Original Article

Outcome of Spinal Anesthesia during Emergency Cesarean Section for Severe Preeclampsia and Eclampsia Patients in a Tertiary Care Hospital

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Abstract

***Background**: In Bangladesh eclampsia and severe preeclampsia or toxemia (PET) are the leading cause of perinatal morbidity and mortality. Its management is challenging for the obstetrician and anesthesiologist. Still now general anesthesia is commonly practiced for emergency LUCS in developing countries, but the outcome of spinal anesthesia is better than GA. Recently in developed countries like the UK and United States, spinal anesthesia is also accepted as a safer anesthetic technique. **Objective**: The objective of our study was to establish spinal anesthesia as a preferable method to reduce maternal and neonatal morbidity and mortality during emergency LUCS in severe PET and eclampsia patients. **Materials and Methods**: The study was done in the Department of Anesthesiology and ICU of Enam Medical College & Hospital, Savar, Dhaka during the period from January 2016 to December 2017. Total 62 cases of severe PET and eclampsia patients were selected by subarachnoid block for emergency LUCS. Each patient was given magsulph as prophylactic or maintenance dose and judiciously preloaded by crystalloid fluid. Thiopental sodium 50−100 mg was given to those who had convulsion during SAB. About 2−2.5 mL (10−12.5 mg) 0.5% bupivacaine heavy was used by 25−27 G spinocaine in L3−4 or L4−5 space. After the establishment of the desired block, LUCS was performed. Meticulous monitoring was done and all events were recorded and problems were effectively managed. **Results**: Our study shows higher maternal (96.6%) and neonatal (95.17%) success rate. Almost all patients were eclamptic (74.19%), primi (59.67%), term pregnancy (64.51%), aged between 21–30 years (43.54%) and rest of them had preeclampsia (25.80%), multigravida (40.32%), preterm (35.48%), aged <20 years (25.80%) and aged >30 years (30. 64%). Thiopental sodium was given in 9.65% cases for controlling convulsion during LUCS. Remarkable complications were hypotension (33.87%) with highly significant p value (0.000) and bradycardia (27.41%). **Conclusion**: With close monitoring of perioperative events, spinal anesthesia may be given as a safe alternative technique in severe preeclampsia and eclapmsia rather than GA or epidural even in cases of altered consciousness or restless in presence of an expert and skilled anesthesiologist and thereby perioperative maternal and neonatal morbidity and mortality will be reduced.*

***Key words**: Eclampsia; Preeclampsia; Spinal anesthesia; Maternal and neonatal outcome*

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Introduction

In our country severe preeclamptic toxemia and eclampsia are the life-threatening conditions in pregnancy which are the major cause of perinatal maternal and neonatal mortality and morbidity due to poverty, illiteracy, lack of education, lack of transport facility, availability of well-equipped antenatal clinic, HDU, ICU facility and delay in hospital admission; for these reasons it is a great challenge for the anesthesiologists and obstetricians for managing such types of cases.

Preeclampsia (or toxemia) is a multisystem disorder[1] that is usually associated with the triad of hypertension (systolic BP >140 mm Hg or diastolic BP >90 mm Hg), proteinuria (>500 mg/day) and edema occurring after 20 weeks of gestational period and resolving after 48 hours of delivery.[2] When preeclampsia is complicated with generalized tonic-clonic convulsions and/or coma, it is called eclampsia.[3]

Eclamptic seizure occurs due to loss of autoregulation of cerebral blood flow (60−120 mm Hg) which leads to cerebral vasospasm, edema and hemorrhage.[4] The seizure usually occurs from 2nd half of pregnancy to 10 days after delivery, but it may occur up to 6 weeks of postpartum period.[5]

The convulsions occur in two phases.[6] 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 about one minute), begins with jaw muscles and rapidly passes to eyelids, facial muscles and other body muscles. Tongue bite may occur at the second phase if no protective measure is taken.

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

In developing countries about 50,000 maternal deaths occur each year due to eclampsia and preeclampsia.[7] In developed countries, eclampsia complicates about 1 in 2000 deliveries.[8] In developing countries, the prevalence of eclampsia varies widely from 1 in 100 to 1 in 1700.[8]

The incidence of eclampsia is extraordinarily high in Bangladesh − 7.9% (not including preeclampsia), according to the result of the house to house survey.[9] In our country only 2.3% women remain under medical supervision throughout the entire period of pregnancy whether it is abortion or delivery and the rest have no access to obstetric care.[10] As a result most of the PE cases remain unrecognized until it becomes complicated such as eclampsia.[9] In Bangladesh, about 5% of the total pregnancies present with pre-eclampsia and eclampsia[9] and 16% of maternal deaths occur due to eclampsia[9]. The basic principles of management of severe PET and eclampsia are ─ control of convulsion and hypertension, termination of pregnancy, generalized nursing care, to ensure feto-maternal safety. Early termination of pregnancy is needed by LUCS with safe anesthesia.

