	78.92±7.24	0.00
	60 MIN	81.6±11.43	78.24±5.78	0.04
Postoperative	15 MIN	80.08±3.76	80.68±3.49	0.41
	30 MIN	82.12±2.81	81.42±3.47	0.27
	60 MIN	83.24±2.45	83.04±3.03	0.71
	90 MIN	84.12±2.53	85±3.05	0.11
	120 MIN	85.16±2.99	85.16±2.74	1

Table 7: Comparison of mean arterial pressure (mm Hg) in both the groups

		Group GA Mean ±SD	Group SA Mean ±SD	P value
Intra operative	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	120.68±5.37	107.61±6.3	0.00
	10 MIN	114.76±6.37	98.56±11.73	0.00
	15 MIN	104.11±10.61	92.20±10.59	0.00
	30 MIN	100.66±9.99	91.12±6.53	0.00
	60 MIN	95.5±10.99	90.39±4.27	0.00
Postoperative	15 MIN	93.41±3.14	93.17±2.58	0.67
	30 MIN	95.11±2.49	94.09±2.66	0.05
	60 MIN	96.24±2.61	95.73±2.44	0.31
	90 MIN	97.53±2.74	98.05±2.73	0.34
	120 MIN	100.78±2.62	100.16±1.93	0.18

Table 8: Comparison of Mean ±SD APGAR SCORE in both the groups

	Group GA Mean±SD	GroupSA Mean±SD	P value
1 MIN	7.42±1.16	8.96±0.66	0.00
5 MIN	9.12±0.91	9.12±0.47	1

Table 9: Comparison of maternal and foetal complications in both the groups

	Complications	GA	SA
1.	Hypertension	5(10%)	Nil
2.	Pulmonary oedema	2(4%)	Nil
3.	Hypotension	Nil	7(14%)
4.	Birth Asphyxia	4(8%)	1(2%)

Discussion

In our study, there was significant rise in HR in GA group as compared to SA group intraoperatively, and the difference was insignificant between two groups in postoperative period (Table 4). Our findings were similar to Ahsan-Ul-Haq M15 who showed that the rise in HR was significant in GA group after intubation, which settles down towards the preinduction value at 10 min whereas in SA group there was reduction in mean heart rate after induction of subarachnoid block.

There was significant reduction of SBP, DBP and MAP in SA group as compared to group GA after induction and during the intraoperative period, whereas the reduction was insignificant in postoperative period (Table 5, 6 and 7). Ahsan-Ul-Haq M [15] also observed that there was increase in blood pressure in group GA compared to group SA where there was significant reduction in blood pressure. Wallace DH et al [16] found that MAP significantly declined over time in regional anaesthesia as compared to GA.

The rise in HR, SBP, DBP and MAP after induction in GA group might be due to the sympathetic stimulation caused by the stress response to laryngoscopy and endotracheal intubation.

On statistical comparison, the APGAR score was significantly higher in SA group as compared to GA group at 1 min, whereas there was no significant difference between the two groups at 5 min (Table 8).

The findings were in accordance with Ahsan-ul-haq-M [15] observed that the APGAR score at 1 min was significantly lower in GA group as compared to SA group, but there was no significant difference in APGAR score at 5 min between two groups. Iqbal R et al [17] in their study found that APGAR score of neonates at 1 min was better in mothers who received SAB compared to those who received GA whereas, there was no significant change in the APGAR score at 5 min in both the groups.

Kolatat et al [18] showed that the APGAR scores were significantly lower in infants whose mothers received GA than infants whose mothers received SAB.

Solangi et al [19] showed that APGAR score at 1 and 5 min was significantly higher in SAB group as compared to GA group. Abdallah MW et al [20] analyzed the APGAR scores and umbilical artery blood gas 1 and 5 min after delivery in the newborn and found a statistically significant higher APGAR scores at 1 and 5 min in CSE group as compared to GA group and the newborns in GA group had a statistically significant lower HCO3

Nafie M and ismael S [21] also showed the median score of APGAR at 1 minute and at 5 minute were significantly lower in GA group as compared to SAB group. But the median scores in both the study groups were above 7. The higher APGAR score at 1 min in SA group might be due to parturients who received SAB, delivered more alert and less sedated neonate as they have not received any general anaesthetic agent through the placental circulation.

In our study, the incidence of hypertension and pulmonary oedema were higher in GA group (10% and 4%) as compared to SA group (0%). Whereas, incidence of hypotension is significantly higher in SA group (14%) as compared to GA group (0%). Similarly, incidence of birth asphyxia in neonates was higher in GA group (8%) as compared to SA group (2%). There was only one still birth in GA group, compared to none in SA group (Table 9).

Hypertension was treated with Inj. Labetolol 20 mg IV.Pulmonary oedema 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 [15] who showed that 73.3% and 16.6% patients developed intraoperative and postoperative hypertension respectively in GA group, as compared to SA group where 33.3% and 3% 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. Okafor UV, Okezie O [22] in their study observed that there were 13 still births and 10 neonatal deaths in the GA group.

Algert et al [23] showed that the rate of intubation was more in infants in GA group as compared to SA group in whom the Caesarean section was done for foetal distress.

Limitations

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

Conclusion

We conclude that subarachnoid block serves better as a mode of anaesthesia for LSCS in severe preclamptic parturients in terms of both intraoperative and postoperative morbidities. Maternal and foetal 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 larger sample size to quantitate the same.

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