

Maternal and fetal outcome of spinal versus general anaesthesia in pre-eclampsia cases undergoing caesarean section

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Abstract

Introduction: Because of the high frequency of intrauterine growth restriction, foetal distress, and preterm, women with pre-eclampsia have a higher rate of caesarean delivery. Cesarean section, on the other hand, increases the risk of pre-eclampsia-related cardiac morbidity. This is attributed to pre-eclampsia patients' altered hemodynamics. Both spinal and general anaesthesia come with this risk. This highlights the necessity for research comparing the outcomes of Cesarean sections performed under subarachnoid block to general anaesthesia, since this will aid clinicians in underdeveloped countries in making decisions.

Objective: To compare the outcome of spinal anesthesia and general anesthesia in Cesarean delivery for women with severe pre-eclampsia.

Methods: A retrospective study of women with severe pre-eclampsia requiring Cesarean section was carried out in our hospital. A total of 48 patients were enrolled in the study. Maternal age, parity, gestational age at delivery, booking status, Apgar scores, maternal and perinatal mortality of the sub-arachnoid block group were compared with those of general anesthesia group using Student t-test.

Results: There were no significant difference between the two groups in overall maternal mortality (5% vs. 7%, $P=0.5$) and perinatal mortality (2.7% vs. 11.9%, $P=0.15$). The general anesthesia group had significantly more birth asphyxia than the spinal group (56% vs. 27%, $P=0.0006$).

Conclusion: There was statistically significant difference in the perinatal mortality outcome of cesarean delivery between women with severe pre-eclampsia who had regional anesthesia and those that had general anesthesia. Mean maternal age was statistically significant. There was significantly higher proportion of birth asphyxia in babies of women who received general anesthesia. P value <0.05 with respect to post operative convulsions & acute renal failure which is statistically significant.

Keywords- General anaesthesia, spinal anaesthesia, pre eclampsia, birth asphyxia

Introduction

Because of the high frequency of intrauterine growth restriction, foetal distress, and preterm, women with pre-eclampsia have a higher rate of caesarean delivery. Cesarean section, on the

other hand, increases the risk of pre-eclampsia-related cardiac morbidity¹. This is attributed to pre-eclampsia patients' altered hemodynamics. Both spinal and general anaesthesia come with this risk^{2,3}. This highlights the necessity for research comparing the outcomes of Cesarean sections performed under subarachnoid block to general anaesthesia, since this will aid clinicians in underdeveloped countries in making decisions.

Recently, spinal anesthesia (SA) has been recognized to have a place in operative management in pre-eclampsia parturients because it is more practical, has faster onset and with fewer complications^{3,4}. There is also evidence that its use in pre-eclampsia is increasing. A concern has been raised that SA might be unsuitable for pre-eclamptic patients as there is a potential for profound hypotension that could further compromise an already potentially compromised newborn and worsen neonatal outcome. On the other hand, there are reports stating that patients with severe pre-eclampsia experience less hypotension during SA than healthy parturients. Minimal hemodynamic effects from spinal anesthesia in healthy pregnancy have been demonstrated when using a low dose of bupivacaine (under 10 mg bupivacaine) but this has not been sufficiently investigated in pre-eclamptic toxemia^{5,6}. Pre-eclampsia has an incidence of around 8% of pregnancies and is a major cause of maternal morbidity and mortality.

Methodology

- Severe pre-eclampsia: Systolic blood pressure ≥ 160 mmHg and/or diastolic blood pressure ≥ 110 mmHg with $\geq 2+$ of Proteinuria on dipstick urinalysis.
- Booked: women who received antenatal care at the study center.

Sub-arachnoid block is usually done with 0.5% bupivacaine. For general anesthesia, rapid sequence induction with Sellick's maneuver and a relaxant technique are used. Sodium thiopentone 4-6 mg/kg and suxamethonium 1-2 mg/kg are used for induction and endotracheal intubation. Anesthesia is maintained with pancuronium, halothane and oxygen/nitrous oxide.

The records of all women who had Cesarean section for severe pre-eclampsia were retrieved. Data on maternal age, parity, gestational age at delivery, booking status, Apgar scores, maternal mortality and perinatal mortality were extracted.

The subjects were classified into two categories: Group A was patients that had spinal anaesthesia while group B comprised of patients that had general anaesthesia.

The background characteristics and outcomes were compared between the two groups using χ^2 , Student t-test, using SPSS version 23.0 statistical software. Differences were considered significant if $P < 0.05$.

