Original Article

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# The Effect of Intrathecal Anesthesia during Emergency Caesarean Section for Severe Preeclampsia and Eclampsia Patients in a Tertiary Care Hospital

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**ABSTRACT**

***Background:*** *Severe preeclampsia and eclampsia are common in Bangladesh and are one of the leading cause of perinatal morbidity and mortality. The aim of the study is to observe the effect and hazards of intrathecal anesthesia for the mangement of caesarean section for severe pre-eclampsia and eclampsia patients. Management of these patients is very much important for the strenuous obstetrician and anesthesiologist both.*

***Materials and Methods:*** *This retrospective observational study was conducted in the Department of Anesthesiology and ICU of the IAHS (Institute of Applied Health Sciences) Chattogram from January 2022 to December 2022. Total 50 ASA grade 1 or 11, aged between 18-40 years, need urgent LSCS of 1-2 hours duration cases were selected purposively for intrathecal anesthesia. Patients with known cardiovascular and pulmonary diseases, fetal distress, severe maternal distress, uncontrolled DM, presence of any contraindication, patient's refusal for SAB, septicemia, BP>170/120 mmhg, altered coagulation profile, APH, IUD were excluded from this study.*

***Results:*** *Among the study subjects, 30(59.68%) cases were primigravida patients- out of which five had severe pre eclampsia and 25 had eclampsia. Intraoperative shivering was observed in 18(29.03%) cases, postoperative shivering was observed in 16(25.80%) cases. Acute renal failure was found in 3(6%) cases, HELLP syndrome 10%, DIC 8%, abruption placentae 14%, pulmonary edema 4%, septicemia 16%, PPH 12% and postpartum eclampsia 22% cases. Apgar score <7 at 5 minutes in severe PET was observed in 04(6.45%) cases and eclampsia in 07 (14.51%) cases. Among them 10(20.96%) were eclamptic and 02(4.83%) had PET. p value was found 0.000 which is very highly significant.*

***Conclusion:*** *The outcome results of intrathecal anesthesia is better than general anesthesia.*

**Key words:** Caesarean section; Eclampsia; Intrathecal anesthesia; Pre-eclampsia.

## Introduction

Severe preeclampsia and eclampsia are life-threatening conditions in pregnancy and are the major causes of perinatal maternal and neonatal morbidity and mortality due to ignorance, poverty, illiteracy, lack of education, delay in transfer of the patient to hospital due to social myths and taboos', lack of transport facility, nonavailability of well-equipped and comprehensive ANC clinic, SDU, HDU, ICU, NICU facility and delay in hospital admission. For these reason it is a great challenge for proper management by the anesthesiologists and obstetricians of such types of patients.

Preeclampsia is a multisystem disorder, that is usually with a triad of hypertension (Systolic >140 mmhg or diastolic >90 mmhg), proteinuria (>500mg/day), edema occurring after 20 weeks of pregnancy and resolved after 48 hrs. of delivery.[1,2]

When preeclampsia is complicated with generalized tonic-clonic seizures and/or coma, it is termed as eclampsia.[3]

Eclamptic seizure occurs due to impairment of auto regulation of cerebral blood flow (60-120 mmhg) which leads to cerebral vasoconstriction, edema and haemorrage.[4] The seizure usually occurs from 2nd half of gestation to 10 days after parturience, but it may occur up to 6 weeks of postpartum period.[5]

The seizure phenomena occur in two phases, the first phase (Lasts for 15 to 20 seconds) begins with facial twitching followed by a rigid body with generalized muscular contractions and the second phase (Lasts for about one minute) begins with jaw muscles and rapidly passes to eyelids, facial muscles and other body muscles.[6] Tongue bite may occur at the second phase if no protective measure is taken.

