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*Original Article*

# RANDOMISED COMPARISON OF GENERAL ANAESTHESIA & SUBARACHNOID BLOCK FOR CAESAREAN DELIVARY IN PREGNANCIES COMPLICATED BY ECLAMPSIA

**Manash Kumar Basu[1], Hasina Begum[2], Md. Abdul Karim[3], M Khalilur Rahman[4]**

**SUMMARY:**

*General anaesthesia & subaracnoid block were used randomly in women with eclampsia who required caesarian delivery to evaluate the maternal and foetal effects of the two anaesthetic methods. The haemodynamic parameters, level of consciousness of the mothers and APGAR scores of the neonates were assessed. A total 60 women with eclampsia underwent caesarean section were allocated randomly received either of the techniques. Both the techniques provided good quality anaesthesia. At arrival in OT, there was no significant difference of MAP between two groups. But following induction there developed significant difference between two groups & within the same group. There was no significant difference of neurological status between two groups within 24 hours after operation. There were significant difference of Apgar scores in 1 min. after birth & at 5 min. no significant difference were found between the two groups. Out of 30 infants of GA group II had to resuscitate with Ambu-mask ventilation & 6 babies had to sent special care unit. From SAB group 2 infants received resuscitation & one baby had to sent special care unit. In the context of Bangladesh, General anaesthesia as well as Subaracnoid block are equally acceptable for LUCS in eclamptic mothers, if steps are taken to ensure a careful approach to either method.*

**INTRODUCTION:**

Incidence of eclampsia is still complicates a large number of pregnancies in developing countries[1] though the incidence is decreasing in the developed countries. The definitive treatment of eclampsia is delivery of the foetus & placenta[2,3]. If not all, many of the mothers suffering from eclampsia requires caesarean section under anaesthesia. For long there is little agreement concerning the optimal anaesthetic management of caesarean section in the patients with eclampsia[4]. Both spinal & epidural were avoided in women with severe pre- eclampsia & eclampsia and most investigators advocate general anaesthesia[4]. Randomised comparison of general anaesthesia & regional anaesthesia for caesarian delivery in pregnancies complicated by severe pre-eclampsia & eclampsia has been done with appreciable results[5]. But there is lack of studies on caesarean section of eclamptic patients under subaracnoid block.

In order to expand obstetric care to the remote areas of Bangladesh, subaracnoid block has gained reliability. Anaesthsiologists have also attained confidence in performing subaracnoid block on regular basis to the mothers with pregnancy induced hypertension. One study of regional anaesthesia on eclamptic mothers revealed that subaracnoid block is acceptable for caesarian delivery in those patients if steps are taken to ensure a careful approach[6].

This current control study was carried out to gain more confidence about the safety compared to general anaesthesia. The study reveals that in case of LUCS for caesarian delivery for eclamptic mothers subaracnoid block is equally acceptable as general anaesthesia. It is rather advantageous in some respects. The chief objective of this study is to evaluate the maternal & foetal outcome of eclamptic mothers who required caesarian delivery by GA or SAB and to find out whether subaracnoid is advantageous for such patients.

**MATERIALS & METHODS:**

Sixty women with eclampsia who required LUCS under anaesthesia in Dhaka Medical College Hospital (DMCH), Bangladesh, were randomly

1. Jr. Consultant, Department of Anaesthesiology, General Hospital, Munshigonj, Dhaka
2. Jr. Consultant, Department of Anaesthesiology, Burn Unit, DMCH
3. Assistant Professor. of Anaesthesiology, BMCH (Uttara branch)
3. Prof. of Anaesthesiology. Square Hospitals, Dhaka.

selected & studied between January 2001 to December 2001. Inclusion criteria for eclampsia included the following: convulsion, hypertension, proteinuria. Women with medical complications (including heart disease, diabetes mellitus, bronchial asthma or chronic renal disease) were excluded. Bed side whole blood coagulation test was done & whole blood sample failed to coagulate within seven minutes was taken as an exclusion criteria. women with overt bleeding were not also included. In addition to exclusion criteria, the attendants of the patient who were not willing to participate in the study were excluded from the study.