Though there are a lot of controversies about the choice of the technique for LUCS in severe PET and eclampsia patients, SAB is better than GA. Even though there is a risk of spinal-induced hypotension, SAB is preferred just to avoid the hazards of GA like laryngoscopic-induced hypertension during intubation and extubation[11], difficult intubation, failed intubation, esophageal intubation, pulmonary aspiration, risk of cerebral hemorrhage, drug interaction between magsulph and non-depolarizing muscle relaxant (NDMR)[12], delayed recovery or reversal hazards, drug-related fetal depression, more chances of awareness, increase incidence of transfer to ICU and NICU. The desired effect can be achieved by immediate hospitalization with intense nursing care and medical management in a well-equipped eclampsia ward along with early termination of pregnancy by cesarean section if there is any delay for vaginal delivery after correcting hemodynamic status in the best possible limit. In UK now it is accepted that regional anesthesia is safer than GA for women with preeclampsia when no contraindications exist.[13]

The aim of our study was to observe maternal and neonatal outcomes with spinal anesthesia for emergency LUCS in severe PET and eclampsia patients.

Materials and Methods

This retrospective observational study was conducted at the Department of Anesthesiology & ICU in Enam Medical College & Hospital during the period from

January 2016 to December 2017.

Total 62 cases were selected for spinal anesthesia. Patients with previously diagnosed cardiovascular and pulmonary diseases, fetal distress, severe maternal distress, uncontrolled DM, presence of any contraindication, patient refusal for spinal anesthesia, sepsis, BP >170/120 mm Hg, altered coagulation profile, APH, IUD were excluded from our study.

All eclamptic patients got magsulph for controlling convulsion as a loading dose followed by a maintenance dose in severe PET cases. Hypertension was controlled by using labetalol (20, 40 and 80 mg every 20 minutes interval up to 220 mg)/hydralazine (5–10 mg every 20 minutes up to 20 mg)/nifedipine/nitroglycerine. All patients also were given intravenous ranitidine (100–150 mg) and metachlorpromide (10 mg) one to two hours prior to the cesarian section to prevent aspiration pneumonia.

After taking informed written consent all patients were preloaded with the crystalloid infusion[14] with a wide bore I/V cannula (18 G). After ensuring all drugs and equipment for general anesthesia with all aseptic precautions spinal anesthesia was given either in sitting or left lateral position.[15]

2 −2.5 mL (10–15 mg) of 0.5% bupivacaine heavy[2] was injected in subarachnoid space at the level of L 3/4 or L 4/5 space using Quincke tipped 25 or 27 G spinocaine needle to achieve block up to T4-6. After injecting anesthetic solution patient was placed in supine position with left uterine displacement to prevent aortocaval compression. Then confirming desired block surgery was started. Oxygen (40–50%) supplement was given throughout the period of surgery. Intraoperative vital signs were recorded in anesthetic record sheet. Blood pressure was 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 in boluses of 3 mg or by IV infusion.[15] Similarly, 25% increase or decrease in heart rate from baseline were considered as tachycardia or bradycardia.

In case of eclamptic patient presenting with a seizure at first thiopental sodium[16] was given in sedative doses, then spinal anesthesia was given at left lateral position. The total procedure was done very quickly. All patients were shifted to the post-operative room and vital signs, fluid intake and output and pervaginal bleeding were observed for 48 hours. The total amount of fluid including oral and intravenous was restricted to 80 mL/hour.

Eclamptic parturients, especially with pre-existing chronic hypertension, abnormal renal function, abruptio placentae, are at increased risk of pulmonary edema and exacerbation of severe hypertension. So it is very necessary to continue the strict observation in the postoperative period. Magsulph was continued for 24 hours after delivery and or for 24 hours following the last convulsion. Hypertension was controlled by using calcium channel blockers, beta blocker or in case of need alpha blockers.

