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Analysis of maternal outcome of general versus spinal anaesthesia for caesarean delivery in severe pre-eclampsia

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ABSTRACT

Aim: To study the analysis of maternal outcome of general versus spinal anaesthesia for caesarean delivery in severe pre-eclampsia. **Methods and Materials:** Sixty parturients with severe pre-eclampsia candidate for caesarean section were randomised into two groups of 30 for either spinal or general anaesthesia. Patients are parturients with the criteria of severe pre-eclampsia **Results:** Mean age of Group G and Group S was 23.63 and 24.47 years respectively. Mean weight in Group G and Group S was 57.37 and 55.80 kgs. Mean height of Group G and Group S was 160.33 cms and 160.50 cms. Mean Gravida in Group G and Group S was 1.67 and 1.80 respectively. Mean parity in Group G and Group S was 0.63 and 0.80 respectively. Mean gestational age was 33.8 and 33.93 in Group G and Group S respectively. Intraoperative hypotension was 16.6% in GA group and it was 33.3% in SA group. Postoperative hypotension was 6.6% in GA group and it was 13.3% in SA group. Intraoperative hypertension was 73.3% in GA group and it was 6.6% in SA group. Postoperative hypertension was 16.6% in GA group and it was nil in SA group. Tachycardia was 73.3% in group GA and 33.3% in group SA. Bradycardia was 16.6% in GA and 33.3% in SA. Postoperative complications were 50% in GA and 16.6% in SA. Admissions in ICU was 50% in GA and 16.6% in SA. 12 patients from GA group stayed in hospital for 7-15 days and 6 patients stayed in hospital for 4-10 days. **Conclusion:** It is therefore concluded that spinal anaesthesia could be considered as first choice for severe preeclamptic patients, which is as safe as general anaesthesia, with less postoperative morbidity and mortality.

Key words: Pre-eclampsia, Spinal anaesthesia

Introduction

Pre-eclampsia toxaemia (PET) is a multi-system disorder that is characterized by endothelial cell dysfunction as a consequence of abnormal genetic and immunological mechanisms. Despite active research for years, the exact aetiology of this potentially fatal disorder remains unknown. Although understanding of the pathophysiology of preeclampsia has improved, management has not changed significantly over the years [1]. Anaesthetic management of these patients remains a challenge. Although general anaesthesia can be used safely in preeclampsia women, it is associated with greater maternal morbidity and mortality.

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Currently, the safety of regional anaesthesia techniques is well established and they can provide better obstetrical outcome [2] when chosen properly. Thus, regional anaesthesia is extensively used for the obstetric management in women with pre-eclampsia[1]. For the past 50 years PET has been one of the two commonest direct causes of pregnancy-related death, being second only to pulmonary embolism in recent UK maternal mortality data, with similar facts in the USA and Australia. For many years most PET deaths were from cerebral haemorrhage, but since the mid-1980s pulmonary oedema (iatrogenic fluid overload and Adult Respiratory Distress Syndrome) has become the main cause of death [2]. Where Caesarean section is required the relative risks of general and regional anaesthesia must be assessed. Regional anaesthesia is usually considered safer, although cases must be assessed on an individual basis. The added risks associated with general anaesthesia include airway difficulties due to oedema (often

