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FETOMATERNAL OUTCOMES OF DIFFERENT MODES OF DELIVERY IN PATIENTS WITH ECLAMPSIA

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ABSTRACT

Objective: To evaluate the fetomaternal outcomes of different modes of delivery in pregnancies complicated by eclampsia at and after 24 weeks.

Methodology: We conducted a prospective observational study of 352 women, aged 14-47 years, with eclampsia at ≥ 24 weeks of gestation at the Department of Obstetrics & Gynaecology, Women and Children Hospital Bannu, Pakistan from April 2017 to Dec 2018. The primary outcome measures were maternal mortality and maternal near-miss. The secondary outcome measures were perinatal morbidity and mortality.

Results: There were 172 women in the vaginal delivery (VD) and 180 in the cesarean delivery (CD) group. The mean age was 31.46 ± 10.17 years (range 14-47 years). Most of the women were 21-40 years, 179 (50.85%). There were more unbooked and referred cases in the CD group, 171 (95%) versus 150 (87.2%) ($p < 0.05$), and 131 (72.8%) versus 63 (36.6%) ($p < 0.000$) respectively.

The VD group had more maternal deaths, (13.40% versus 6.11%, $p < 0.021$), severe maternal outcomes, (47.09% versus 14.44%, $p < 0.000$), and life-threatening complications, (33.72% versus 8.88%, $p < 0.000$); HELLP (5.81% versus 1.66%, $p < 0.039$), DIC (4.65% versus 0.55%, $p < 0.015$), cardiac dysfunction (3.48% versus 0%, $p < 0.011$), and sepsis (4.65% versus 1.11%, $p < 0.046$).

The perinatal outcome was also poor in women with a VD, with higher stillbirths (20.93% versus 07.77%, $p < 0.000$), and perinatal deaths (31.39% versus 12.77%, $p < 0.000$).

Conclusion: Eclampsia is associated with grave fetomaternal complications. There is an increase in the number of elective CD in women with eclampsia, which is associated with less morbidity and mortality than VD.

Keywords: Eclampsia; Fetomaternal outcomes; Mode of delivery.

INTRODUCTION

Eclampsia is associated with poor fetomaternal outcome. Globally, the developing countries continue to have the highest rate of maternal death. In India, about 1.30 million maternal deaths occurred between 1997 and 2020, with 63% of these occurring in the poorer states.¹ Pakistan is also among the countries with the highest maternal mortality ratio, with 186 maternal deaths/100,000 live births. This is even higher in the rural areas and according to the demographic health survey 2017-2018, the Maternal Mortality Ratio was 203/100,000 live births, with direct maternal deaths accounting for 96% of these deaths.² Hypertensive disorders of pregnancy in Pakistan account for 16.9-27.5% of maternal mortality.³

Eclampsia is associated with poor fetomaternal outcome.¹ The reported maternal complications include pulmonary edema, cerebrovascular incidence

(CVA), disseminated intravascular coagulation (DIC), acute renal failure, hepatic dysfunction, and maternal deaths while the associated fetal complications include prematurity, intrauterine growth restriction (IUGR), stillbirths, intrauterine fetal death (IUFD), and neonatal death.⁴ It is a serious but preventable obstetric emergency. Timely management of pre-eclampsia by administering magnesium sulfate ($MgSO_4$), and termination of pregnancy at the appropriate time, can significantly reduce maternal mortality.⁵

The World Health Organization recommends delivery of all women within 12 hours of admission with eclampsia.⁶ However, deciding on the mode of delivery; vaginal delivery (VD) versus cesarean delivery (CD) is controversial.^{7,8} Some studies report poor fetomaternal outcomes with CD,⁹ while other studies report no difference in the maternal morbidity and mortality but show VD to be associated with poor neonatal outcomes.¹⁰

Our hospital is a secondary-level, rural hospital, with about 5500-6000 deliveries/year and manages about 300-400 eclampsia annually. However, there is a scarcity of data on the best mode of delivery in terms of fetomaternal outcomes in patients with eclampsia. This study was conducted with the same aim to find the fetomaternal outcomes of the two modes of delivery in women with eclampsia in a low-resource setup.

The findings of the study will help us devise local protocols for the management of these patients and determine the best mode of delivery in terms of favorable fetomaternal outcomes.