Patients were seen in the eclamptic ward as they were diagnosed & treatment started. The investigator took part in controlling convulsion & hypertension. Patients attendants were informed in details about the study. Prior permission had been taken from the hospital authority explaining the purpose & procedure of the study. Only those who gave written consent to participate were accepted. Patients were randomly assigned in two groups according to sealed envelopes to receive general anaesthesia or subaracnoid block as they had arrived at operation theatre. Mothers who were to receive general anaesthesia consisted group I & who were to receive subarachnoid block assigned as group II.

Obstetric management included magnesium sulphate for controlling seizure & intermittent Inj. Hydralazine was given IV as needed to lower the diastolic blood pressure that reached 110 mm Hg. or greater. In brief, magnesium sulphate ( 4 gm 50% solution IV and 6gm. IM ) was administered. Hydralazine was administered IV in 5 – 10 mg boluses, as needed, at 20 minutes intervals during labour or the puerperium to reduce diastolic blood pressure. Administration of fluid containing electrolytes was limited to 60 ml/hr.

On entry to the operating room, patients were transfer to operating table. For both the groups immediate management included, left uterine tilt, & administration of 60% oxygen by clear face mask. Those who were conscious were requested to co-operate with the procedure involving anaesthesia. A Datex-Ohmeda S/5 light monitor was attached for continuous ECG monitoring along with heart rate, NIBP (Systolic, diastolic & mean) & measurement of $SPO_2$.

Women randomized to general anesthesia were inducted by rapid sequence induction using Inj thiopental (4-5 mg/kg), Inj. suxamethonium (1.5 mg/kg) with cricoesophageal compression until tracheal intubation was done and endotracheal tube cuff inflated. To prevent hypertension from tracheal stimulation, inj. Lignocaine (1.5 mg/kg) before starting rapid sequence induction and inj. Nitroglycerine (50-ìg boluses, maximum 200 ìg) administered intravenous immediately before intubation. Oxygen, nitrous oxide and halothane concentration were 50:50.5% respectively) Neuromuscular block was maintained with inj. Vecuronium and monitored using peripheral nerve stimulation. Inj. Pethidine 1 mg/kg as administered IV shortly after delivery. Neuromuscular blockade was reversed using neostigmine and atropine. These women were observed closely in the recovery room for next 12 hours.

For spinal anaesthesia, preloading was done with 15 ml/kg body wt. of Ringer's lactate solution was accomplished on arrival to the operating room. A 25-gauze Quincke Babcock needle was placed in subarachnoid space between $4^{th}$ and $5^{th}$ lumbar vertebral interspace. In case of restless patients incremental doses of inj. Thiopental sodium was administered to abolish the restlessness. One trained anaesthetist was available to maintain airway patent. Two ml of 0.5% heavy bupivacaine was injected as there was free flow coming through the needle. The needle was then withdrawn and the lady was immediately positioned supine with left lateral tilt. Her shoulder and neck elevated and in slight flexion to limit cephalad migration of the anaesthetic agent to the $T_4$ level.

Demographic data were recorded. The highest & lowest systolic and diastolic maternal blood pressure in the eclampsia ward were also recorded. Logistical data included intervals of preparation for anaesthesia & time posts of anaesthetic and surgical events. Maternal blood pressures on entry to the operating theatre were measured every 2 minutes throughout the whole period in operation theatre (preparation, Induction of anaesthesia & intraoperative period). Volume of intravenous fluid administration & urine output were recorded. Infant outcomes in relation to the type of anaesthesia included gestational age at delivery, APGAR scores & admission to special care unit.

The study was terminated after taking the measurement of Glasgow Coma Score, blood pressure (systolic, diastolic & mean arterial) & urinary out put at 24 hours. Haematocrit value was also measured at 24 hours.

The assessment of preoperative, peroperative & postoperative parameters & the tests were done by the investigator himself. The data were collected & analyzed statistically using paired and unpaired t-test as appropriate. A value of $p<0.05$ was considered to be significant.

**RESULTS:**

A total of 60 patients were studied. Patients of both the groups were comparable in age and body weight (Table – I). They were also comparable with regard to Glasgow coma score & gestational period (Table – II). Table V shows some of the logistics of providing these two types of anaesthesia. General anaesthesia was associated with significantly shorter arrival in OT to induction interval. But the time interval between induction to skin incision & skin incision to delivery interval were not significant.