aggravated by tracheal intubation), and the presser response to laryngoscopy and extubation [1]. The benefits of epidural analgesia in preeclampsia are well recognized and an early epidural is recommended in labour. If a working epidural is already present this should be extended for surgery. But in emergency situation epidural has its own limitations. Epidural anaesthesia was the regional anaesthesia of choice until pencil-point spinal needles were introduced [2]. The disadvantages of epidural anaesthesia are that onset of block is longer than that of spinal anaesthesia and that the spread of the block is patchy, often giving poor anaesthesia for caesarean delivery. There is documented evidence of conversion of epidural to GA due to patchy anaesthesia or complete failure and there is increasing evidence to show that spinal anaesthesia or combined spinal epidural may be the anaesthesia of choice for preeclamptic patients. Especially spinal anaesthesia, which is quick to perform, takes less time to be effective and failure rate is less than epidural [3] Previous data showed that spinal anaesthesia was controversial in Pet[4] the anticipated potential risks of pulmonary oedema, profound cardiovascular instability, possibly from a fall in cardiac output [5], and the consequent recourse to IV fluids and vasoconstrictors, suggested that it was not a technique to be recommended in PET. However during the last decade, after the advent of pencil point spinal needles and newer local anaesthetic agents, it has been tried with favourable results. In most of the obstetrical centers it is now being used as anaesthesia of first choice for preeclamptic patients[6-9]The data from previous studies demonstrates that pre-eclampsia / eclampsia - related complications and haemorrhage are the leading causes for admission of obstetric patients to the ICU[10,11] Both are associated with increased risk of maternal morbidity and mortality[12], which is more prevalent perioperatively in patients given general anaesthesia as compared to regional anaesthesia[1]. Most of these studies recommend further clinical trial to choose the best technique [6-9]In our center we have been using both the techniques of anaesthesia, general as well as spinal since years and recently we have adopted this technique in 98% such patients.

Materials and Methods

Sixty parturients with severe pre-eclampsia candidated for caesarean section were randomised into two groups of 30 for either spinal or general anaesthesia.

Inclusion criteria: Patients are parturients with the criteria of severe pre-eclampsia (BP >160/90 mm of Hg, proteinuria >5g/24 hrs with at least one of the associated symptoms of severe pre-eclampsia as head ache, visual disturbance, epigastric pain, hyper reflexia, dizziness or vomiting).

Exclusion criteria: were cardio vascular and pulmonary disease, diabetes, HELLP syndrome, <34 weeks gestation, fetal bradycardia and any contra indications of regional anaesthesia including patients refusal, severe hemorrrhage, coagulopathy and sepsis.

In the ante partum management all patients received magnesium sulphate as a seizure prophylaxis. Previous use if other drugs was recorded. After taking informed written consent, all patients received 10 ml kg^{-1} of crystalloid before anaesthesia and basic vitals (NIBP and HR) were controlled and recorded. Spinal group (group S, n=30) received 6 to 10 mg of 0.5% hyperbaric bupivacaine intrathecally between L_3-L_4 or L_4-L_5 interspace in sitting or left lateral position with 25 G quinke needle. Patients received 6 to 8 l/min oxygen from face mask throughout surgery. General anaesthesia (group G, n=30) under went general anaesthesia with rapid sequence induction.

After pre oxygenation, fentanyl 1 mcg/kg, lidocaine 1 mg/kg, thiopental 4-5 mg/kg , succinyl choline 1mg/kg were administered and they were intubated under sellicke's maneuver. Maintenance of anaesthesia was achieved with 50% N_2O in 50% O_2, 0.5 to 0.75% halothane and 0.15 mg/kg atracurium. Patients were extubated awake with full dose reversal of atracurium. Demographic data including age, weight, gravida, gestational age were recorded. Blood pressure and heart rate was monitored in the ward before induction, after intubation and at 5 min interval 4-10 till completion of the operation. Blood pressure was monitored just after spinal anaesthesia and at 5 min interval. Parameters noted were incidence of morbidity and mortality and admission in ICU. Morbidity parameters observed were incidence of peri operative hypotension and hypertension, changes in heart rate during anaesthesia, post operative complications like convulsions, pulmonary edema, acute renal failure, aspiration pneumonitis and delayed recovery from anaesthesia. Twenty five percent fall or rise in blood pressure (BP) from the baseline, was considered as hypotension or hypertension respectively. Similarly 25% rise or fall in heart rate (HR) from the base line, was considered as tachycardia or bradycardia respectively.

Results

Patient in Spinal group (group S, n=30) received 6 to 10 mg of 0.5% hyperbaric bupivacaine intrathecally . General anaesthesia (group G, n=30) under went general anaesthesia with rapid sequence induction and results were noted and analysed.