The major complications of eclampsia are HELLP syndrome (Hemolysis, elevated liver enzymes and low platelet count), IUGR, abruption placentae, neurological deficits, aspiration pneumonia, DIC, pulmonary edema, renal impairment/failure, cardiac arrest, and death.[6]

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In developing countries about 50,000 maternal deaths occur each year due to preeclampsia and eclampsia.[7] In developed countries, the prevalence of eclampsia varies widely from 1 in 100 to 1 in 1700 in pregnancy cases.[8] The incidence of eclampsia is extraordinarily in Bangladesh 79%. In this country, only 2.3% women remains under medical supervision throughout the antepartum and postpartum period and the rest have no access to obstetric care. For this reason, most of the preeclamptic cases remain undiagnosed until it becomes complicated with eclampsia.[9,10] In Bangladesh, about 5% of total pregnancies present with preeclampsia and eclampsia, 16% of maternal deaths occur due to eclampsia.[9] The mainstay of management of severe PET and eclampsia are control of convulsion and hypertension, termination of pregnancy, good nursing care and feto-maternal safety. Early termination of pregnancy is essential by Lower Segment Cesarian Section (LSCS) with careful anesthesia.

Even though there are many controversies on the choice of anesthetic technique for LSCS in severe PET (Pre-Eclampsia) and eclampsia patients, SAB (Subarachnoid Block) is better than GA. Though there is a risk of spinal- induced profound hypotension, SAB is preferred just to avoid the hazards of GA like laryngoscopy-induced hypertension during intubation and extubation, difficult intubation, failed intubation, esophageal intubation, pulmonary aspiration, risk of cerebral hemorrhage, drug interaction between magsulph and Non-Depolarizing Muscle Relaxant (NDMR) delayed recovery or reversal hazards, drug-related fetal depression, more chances of awareness, increase incidence of transfer to ICU and NICU.[11,12] The desired effect can be achieved by immediate hospitalization with specialized nursing care and medical management in a well-equipped eclampsia unit along with early termination of pregnancy by LSCS if there is any delay for vaginal delivery after correcting hemodynamic status in the best possible way. This should be done. In UK, it is now accepted that regional anesthesia is safer than general anesthesia for women with preeclampsia when no contraindication exist.[13]

To observe the adverse effects of intrathecal anesthesia during emergency caesarian section on severe preeclamptic and eclamptic patients and their neonates this research is performed.

**Materials and methods**

This retrospective observational study was conducted in the Department of Anesthesiology and ICU of the IAHS (Institute of Applied Health Sciences), Chattogram from January 2022 to December 2022.Total 50 ASA grade 1 or 11, aged between 18-40 years, need urgent LSCS of 1-2 hours duration cases were selected purposively for intrathecal anesthesia. Patients with known cardiovascular and pulmonary diseases, fetal distress, severe maternal distress, uncontrolled DM, presence of any contraindication, patient's refusal for SAB, septicemia, BP>170/120 mmhg, altered coagulation profile, APH, IUD were excluded from this study. All eclamptic patients got magsulph for controlling convulsion as a loading dose followed by a maintenance dose in severe PET patients. Hypertension was controlled by using labetalol (20, 40 and 80 mg every 20 minutes interval up to 220 mg) or hydralazine (5-10 mg every 20 minutes up to 20 mg)/ oral nefedifine or nitroglycerine infusion. After taking informed written consent, all patients were pre-anesthetic loaded with crystalloid solution (14/ 23ml) with a wide bore I/V cannula (18 G). After ensuring all drugs and equipment for general anesthesia and with aseptic precautions, subarachnoid block was given either in sitting or left lateral position.[14,15]

2.5 -3 ml (12.5 -15 mg) of 0.5% bupivacaine HCL heavy was injected in subarachnoid space at the level of L ¾ or 4/5 intervertebral space using Quincke tipped 25,26 or 27 G spinocaine needle to achieve block up to T-4 to T-6. After administration of anesthetic solution, the patient was placed in supine position with left uterine displacement to prevent aortocaval compression. Then confirming the desired block, caesarian section surgery was started. Supplemental oxygen (40-50%) was given perioperative period. Intraoperative vital signs were recorded in anesthetic record sheet. Blood pressure measured every 1-2 minutes interval until stabilization. Hypertension was considered when increased 25% of the baseline and hypotension was considered when decreased by 25% from the baseline, which was treated with ephedrine HCL in boluses of 3 mg or by me I /V infusion.[15] Also, 25% increase or decrease in heart rate from baseline was considered as tachycardia or bradycardia.