METHODOLOGY

This observational study was conducted at the Department of Obstetrics & Gynaecology, Women and children Hospital Bannu, Pakistan from April 2017 to December 2018. This study was conducted after approval from the hospital's Institutional ethical research committee (ERC-BMC/17). The non-probability consecutive sampling method was used for sample collection. A sample size of 352 was calculated using 16% as a proportion of maternal death in the VD group and 6% in the CD group in patients with eclampsia, using a power of 80%, and a confidence interval of 95%, using open-Epi software for sample size calculation.¹¹ Written informed consent was taken from all the patients. In this study, women aged 14-47 years, with a singleton pregnancy, presenting with eclampsia at ≥ 24 weeks of gestation. Patients with chronic hypertension, known epilepsy, diagnosed intracranial space-occupying lesions, ruptured uterus, antepartum hemorrhage, IUFD, and patients who refused to consent were excluded. Patients were followed till discharge or maternal death.

Eclampsia was defined as the onset of generalized convulsions or coma, after 20th weeks of gestation in women with

pre-eclampsia but no other neurological disorders.¹² A detailed obstetric history was taken from all patients followed by clinical examination, pertinent investigations, and cardiotocography (CTG) for fetal wellbeing, as per the obstetric unit protocols. Timings and mode of delivery were decided by a consultant obstetrician after stabilization of convulsions and blood pressure. Induction of labour was done using prostaglandin-E₂, 600 micrograms, two tablets kept vaginally, six hours apart, and induction was considered failed if there was the failure of onset of labour, 12 hours after the start of induction. Data on patients' demographic, clinical and laboratory findings, and the fetomaternal outcomes was obtained using a structured proforma. All women with a spontaneous vaginal delivery, instrumental vaginal delivery, failed induction of labour, and failure of progress of labour resulting in CD was assigned to the VD group. Women with elective CD were included in the CD group.

The primary objective was to find the frequency of severe maternal outcomes, which included both maternal mortality and maternal near-miss cases. Maternal near-miss cases comprised of severe complications such as renal dysfunction (oliguria with urine output < 15 ml/ kg/ hr, deranged renal function tests), hepatic dysfunction (deranged liver function tests with jaundice), cardiac dysfunction (cardiac arrest/ failure, pulmonary edema), respiratory dysfunction (oxygen saturation $< 90\%$, requiring intubation), sepsis (sign of infection along with any three findings of tachycardia with pulse > 90 /min, temperature > 38 °C, respiratory rate > 20 /min, or White Blood Cell count $> 12,000$ /cm³), and disseminated intravascular coagulation (DIC). The secondary objectives were to assess perinatal morbidity and mortality.

Data analysis was done using SPSS version 21. We used frequencies and percentages for categorical data such as age, parity, gestation, mode of delivery, fetal pre-

maturity, stillbirths, early neonatal deaths (ENND), maternal complications, maternal deaths, and severe maternal outcomes. For inferential statistics, continuous scale data were analyzed using Student's t-test, while the categorical data were compared using the Chi-square test or Fischer exact test as appropriate. A p-value < 0.05 will be considered statistically significant.

RESULTS

Of the 352 women with eclampsia, 172 women had a VD and 180 underwent CD. On analyzing the indications of CD, 109 women had poor Bishops score, 51 had fetal distress, and twenty had cephalo-pelvic disproportion. Table 1. Shows baseline characteristics of the study population. The mean age of the study group was 31.46 ± 10.17 years, with a range of 14-47 years. The majority of patients were in the age range of 21-40 years, both in the VD, 84 (48.8%) and CD groups, 95 (52%). There was no significant difference in baseline characteristics except booking status, and mode of admission. The majority of women in the CD group were unbooked, 171 (95%) versus 150 (87.2%) in the VD group ($p < 0.05$), and referred from other hospitals, 131 (72.8%) ($p < 0.05$).

There was a higher frequency of maternal deaths in the VD group, (13.40% versus 6.11%, $p < 0.05$). The severe maternal outcomes were also more in the VD group, (47.09% versus 15%, $p < 0.05$). More patients in the VD group developed life-threatening complications, (33.72% versus 8.88%, $p < 0.000$). On analyzing the causes of near-miss, women with VD had a significantly higher frequency of HELLP (5.81% versus 1.66%, $p < 0.039$), DIC (4.65% versus 0.55%, $p < 0.015$), cardiac dysfunction (3.48% versus 0%, $p < 0.011$), and sepsis (4.65% versus 1.11%, $p < 0.046$) (Table 2).

Among the 23 maternal deaths in the VD group, 18 (78.26%) were received uncon-

scious, and 5 (21.73%) were in an irritable state. Twenty (86.95%) patients had four or more episodes of convulsions, and 18 (78.26%) had an induction-delivery interval of more than 12 hours. About 4 (36.36%) patients were unconscious and 7 (63.63%) irritable in the 11 maternal deaths in the CD group, 9 (81.81%) women had convulsion-delivery intervals > 14 hours, with > 4 episodes of convulsions.