Table III summarizes maternal BPs preoperative, postoperative & 24 hours after LUCS, in relation to type of anaesthesia used. The mean highest systolic and diastolic blood pressure before arrival into operation theatre was approximately 153/103mm of Hg which was non significant between two groups. In the recovery room & at 24 hours after LUCS there were no significant difference in average highest systolic and highest diastolic between two groups. Hypotension requiring treatment with fluid boluses & ephedrine occurred in SAB group. Total amount of fluid infusion in SAB group (1696 ± 53.38 ml) was significantly different from GA group (889 ± 9.40 ml). Preoperative & postoperative haematicrits (first postoperative day) were not significantly different between the anaesthetic groups, & none of the mothers required blood transfusion (Table-VII). Mean arterial blood pressure profiles at different key time posts were analyzed (Table-XI). At arrival in OT, there was no significant difference of MAP between two groups. Following induction there developed significant difference between two groups & within the same group. Urine flow difference was not significant between two groups preoperatively. But it significantly increased in women in both the groups. Then with no significant tendency for augmented flow in women given larger fluid volumes. Neurological status was measured with Glasgow coma score. On arrival at OT they were similar. There were also no significant difference between two groups 24 hours after operation.

Infant condition at birth measured by (APGAR) scores. There were significant difference of APGAR scores in 1 min. after birth & at 5 min. no significant difference were found between the two groups. Out of 30 infants of GA group 11 had to resuscitate with Ambu-mask ventilation & 6 babies had to send special care unit. From SAB group 2 infant received resuscitation & one baby had to send special care unit. There was no significant difference in birth weight between babies of mothers of two groups (Table-XII).

**Table-I**

*Demographic Characteristics of eclamptic mothers of two groups*

| Characteristics | Group I (n -30) | Group II (n – 30) | p | Significant difference |
|---|---|---|---|---|
| Age(years) | 21.60 ±.79 | 21.00 ± .77 | > .10 | NS |
| Body wt.(Kg) | 50.07 ± 1.15 | 49.10 ± 1.28 | > .10 | NS |

Data are presented as mean ± standard error of mean
Unpaired students t-test. NS = not significant.

**Table: II**

*Clinical profile of eclamptic mothers of two groups*

| Parameters | Group I (n -30) | Group II (n – 30) | p | Significant difference |
|---|---|---|---|---|
| Gestation(weeks) | 36.50 ± .39 | 36.87 ± 0.32 | > .10 | NS |
| No. of convulsions before treatment started | | 6.83 ± 0.70 | 5.94 ± 0.61 | > .10 NS |

Data are presented as mean ± standard error of mean
Unpaired students t-test. NS = not significant.

**Table- III**

*Maternal blood pressure before, after and at 24 hours after caesarean delivery*

| Parameters | Group I (n -30) | Group II (n – 30) | p | significant difference |
|---|---|---|---|---|
| Blood pressure in eclamptic ward(mm Hg) | | | | |
| Highest systolic | 153.07 ± 2.99 | 150.67 ± 2.54 | > .10 | NS |
| Highest diastolic | 106.10 ± 1.94 | 103.83 ± 2.24 | > .10 | NS |
| Blood pressure in recovery room(mm Hg) | | | | |
| Highest systolic | 144.53 ± 1.91 | 150.2 ± 2.73 | > .10 | NS |
| Highest diastolic | 101.57 ± 1.56 | 98.43 ± 1.3 | > .10 | NS |
| Blood pressure at 24 hrs after LUCS(mm Hg) | | | | |
| Highest systolic | 132.20 ± 1.48 | 135.47 ± 1.77 | > .10 | NS |
| Highest diastolic | 88.33 ± 0.88 | 86.53 ± 0.91 | > .10 | NS |

Data are presented as mean ± standard error of mean
Unpaired students t-test. NS = not significant.

**Table- IV**

*Intravenous fluid volumes*

| | Group I (n -30) | Group II (n – 30) | p | Significant difference |
|---|---|---|---|---|
| Pre-inductionIV fluid (ml) | 120.547 ± 9.40 | 683.33 ± 19.52 | <.001 | HS |
| Total IV fluid(ml) | 889.16 ± 9.40 | 1696.67 ± 53.38 | <.001 | HS |

Data are presented as mean ± standard error of mean
Unpaired students t-test. HS = Highly significant.