In case of eclamptic patient, presenting with convulsion, at first, anti-convalescent agent Thio-Pentone Sodium (TPS) was given as sedative doses, then SAB was done at left lateral position.[16] The total procedure was done very quickly. All patients were shifted to the post-operative ward and vital signs, fluid intake, output and P/V bleeding were observed for 48 hours. The total amount of infusion fluid including oral and intravenous was restricted 80 ml/hour.

Eclamptic patients, especially with pre-existing chronic hypertension, impaired renal function, abruption placentae, are at increased risk of pulmonary edema and exacerbated severe hypertension. So it is necessary to continue the close observation in the postoperative period. Magsulph was continued for 24 hours after

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delivery and/ or for 24 hours following the last seizure time. Hypertension was controlled by using sodium channel blockers, beta blocker or in case of need, alpha blocker.

After complete recovery from intrathecal anesthesia, the patient was transferred to Eclampsia ward or to ICU if necessary. After delivery of the baby and expulsion of placenta, 5-10 units of oxytocin was given as direct I/V or by 20-30 units in each litre of I/V fluid. Apgar score was noted and after primary resuscitation, baby was sent to the neonatal ward and transfer to neonatal ICU. Data were analyzed using SPSS version 20.0. The result was reported as frequency and percentage.

**Results**

**Table I** Distribution of cases with severe PET and eclampsia according to age (n=50)

| Age in years | Severe PET | Eclampsia | Total | Percentage (%) |
|---|---|---|---|---|
| < 20 | 2 | 12 | 14 | 28.00 |
| 21-30 | 7 | 15 | 22 | 44.00 |
| >30 | 3 | 11 | 14 | 28.00 |
| Total | 12 | 38 | 50 | 100.00 |

Among the cases, 22(44%) were of (21-30) years age and > 30 years were 14(28%).

**Table II** Distribution of patients according to status of gravida (n=50)

| Gravida | Severe PET | Eclampsia | Total | Percentage (%) |
|---|---|---|---|---|
| Primi | 5(16.67%) | 25(83.33%) | 30 | 59.68 |
| Multi | 7(35%) | 13(65%) | 20 | 40.32 |
| Total | 12(24%) | 38(76%) | 50 | 100.00 |

Among the study subjects, 30(59.68%) cases were primigravida patients- among them five had severe preeclampsia and 25 had eclampsia. 20(40.32%) were found as multigravida and among them 07(35%) had severe preeclampsia and 13(65%) had eclampsia.

**Table III** Frequency and percentage of gestational age (n=50)

| Gestational age 5%) | Severe PET | Eclampsia | Total frequency | Percentage (%) |
|---|---|---|---|---|
| Full term | 5(13.16%) | 23(86.84%) | 38 | 64.52 |
| Preterm | 5(41.67%) | 7(58.33%) | 12 | 35.48 |
| Total | 10(20%) | 40(80%) | 50 | 100.00 |

Regarding gestational age, 38(64.52%) had term pregnancy. Among them 05(13.16%) had severe PET and 12 had preterm (35.48%) eclampsia. Among 12(35.48%) preterm cases, 05(41.67%) had severe PET and 07 (58.33%) had eclampsia.