After total recovery from spinal anesthesia, the patient was transferred to Eclampsia Ward or to ICU if necessary. After delivery of the baby and placenta, 5–10 units of oxytocin was given as direct I/V or by 20−30 units in each liter of IV fluid.[2] Apgar score was noted and after primary resuscitation baby was sent to the neonatal unit and and transferred to neonatal ICU. Data were analyzed using SPSS version 20.0. The result was reported as frequency and percentage. Perioperative morbidity and mortality was observed and noted. All patients were monitored until discharged.

Results

Among 62 patients, 46 (74.19%) had eclampsia and 16 (25.80%) had severe preeclampsia. Among the subjects, 43.54% cases were in between 21 to 30 years of age, 30.64% were above 30 years and 25.80% were below 20 years of age (Table I). Significant p value (0.013) was found in age group 21 to 30 years.

Table I: Distribution of subjects with severe PET and eclampsia according to age

Age in years	Severe PET	Eclampsia	Total	Percentage
<20	3	13	16	25.80
21−30	8	19	27	43.54
>30	5	14	19	30.64
Total	16	46	62	100

Among the study subjects, 37 (59.68%) cases were primigravida patients ─ among them seven had severe preeclampsia and 30 had eclampsia. Among the study subjects 25 (40.32%) were found as multigravida and among them nine had severe preeclampsia and 16 had eclampsia (Table II).

Table II: Distribution of patients according to status of gravida

Gravida	Severe PET	Eclampsia	Total	Percentage
Primi	07	30	37	59. 68
Multi	09	16	25	40.32
Total	16	46	62	100

Regarding gestational age, 40 (64.52%) cases had term pregnancy. Among them 16 had severe PET and 24 had term eclampsia. Among 22 (35.48%) preterm cases, nine had severe PET and 13 had eclampsia (Table III).

Table III: Frequency and percentage of gestational age

Gestational age	Severe PET	Eclampsia	Total frequency	Percentage
Term pregnancy	16	24	40	64.52
Preterm pregnancy	09	13	22	35.48
Total	25	37	62	100

In case of emergency when patients presented with convulsion on operation table, thiopental 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 postoperative period hypotension was observed in 6 (9.67%) cases. Intraoperative hypertension was observed only in two (3.22%) patients and in postoperative period 7 (11.29%) cases were found. Intraoperative tachycardia was found in five (8.06%) cases and bradycardia was observed in 17 (27.41%) cases.

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 9 (14.51%) cases and postoperative nausea and vomiting were observed in 6 (9.67%) cases.

Table IV: Intra- and postoperative significant parameters

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

Maternal morbidity is described in Table V. Acute renal failure was found in 4.83% cases, HELLP syndrome 8.06%, DIC 6.45%, abruptio placentae 11.29%, pulmonary edema 3.22%, septicemia 12.90%, PPH 9.67% and postpartum eclampsia 17.74%. Total 29.03% cases were referred to intensive care unit. Aspiration pneumonia, neurological deficit and cardiac arrest were not found in any cases.

Table V: Maternal morbidity

Parameters	Frequency	Percentage
Acute renal failure	03	4.83
HELLP syndrome	05	8.06
Abruptio placentae	07	11.29
DIC	04	6.45
Pulmonary edema	02	3.22
Postpartum eclampsia	11	17.74
Septicemia	08	12.90
PPH	06	9.67

Maternal outcomes are described in Table VI. Among the study subjects 44 (70.96%) cases were transferred

to Eclampsia Ward and 18 (29.03%) cases were transferred to Intensive Care Unit, of them 25.81% were shifted to Gynecology Ward and two (3.22%) patients expired. p value was found 0.000 which is very highly significant.

Table VI: Maternal outcomes (N=62)

Parameters	Frequency	Percentage
Transfer to Eclampsia ward	44	70.96
Transfer to ICU	18	29.03
Expired	02	3.22

Fetal outcome is described in Table VII. Apgar score <7 at 5 minutes in severe PET was observed in 4 (6.45%) cases and eclampsia in 9 (14.51%) cases. Sixteen (25.80%) cases were referred to neonatal intensive care unit. Among them 13 (20.96%) were eclamptic and 3 (4.83%) had PET. Neonatal mortality was observed in 3 (4.83%) cases. p value was found 0.000 which is very highly significant. Of them, two (3.22%) mothers were eclamptic and one (1.61%) had severe PET.