Table 1: Demographic details in present study

Parameter	Group G Mean±SD	Group S Mean±SD
Age (yrs)	23.63±3.29	24.47±4.27
Weight (kg)	57.37±5.33	55.80±4.78
Height (cm)	160.33±4.59	160.50±6.10
Gravida	1.67±0.84	1.80±0.96
Parity	0.63±0.3	0.80±0.2
Gestational Age	33.8±2.07	33.93±2.24
Highest SBP (mm Hg)	161.07±7.55	137.93±6.05
Lowest SBP (mm Hg)	117.80±7.98	102.80±12.60
Mean SBP (mm Hg)	131.27±8.84	99.17±4.89
Highest DBP (mm Hg)	99.83±5.85	96.10±6.35
Lowest DBP (mm Hg)	78.93±7.68	62.80±10.04
Mean DBP (mm Hg)	78.23±7.78	69.13±3.09
Mean MAP (mm Hg)	93.57±5.15	84.53±4.20

Table 2: Indications for admissions in ICU

Indications	GA group	SA group	P value
Post operative hypertension	5 (16.6%)	Nil	0.000006
Post operative hypotension	2 (6.6%)	3 (10%)	0.3326
Convulsions	2 (6.6%)	1 (3.3%)	0.999
Pulmonary oedema	1 (3.3%)	Nil	0.999
Acute renal failure	2 (6.6%)	1 (3.3%)	0.999
Delayed recovery	3 (10%)	Nil	0.2373
TOTAL	15 (50%)	5 (16.6%)	0.0068