**Table IV** Analysis of symptoms in terms of operation status

| Parameters | Frequency | Percentage |
|---|---|---|
| Intraoperative hypotension | 21 | 33.87 |
| Postoperative hypotension | 06 | 9.67 |
| Intraoperative hypertension | 02 | 3.22 |
| Postoperative hypertension | 07 | 11.29 |
| Intraoperative bradycardia | 17 | 27.41 |
| Intraoperative tachycardia | 05 | 8.06 |
| Intraoperative nausea and vomiting | 09 | 14.51 |
| Postoperative nausea and vomiting | 06 | 9.67 |
| Intraoperative shivering | 18 | 29.03 |
| Postoperative shivering | 16 | 25.80 |

In case of when patients presented with convulsion on operation table, thiopental sodium was given in 9.67% cases for controlling convulsion just before giving spinal anesthesia. Perioperative significant parameters are shown in Table IV. Intraoperative hypotension was observed in 21(33.87%) cases and in postoperative period was observed in 6(9.67%) cases. Intraoperative hypertension was observed only in 02(3.22%) cases and in postoperative period 07(11.29%) cases were found. Intraoperative tachycardia was found in 05(8.06%) patients and bradycardia was observed in 17(27.41%) patients.

Intraoperative shivering was observed in 18(29.03%) cases, postoperative shivering was observed in 16(25.80%) cases. Intraoperative nausea and vomiting were observed in 09(14.51%) cases and postoperative nausea and vomiting were observed in 06(9.67%) patients.

**Table V** Complications of the parturient ladies (n=50)

| Parameters | Frequency | Percentage% |
|---|---|---|
| Acute renal failure | 03 | 6.0 |
| HELLP syndrome | 05 | 10.0 |
| Abruptio placentae | 07 | 14.0 |
| DIC | 04 | 8.0 |
| Pulmonary edema | 02 | 4.0 |
| Postpartum eclampsia | 11 | 22.0 |
| Septicemia | 08 | 16.0 |
| PPH | 06 | 12.0 |
| Others | 04 | 8.0 |
| Total | 50 | 100.0 |

Maternal morbidity is described in Table V. Acute renal failure was found in 3(6%) cases, HELLP syndrome 10%, DIC 8%, abruption placentae 14%, pulmonary edema 4%, septicemia 16%, PPH 12% and postpartum eclampsia 22%. Total 29.03 % were referred to intensive care unit. Aspiration pneumonia, neurological deficit and cardiac arrest were not found in any cases.

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**Table VI** Maternal outcomes (n=50)

| Parameters | Frequency | Percentage |
|---|---|---|
| Transfer to Eclampsia Ward | 38 | 70.96 |
| Transfer to ICU | 12 | 29.04 |
| Expired | 00 | 00.00 |
| Total | 50 | 100.00 |

Maternal outcomes are described in Table VI. Among the study subjects 38(70.96%) cases were transferred to Eclampsia Ward and 12 (29.03%) cases were transferred to Intensive Care Unit, of them 25.81% were shifted to Gynecology Ward. p value was found 0 .000 which is very significant.

**Table VII** Fetal outcomes (n=50)

| Parameters | Frequency | Percentage (%) |
|---|---|---|
| Apgar score <7 at 5 minutes | 12 | 24% |
| Transfer to NICU | 12 | 24% |
| Perinatal death | 00 | 00% |
| Normal | 26 | 52% |
| Total | 50 | 100.0 |

Fetal outcome is described in Table VII. Apgar score <7 at 5 minutes in severe PET was observed 12(24%) cases and eclampsia in 07 (14.51%) cases. 12(24%) cases were referred to neonatal intensive care unit. Among them 10(20.96%) were eclamptic and 02(4.83%) had PET. No neonatal mortality was observed p value was found 0.000 which is very highly significant. Of them 02(3.22%) mothers were eclamptic and 01(1.61%) had severe PET.

**Discussion**

In this study it was found 5(10%) HELLP syndrome, 3(6%) acute renal failure, 4% pulmonary edema, 8% DIC, 14% abruptio placentae, 29.03% ICU referral and no cases were found regarding the neurological deficit, aspiration pneumonia, cardiac arrest. Yildirim et al. found 39.1% HELLP syndrome, 3.6% acute renal failure, 8.1% abruptio placentae, 1.8% neurological deficit, 8.8% intensive care unit referral. Matter and Sibai found 10% abruption placentae, 11% HELLP syndrome, 6% DIC, 5% pulmonary edema, 4% acute renal failure, 4% cardiac arrest and 1% death.[17,18]