**Table- V**

*Interval of surgical events*

| Interval | Group I (n -30) | Group II (n – 30) | p | Significant difference |
|---|---|---|---|---|
| Arrival in OTto anaesthesiainduction (min) | 12.06 ± 0.70 | 17.37 ± 0.86 | <.001 | HS |
| Induction to skin incision (min) | 6.30 ± 0.45 | 5.83 ± 0.33 | > .10 | NS |
| Skin incision to delivery (min) | 8.37 ± 0.50 | 7.46 ± 0.60 | > .10 | NS |

Data are presented as mean ± standard error of mean
Unpaired students t-test. HS = Highly significant., NS = not significant.

**Table- VI**

*Urine flow*

| Urine flow (ml/Kg/hr) | Group I (n -30) | Group II (n – 30) | p | Significant difference |
|---|---|---|---|---|
| Before surgery | 0.90 ± 0.05 | 0.95 ± 0.03 | >0.10 | NS |
| During surgery | 1.26 ± 0.06 | 1.54 ± 0.09 | <0.05 | HS |
| After surgery | 1.25 ± 0.09 | 1.39 ± 0.05 | >0.10 | NS |
| At 24 hours after surgery | 1.30 ± 0.40 | 1.43 ± 0.05 | >0.50 | NS |

Data are presented as mean ± standard error of mean
Unpaired students t-test. HS = Highly significant, NS = not significant.

**Table - VII**

*Pre-operative and Postoperative haematocrit value*

| | Group I (n -30) | Group II (n – 30) | p | Significant difference |
|---|---|---|---|---|
| Preoperative Haematocrit (%) | 34.1 ± 0.70 | 33.2 ± 0.41 | > .10 | NS |
| Postoperative Haematocrit on 1st Post. op. day (%) | 30.1 ± 0.77 | 28.57 ± 0.56 | > .10 | NS |

Data are presented as mean ± standard error of mean
Unpaired students t-test. HS = Highly significant., NS = not significant.

**Table - VIII**

*Pre-operative and Postoperative Conscious level*

| Glasgow coma score | Group I (n -30) | Group II (n – 30) | p | significant difference |
|---|---|---|---|---|
| GCS on arrival at OT | 11.93 ± 0.28 | 11.96 ± 0.44 | > .10 | NS |
| GCS at 24 hrs | 14.66 ± 0.14 | 14.73 ± 0.15 | > .10 | NS |

Data are presented as mean ± standard error of mean
Unpaired students t-test. HS = Highly significant., NS = not significant.

**Table - IX**

*Drugs used to manage hypotension and restlessness*

| | Group I (n -30) | Group II (n – 30) |
|---|---|---|
| Inj. Ephedrine for hypotension | 0 | 26 (86.66%) |
| Inj. TPS to manage restlessness during induction of subarachnoid block | 0 | 16 (53.33%) |

Data are presented as n (%)

**Table - X**

*Drugs used to prevent hypotension from laryngoscopy and intubation*

| | Group I (n = 30) | Group II ( n = 30) |
|---|---|---|
| Inj. Glycerol Trinitrate (mg) | 107 ± 4.69 | 0 |

Data are presented as mean ± standard error of mean

**Table - XI**

*MAP at different time periods of operative procedure*

| Parameters | Group I(n -30) | Group II(n – 30) | p | significant difference |
|---|---|---|---|---|
| Arrival at OT | 114.87 ± 7.50 | 112.6 ± 1.55 | >0.10 | NS |
| At induction | 115.97 ± 1.07 | 109.56 ± .93 | >0.10 | NS |
| At skin incision | 123.97 ± 2.00 | 93.27 ± 1.74 | <0.001 | HS |
| At the time of delivery | 109.6 ± 1.53 | 85.7 ± 1.40 | <0.001 | HS |
| At skin closure | 102.43 ± 1.40 | 88.53 ± 2.68 | <0.001 | HS |

Data are presented as mean ± standard error of mean
Unpaired students t-test. HS = Highly significant., NS = not significant.

**Table - XII**

*Foetal status*

| Parameters | Group I(n -30) | Group II(n – 30) | p | significant difference |
|---|---|---|---|---|
| Body weight (Kg) | 2.02 ± 0.48 | 2.18 ± 0.09 | >0.10 | NS |
| Apgar at 1st minute | 4.46 ± 0.48 | 6.76 ± 0.49 | <0.001 | HS |
| Apgar at 5th minute | 8.7 ± 0.25 | 9.2 ± 0.21 | >0.10 | NS |
| Resuscitation needed | 11 (36%) | 2 (6%) | | |
| Sent to special care unit | 6 (20%) | 1 (3%) | | |

Data are presented as mean ± standard error of mean, or n (%)
Unpaired students t-test. HS = Highly significant., NS = not significant.