Exclusion criteria

- ❖ mild pre-eclampsia
- ❖ Medical disorders in pregnancy,
- ❖ multiple pregnancies,
- ❖ gestational age less than 32 weeks,
- ❖ Eclampsia

Results

A total of 48 patients were enrolled for the study by retrospectively analysing history case sheet papers, monthly statistics.

Characteristics	Spinal anaesth.(N=18)	General anaesth.(N=30)	P value
Mean maternal age	24.45	27.23	<0.05
Mean Weight (Kg)			
Mean Height (cm)	55.67	56.65	>0.05
	158.7	159.45	>0.05
Mean Gestational age	36.78	37.54	>0.05
Booked Patients	5	7	>0.05

Table 1. Demographic profile of patients.

P value <0.05 with respect to mean maternal age which is statistically significant.

Indication for caesarean section	Spinal anaes. (N= 18)	General anaes.(N=30)	P value
Severe pre eclampsia with unfavorable cervix	11	20	>0.05
Severe pre eclampsia with previous Caesarean	2	3	>0.05
Severe pre eclampsia with bad obstetric history	1	2	>0.05
Severe pre eclampsia with failed induction of labour	1	3	>0.05
Severe pre eclampsia with fetal distress	1	1	>0.05
Severe pre eclampsia with IUGR	2	1	>0.05

Table 2. Indications of caesarean section in severe pre eclampsia patients.

Outcome	Spinal anaesthesia (N=18)	General anaesthesia (N=30)	P Value
APGAR Score <7 at 1 min.	6	17	<0.05
APGAR Score <7 at 5 min.	4	11	<0.05
Perinatal mortality	1	5	<0.05
Maternal mortality	1	2	>0.05

Table 3. Maternal & perinatal outcome of patients.

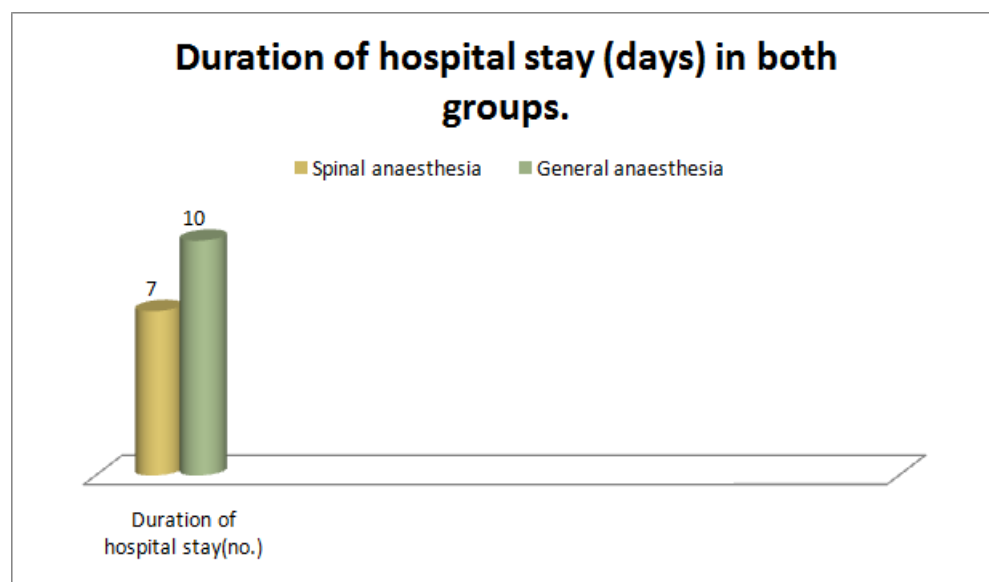


Figure 4. Duration of hospital stay (days) in both groups.