Table VII: Fetal outcomes

Parameters	Frequency	Percentage
Apgar score <7 at 5 minutes	13	20.96
Transfer to NICU	16	25.80
Perinatal death	03	4.83

Discussion

In our study, we found 8.06% HELLP syndrome, 4.83% acute renal failure, 3.22% pulmonary edema, 6.45% DIC, 11.29% abruptio placentae, 29.03% ICU referral and no cases were found regarding the neurological deficit, aspiration pneumonia, cardiac arrest. Yildirim et al[17] 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[18] found 10% abruptio placentae, 11% HELLP syndrome, 6% DIC, 5% pulmonary edema, 4% acute renal failure, 4% cardiac arrest and 1% death.[18]

The major side effects of spinal anesthesia are hypotension, decreased cardiac output resulting in placental hypoperfusion and poor perinatal outcomes as well as the risk of iatrogenic pulmonary edema due to bolus intravenous fluid administration during treating spinal-induced hypotension.[13] But the hypotensive side effects are usually less[19] in eclamptic and severe preeclampsia patients than in normal pregnant or non-pregnant women[20], which may be due to having high level of catecholamines[12] and persisting vasoconstriction effect as a consequence of imbalance between pro- and antiangiogenic growth factors followed by vascular epithelium damage.[20] However, our study shows hypotension in 33.87% cases and was effectively treated by using the vasopressor agent. In 1995 Ahmed et al[19] found hypotension in 47.1% cases after giving spinal anesthesia.

In UK most of the death in the preeclamptic patient was observed secondary to intracranial hemorrhage as a result of severe hypertension.[13] This effect is found more in patients who are having general anesthesia during cesarean section. Several studies show that death rate is more following general anesthesia. In India, a study by Chattopadhyay et al[21] published in the Journal of Pregnancy in 2014 found higher mortality (25.9%) in general anesthesia group than spinal (1.4%) anesthesia. Another study by Sobhy et al[13] also found high mortality in the general anesthesia group than in spinal group. In our study perinatal maternal death was found in only 2 (3.22%) patients. The cause of death of one was postpartum eclampsia with DIC, acute renal failure and in another was due to postpartum cardiomyopathy.

General anesthesia during cesarian section causes hypertension[13] 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 pre-eclampsia and eclampsia patients than in normal parturients.[13] Sobhy et al[13] found an increase in hypertension in the general anesthesia group. On the other hand hypertension following spinal anesthesia is negligible; our study also shows that only three patients developed hypertension.

Difficult intubation/failed intubation is more common in severe PET and eclamptic patients due to accentuated peripartum pharyngeal and glottic edema[22] than in healthy parturients. The incidence of failed intubation is 1:300 versus 1:2000 for all normal patients.[2]

In a study by Haq[23] 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.

The neonatal outcome is also bettter in spinal anesthesia. Apgar score ≥7 at one and five minutes account as an accepted standard marker for assessing the risk of neonatal hypoxia.[23]

In his study Keerath[24] 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%). We found Apgar score <7 at five minutes following spinal anesthesia in 20.96% cases, 25.80% cases needed transfer to neonatal ICU and mortality was 4.83%. The cause of death was in one patient was septicemia and in other two were extremely low birth weight babies due to prematurity. Chattopadhyay et al[21] found higher mortality in GA (29.6%) compared to spinal anesthesia (11%), which is higher than in our study. Sibai[25] found 11.8% perinatal mortality, majority of whom were due to abruptio placentae or extreme prematurity.

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] To avoid hazards of general anesthesia such as nausea, vomiting, tachycardia, hypertension, difficult intubation, aspiration pneumonia, pulmonary edema, hazards of reversal, excessive perioperative bleeding, fetal and maternal hypoxia, delayed recognition of maternal stroke during anesthetic period, drug interaction between magsulph and muscle relaxants, increased chances of transfer to ICU and NICU and to gain reduced maternal/ fetal morbidity and mortality, spinal anesthesia can be given safely after proper preoperative assessment, judicial use of fluid, use of vasopressor agent along with meticulous perioperative monitoring if there is no coagulopathy or thrombocytopenia.

Spinal anesthesia accounts as 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 the epidural and general anesthesia. With close monitoring of perioperative vital signs it may be recommended as a safe alternative technique in severe preeclampsia and eclampsia even with impaired consciousness or semiconscious, restless or unstable condition in presence of an expert, experienced and skilled anesthesiologist. To reduce the perioperative maternal and neonatal morbidity and mortality, expanded program for public health education and personnel training in antenatal period, establishment of a separate eclampsia ward and ICU with modern facilities are needed.

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