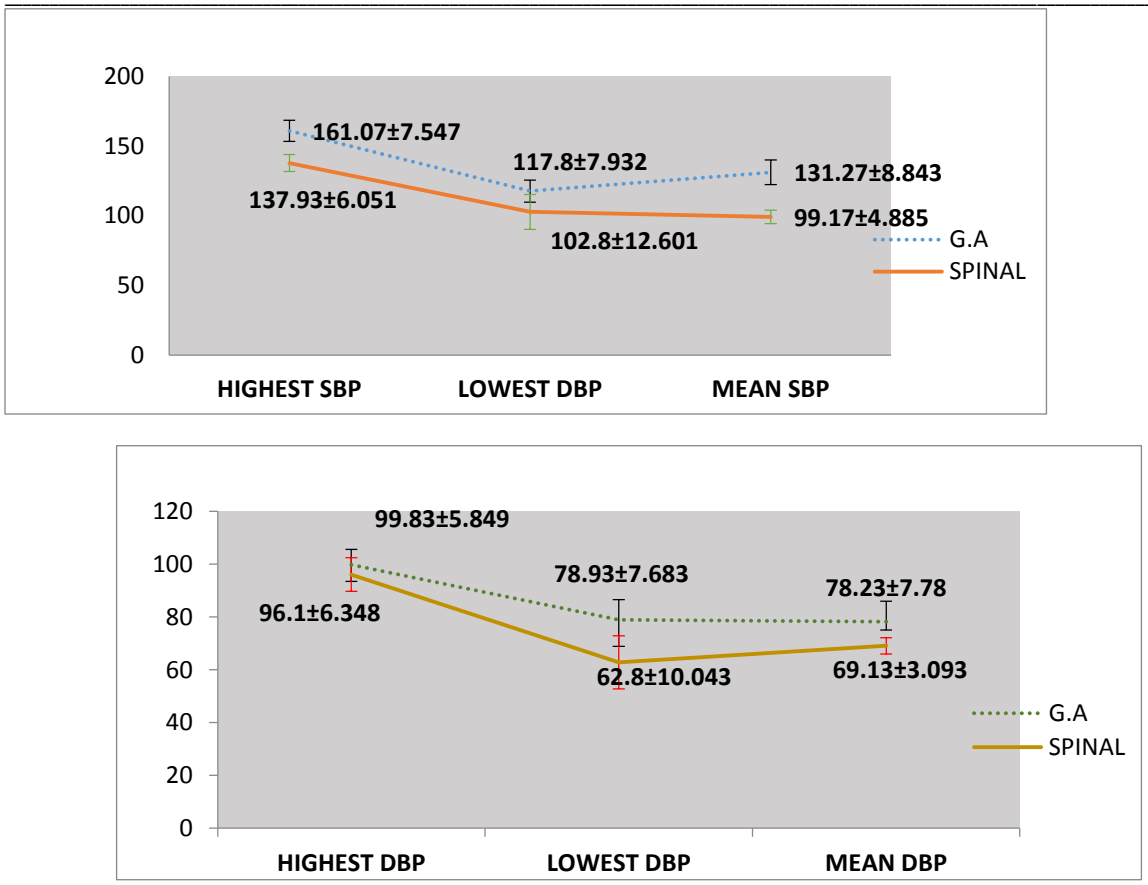

Figure 1: Systolic and diastolic blood pressure

Table 3: Incidence of morbidity and mortality in G and S groups

Parameter	GA group (n 30)	SA group (n 30)	P **value**
Intraoperative Hypotension	5 (16.6%)	10 (33.3%)	0.1521
Postoperative Hypotension	2 (6.6%)	4 (13.3%)	0.3326
Intraoperative Hypertension	22 (73.3%)	2 (6.6%)	0.000006
Postoperative Hypertension	5 (16.6%)	Nil	0.030
Tachycardia	22 (73.3%)	10 (33.3%)	0.0022
Bradycardia	5 (16.6%)	10 (33.3%)	0.1168
Postoperative complications	15 (50%)	5 (16.6%)	0.0068
Admission in ICU	15 (50%)	5 (16.6%)	0.0068
Days in hospital	12 (7-15)	6 (4-10)	0.045

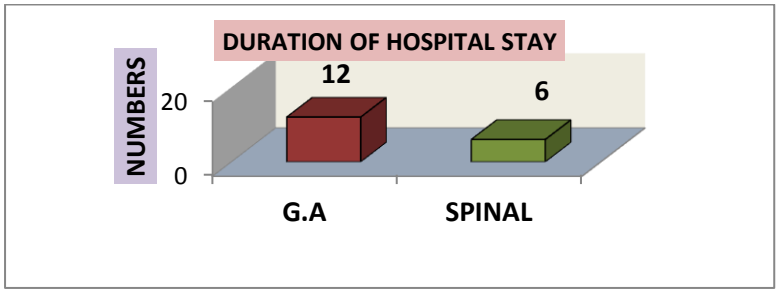

Figure 2: Duration of Hospital stay in the study

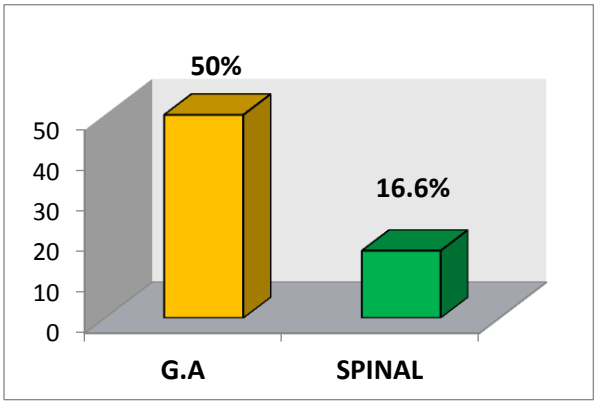

Figure 3: Post OP complications

Discussion

There are several reasons for preferring spinal anaesthesia to general anaesthesia for caesarean section. Babies born to mothers having spinal anaesthesia may be more alert and less sedated as they have not received any general anaesthetic agents through the placental circulation. As the mother's airway is not compromised, there is a reduced risk of aspiration of gastric contents causing chemical pneumonitis. Although spinal anaesthesia is not contra-indicated in the presence of mild pre-eclampsia, such patients may have altered clotting function and are relatively hypovolaemic. There is always a chance that a preeclamptic patient may suddenly have a convulsion and anticonvulsant drugs (midazolam or thiopentone sodium) must be immediately available. The advantages and disadvantages of spinal versus general anaesthesia will have to be carefully considered for each patient. On the other hand, spinal anaesthesia conveys significant advantages over epidural anaesthesia such as the simplicity of its use and the speed of onset, which allows neuraxial anaesthesia in urgent Caesarean sections and thus reduces the necessity for general anaesthesia. The small doses of local anaesthetics required to perform spinal anaesthesia reduce the risks of systemic toxicity to almost nil. Spinal anaesthesia is now considered the method of choice for Caesarean section. Preliminary studies indicate that spinal anaesthesia may be safely performed in patients with severe preeclampsia, in whom spinal anaesthesia was previously considered controversial. One previous study showed that the incidence of complications following GA (66.67%) were significantly ($P < 0.05$) more than that of SA (16.67%). Commonest complication following GA was intra-operative hypertension (73.3%), in our study and patients showed exaggerated response to laryngoscopy. Both the BP (73.3%) as well as heart rate (73.3%) was high after intubation and administration of IV lignocaine hydrochloride did not effectively reduce the response in preeclamptic parturients. While intraoperative hypotension following SA was 33.3% in our study and the difference among GA versus SA