**DISCUSSION:**

There was no incidence of failure of spinal anaesthesia. All anaesthetic procedures were conducted by the investigator himself. None of the women were predicted to have a difficult airway for intubation and there was no difficult intubation. None of the women suffered serious complications resulting from any of the two anaesthetic methods used specially there was no serious foetal effects from maternal circulatory changes induced in SAB. A number of potential maternal complications has described. Laryngeal oedema with difficult intubation associated with aspiration results in hypoxaemia of rapid onset resulting in serious maternal morbidity & mortality[7,8]. In addition, laryngeal oedema has resulted in respiratory arrest in the recovery room.

Maternal hypotension caused by SAB was manageable without excessive fluids and there was not a dangerou response to vasopressor when such agents were necessary. The investigators found that fall of BP was not enhanced rapidly when compared to conventional anti-hypertensive therapy with intermittent IV inj. hydralazine. Tracheal intubation did not stimulate uncontrolled maternal hypertension when BP was carefully managed immediately before induction and intubation in general anaesthesia. Not unexpectedly, the choice of anaesthetic had logistic implications because preparation time for LUCS was longer when SAB was used. It was some how surprised that none of the advantages or disadvantages cited commonly for the anaesthetic techniques used for these women with eclampsia were confirmed in the investigation. Rather spinal anaesthesia gave some advantages concerning the foetal outcome when Apgar scores were compared with babies of mothers having general anaesthesia. Laboratory tests for coagulopathy was difficult for our setting. Time of admission, urgency of caesarean section, financial ability all resulted in constraints. But absence of clinical bleeding as evidenced by gum bleeding, petechiae or haematuria when combined with negative bed side whole blood coagulation test as advocated by WHO for developing countries has given good predictive value. There was no sign or symptoms of intraspinal or extradural haematoma.

There was lack of studies of anaesthetic techniques on eclamptic mothers. So far known, no randomized trial has been to compare the commonly used techniques. But this investigation gave the understanding that regional anaesthesia is not contraindicated nor is general anaesthesia is indicated exclusively in women with eclampsia.

**CONCLUSION:**

Many obstetricians & some of the anaesthesiologists may consider SAB in eclamptic mothers contraindicated, because of the risk of rapid onset of severe hypotension. However the potential advantages of SAB – early induction to delivery of the infant and better Apgar score of the infant – warranted reappraisal of the technique. In our country emergency obstetric care has got the emphasis and the care giving system is extending rapidly in rural areas. Modern anaesthetic machine & all drugs of general anaesthesia availability has proven difficult. Neuroaxial block has got its footage in such situation. There is high incidence of pregnancies complicated by eclampsia in our country. SAB for LUCS in eclamptic can be an equal choice as GA.

**REFERENCES**


1. Matter F, Sibai BM. Eclampsia VIII, Risk factors for maternal morbidity. Am J Obstet Gynecol 2000; 182: 307-12.
2. Salha O, Walker JJ. Modern management of eclampsia: Post graduate Med. Journal 1999; 75: 78-82.
3. Morgan GE. Mikhail MS. Obstetric Anaesthesia. In: Clinical Anaesthesiology. 2nd ed. Connecticut: Appleton & Lange, 1996.
4. Datta S, Alper MH. Anaesthetic for caesarean section. Anaesthesiology 1980; 53: 142-160.
5. Wallace DH et al. Randomized comparison of general anaesthesia & subarachnoid block for caesarean delivery complicated by severe preeclampsia. Obstetric & Gynecology 1995; 193-199.
6. Rahman MK, Rahman MA, subarachnoid block in eclamptic mothers: An experience of 100 patients. Journal of the Bangladesh society of Anaesthesiologists 1997; 10(2): 83-86.
7. Hawthorne L, Wilson R, Lyons G, Dresner M. Failed intubation revisited : 17 – years experience in a teaching maternity unit. British Journal of Anaesthesia 1996; 76: 680- 684.
8. King TA, Adams IF. Failed tracheal intubation. British Journal of Anaesthesia 1990; 65: 400-414.