The major side effects of spinal anesthesia are hypotension, decreased cardiac output resulting in placental hypo perfusion and poor perinatal outcomes as well as the risk of iatrogenic pulmonary edema due to bolus fluid administration during treating spinal induced hypotension.[13] But the hypotensive side effects were usually less in eclamptic and severe preeclamptic patients than in normal patient or non-pregnant women, which may be due to having high level of catecholamines and persisting vasoconstriction effect as a consequence of imbalance between pro- and antiangiogenic growth factors followed by vascular epithelium damage.[12,19,20] However this study shows hypotension in 33.8% patients was effectively treated by using the vasopressor agent. In 1995 Ahmed et al. found hypotension in 47.1% cases after giving spinal anesthesia.[19]

In UK, most of the death in the preeclamptic patient was observed secondary to intracranial hemorrhage as a result of severe hypertension.[13] The effect is found more in patients who had general anesthesia during cesarean section. Several studies show that death rate is more following general anesthesia. In India, a study by Chattopadhyay et al. published in the journal of pregnancy in 2014 found higher mortality (25.9%) in general anesthesia group than spinal (1.4%) anesthesia.[21] Another study by Sobhy et al. also found high mortality in the general anesthesia group than in spinal group.[13] In this study no maternal death was recorded. General anesthesia during cesarean section causes hypertension in most of the cases as a consequence of intubation induced stress response during laryngoscopy which can lead to cerebral hypertension and hemorrhagic stroke in severe preeclampsia and eclampsia patients than in normal parturients[12,13] Sobhy et al. found an increase in hypertension in the general anesthesia group.[13] On the other hand, hypertension following spinal anesthesia is negligible. This research also shows that only two patients developed hepertension.

Difficult intubation/failed intubation are more common in severe PET and eclamptic patients due to accentuated peripartum pharyngeal and glottis edema than in healthy parturients.[22] The incidence of failed intubation is 1:300 versus 1:1200 for all normal patients.[2]

In a study by Haq published in 2004 showed that intraoperative and postoperative complications are more serious following general anesthesia than spinal and also found no mortality in spinal group whereas in general anesthesia group, mortality was 6.6%. They concluded that spinal anesthetic technique should be used as the first choice due to less postoperative morbidity and mortality.[23]

The neonatal outcome also better in spinal anesthesia. Apgar score ≥ at one and five minutes account as an accepted standard marker for assessing the risk of neonatal hypoxia.[23]

In his study, Keerath found Apgar score <7 in 66.7% cases in GA in comparison to 19% in spinal group with higher mortality and morbidity in GA (33.3%) than in spinal anesthesia group(10.3%).[24] In this research it

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was found that Apgar score <7 at five minutes following intrathecal (SAB) anesthesia in 20.96% cases, 20.80 cases needed transfer to neonatal ICU, mortality was 1.61%. The cause of death in this patient was septicemia. Chattpadhyay et al. found higher mortality in GA (29.6%) compared to spinal anesthesia (11%), which is higher than in this study.[21] Sibai found 11.8% perinatal mortality, majority of whom were due to abruptio placentae or extreme prematurity.[25]
Nowadays, the safety of regional anesthesia is well established and it provides better obstetric outcome, if it is chosen properly and thereby hazards of GA can be easily avoided.[26]

**Conclusion**
Intrathecal anesthesia provides a simple, cheap, rapid onset, high quality of block, per-operative acceptable and manageable complications, less maternal and neonatal perioperative morbidity and mortality, less ICU and NICU admission, short duration of hospital stay in contrast to epidural and general anesthesia.

**Recommendation**
It may be recommended that the fluid management along with magnesium and antihypertensive therapy with strict hemodynamic vigilance is to be contnued into postpartum period. To reduce the perioperative maternal and neonatal morbidity and mortality, expanded programme for public health education and personal training in antenatal period, establishment of a separate eclampsia ward and ICU with modern facilities are needed. More research is needed to assess the neonatal outcomes among women with hypertensive disorders underwent intrathecal anesthesia.

**Disclosure**
The author declared no competing interests.

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