groups, in our study, was significant ($p<0.05$). Incidence of bradycardia followed by hypotension, just after SA was 33.3%, which responded to atropine and IV fluid therapy. As the heart rate increased BP became to normal in almost all the patients. Development of bradycardia in GA group was relatively less (16.6%) as compared to SA group (33.3%). Another contradictory study showed that the severely preeclamptic patients had a less frequent incidence of clinically significant hypotension during SA (16.6% versus 53.3%; P = 0.006) than that in healthy patients but in this study SA and GA groups were not compared. Hypotension was treated with conventional treatment using ephedrine and IV fluid therapy and hypertension was controlled with nitroglycerine infusion. We observed that although haemodynamic changes during SA and GA, were statistically significant but clinically these were acceptable and manageable and did not have any deleterious effect on the patients of both groups. Since the criteria for major morbidity differ among institutions, the need to transfer to the intensive care unit (ICU) is used as an indicator of illness severity. We observed that 50% patients from GA group, were admitted in ICU as compared to 16.6% from SA group. Indications for ICU admission were (in order of frequency), postoperative hypertension, delayed recovery, postoperative hypotension, convulsions , acute renal failure and pulmonary edema. Similarly hospital stay in GA group was more (12 days) as compared to SA group (6 days). Difference in both the parameters between two groups is significant ($p<0.05$).General as well as regional anaesthetic techniques are equally acceptable for caesarean delivery in pregnancies complicated by severe preeclampsia if steps are taken to ensure a careful approach to either method. But postoperative morbidity and mortality is more after general anaesthesia as compared to spinal anaesthesia. **Ahmed SM, Khan RM, Bano S et al** [13] and associates found that patients of preeclamptic toxaemia underwent caesarean section (CS) under general anaesthesia and spinal anaesthesia found that Spinal Anaesthesia is not as unsafe as it is thought. **Muhammad ahsan-ul-haq et al** [14] and associates, in a Retrospective comparative analysis of peri-operative morbidity and mortality in severe preeclampsia, found that Spinal anaesthesia should be used as first choice for severe preeclamptic patients, which is as safe as general anaesthesia, with less postoperative morbidity and mortality. **F.Moslemi, S.Rasooli et al** [15] **,** found that severe preeclamptic parturients undergoing spinal anaesthesia experience more hemodynamic instability (in the face of hypotension) than general group, but these changes are not severe, are transient, in the acceptable range and do not influence the neonatal outcome. So sub arachnooid block may be an appropriate anaestheic choice for women with severe preeclampsia having a caesarean delivery. **Obinna V. Ajuzieogu** [16] and co workers did a study which showed no significant difference in the maternal and perinatal mortality outcome of Cesarean delivery between women with severe preeclampsia who had regional and those that had general anesthesia. However, there was significantly higher proportion of birth asphyxia in women who received general anesthesia. **Keerath K** [17]and associates, in their study found that maternal morbidity and mortality were significantly different between general versus spinal group, and concluded that spinal anaesthesia is an appropriate anaesthetic choice in patients with severe preeclampsia.

Conclusion

Both the techniques of general as well as spinal anaesthesia, can be used for severe Preeclamptic patients for caesarean delivery. Haemodynamic changes in both techniques are acceptable and manageable during the operation, but post operative morbidity, requiring admission in ICU and mortality, are more common after general anaesthesia. Stay in the hospital is also prolonged in these patients as compared to patients operated under spinal anaesthesia. It is therefore concluded that spinal anaesthesia could be considered as first choice for severe preeclamptic patients, which is as safe as general anaesthesia, with less postoperative morbidity and mortality.

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