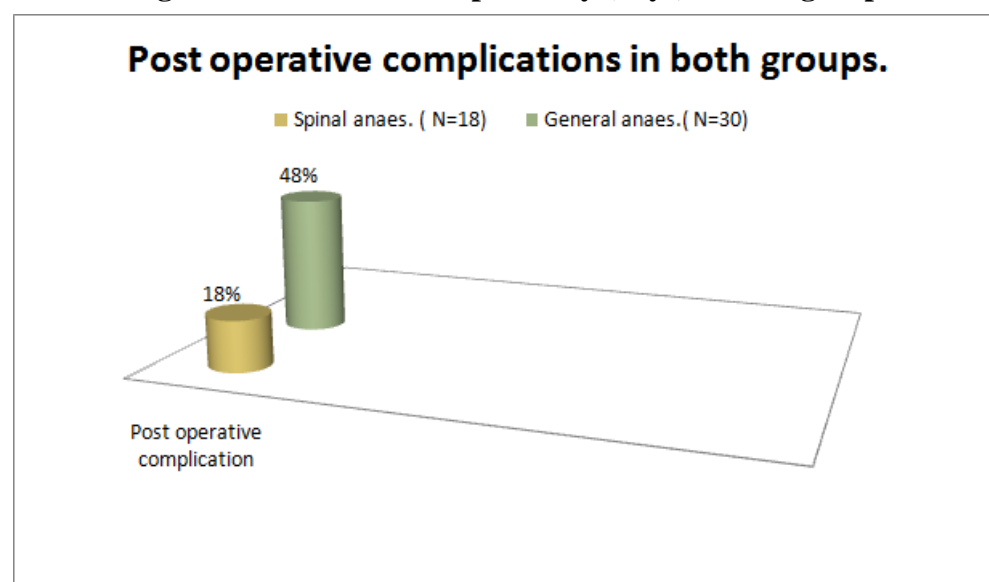


Figure 5. Percentage of post operative complication in spinal & general anaesthesia group.
P value <0.05 Statistically significant.

Amongst post operative complications need for blood transfusion was found to be 4% & 8% in spinal and general anaesthesia group respectively, rest needed ICU admissions which was 7% & 18% in spinal and general anaesthesia group respectively.

Parameter	Spinal anaesthesia	General anaesthesia	P Value
Highest SBP (mmhg)	165.54	171.34	>0.05
Lowest SBP (mmhg)	122.46	129.56	>0.05
Mean SBP (mmhg)	148.56	154.76	>0.05
Highest DBP (mmhg)	114.46	118.98	>0.05
Lowest DBP (mmhg)	104.34	109.67	>0.05

Mean DBP (mmhg)	109.24	114.96	>0.05
Mean MAP (mmhg)	102.34	108.94	>0.05

Table 4. Blood pressure recordings in severe pre eclampsia patients.

Discussion

It is postulated that the main cause of development of preeclampsia is a functional imbalance between the endogenous vasodilators (prostacyclins PG I₂) and vasoconstrictors (thromboxane A₂) leading to arteriolar vasospasm and hypoperfusion of vital organs. Anesthesia for C section can worsen the maternal circulation further and can influence the outcome of the new born⁷.

Severe pre-eclampsia is defined as any one of the following occurring after the 20th week of pregnancy: (i) severe hypertension (systolic blood pressure > 160 mmHg or diastolic blood pressure > 110mmHg); (ii) proteinuria > 5 g per 24 h; (iii) oliguria < 400 ml per 24 h; (iv) cerebral irritability or visual disturbances; (v) epigastric or right upper quadrant pain (liver capsule distension); or (vi) pulmonary edema⁸. 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 contraindicated 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^{7,8}. There was no statistically significant difference with regards to demographic profile of patient except for mean maternal age. Exclusion criteria helped to remove the confounding factor retaining the accuracy of the study. Significantly more babies with Apgar scores less than 7 at 1 and 5 minutes were recorded in the general anesthesia group than in the sub-arachnoid block group. However, the perinatal mortality was not significantly different between both groups. The proportion of maternal deaths from anesthetic complications was not significantly different between both groups supported by Wallace et al¹. In the study of Ahmed et al.¹¹, the effects of spinal anesthesia was compared with general anesthesia in preeclamptic parturients. Hypotension was seen in 47.1% of spinal group and 68.8% of general group became hypertensive. Antoine et al. (2003)¹² showed that patients with severe preeclampsia experience less hypotension (6 times lesser) during spinal anesthesia with 0.5% Bupivacaine. One study (Shifman and Filippovich, 2003)¹³ contains data on retrospective observation study of 54 cases with subarachnoid anesthetic management for cesarean section in preeclampsia. The results showed that no complications were detected in mothers and fetuses of the experimental group and confirmed the safety of this method in patients with preeclampsia. In the study of Ahmed et al.¹¹, Also, the incidence and severity of postoperative complications (hypertension, pulmonary edema, delayed awaking and mortality) were higher in general group in compared with spinal group. Furthermore, because of its simplicity and rapidity we also believe that spinal anesthesia should be considered as an alternative to general anesthesia for

emergency cesarean delivery in preeclamptic women who have been adequately prepared with judicious amount of IV preload.

The absence of studies from this environment demonstrating advantage of sub-arachnoid block over general anesthesia for severe pre-eclampsia may be a contributory factor to the preponderance of general anesthesia noted in this study.

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. The findings in this study support the previous studies which showed significant difference in perinatal mortality & birth asphyxia in outcome of Cesarean delivery between women with severe pre-eclampsia who had spinal and those that had general anesthesia. However, there was significantly higher proportion of birth asphyxia in women who received general anesthesia.

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