Table 1: Demographic details of age, parity, gestation, booking status, socioeconomic status, mode of admission, blood pressure on admission, level of consciousness (n=352)

Variables		Vaginal delivery (n=172)	Cesarean Delivery (n=180)	p-value
Age	<20 Years	34 (19.8%)	45 (24.4%)	0.127
	21-40 Years	84 (48.8%)	95 (52%)	
	>41 Years	54 (31.4%)	40 (22.2%)	
Parity	Primigravida	124 (72.1%)	140 (78.2%)	0.218
	Multigravida	48 (27.9%)	40 (22.2%)	
Gestation	≤ 37 Weeks	60 (34.9%)	63 (34.9%)	0.982
	>37 Weeks	112 (65.1%)	117 (65%)	
Booking Status	Booked	22 (12.8%)	9 (5.0%)	0.009
	Unbooked	150 (87.2%)	171 (95%)	
Socioeconomic Status	Low	130 (75.6%)	138 (76.7%)	0.811
	Middle	42 (24.4%)	42 (23.3%)	
Mode of Admission	Direct	109 (64.1%)	49 (27.2%)	0.000
	Referred	63 (36.6%)	131 (72.8%)	
Blood Pressure on Admission	SBP	144.18±7.36	144.45±7.71	0.732
	DBP	95.87±5.48	95.91±5.33	
Level of Consciousness	Conscious	154 (89.5%)	150 (83.3%)	0.09
	Unconscious	18 (10.5%)	30 (16.7%)	

DISCUSSION

The current study revealed that planned elective cesarean section is associated with lower fetomaternal complications than VD. The maternal mortality in the current study was 34/352 (9.66%). This is comparable to the results of a study conducted in India which showed maternal mortality of 9.5%.¹³ Similarly, a local study revealed that eclampsia accounted for nearly one-third of maternal mortality in a tertiary care hospital in Pakistan.¹⁴ Another local study conducted in Lady Reading Hospital, Peshawar showed 42.16% maternal mortality resulting from

The perinatal outcome is depicted in Table 3. Women with VD had poor perinatal outcomes than the CD group, especially stillbirths (20.93% vs 07.77%, $p<0.05$), and perinatal deaths (31.39% vs 12.77%, $p<0.05$). The frequency of meconium-stained liquor was higher in women in the CD group (25.56% vs 10.46%, $p<0.05$).

hypertensive disorders while the reported death rate from eclampsia in Liaquat University Hospital, Jamshoro-Hyderabad was 20%.¹⁵ The majority of women in our study were 20-40 years of age (51.36%), >37 weeks of gestation (65.05%), primigravida (75%), unbooked (91.19%), of low socioeconomic status (76.13%) and referred cases (54.54%) from other hospitals.

On further analysis with respect to the mode of delivery, the VD group had more maternal deaths (13.40%) than the CS group (6.11%). In line with the findings of our study, other observational studies have shown sim-

ilar results.^{8,17} This finding could be due to the reason that VD has opted in moribund cases.¹⁰ Moreover, since these were observational studies, there was no randomized allocation of women to the VD or CS group. However, two randomized trials by Tukur et al. and seal et al. have revealed no benefit in terms of less maternal morbidity and mortality in eclampsia women with planned CS, but, both these were pilot studies with a low sample size of 50 and 200 respectively.^{9,10}

The maternal near-miss cases were 74 (21.02%), of which the majority were women from the VD group, 58 (33.72%). This is supported by findings of a study from India, which showed a high frequency of life-threatening complications in the VD group (72.5%; p -value <0.0000, OR 6.98).¹¹ In contrast, a population-based study in Brazil, derived from a 2011 nationwide survey found that CS was associated with a three-fold higher risk of maternal death than VD (OR 2.87, 95% CI 1.63-5.06) due to anesthesia complications and postpartum hemorrhage (PPH).¹⁸ The lower maternal mortality in our study may be due to a lack of anesthesia complications and no increased incidence of PPH in the CS group. Moreover, the best management of eclampsia is the timed delivery of the baby. Eclampsia at an early gestation is usually associated with a poor Bishop score, requiring a longer duration of induction, which usually fails, leading to worsening of the maternal condition. In the current study, the majority of the maternal deaths either had a prolonged induction-delivery interval or convulsion-delivery interval of more than 14 hours. Thus, many factors other than merely the mode of delivery may be responsible for the poor maternal outcome in patients with eclampsia.

Eclampsia, is associated with poor placental functions leading to increased risk of fetal distress and IUFD.¹⁹ The stillbirth rate in our study was 14.20%, which was high in the VD group 20.93%. Similarly more perinatal and ENNDs occurred in women

Table 2: Maternal outcomes of the study participants (n=352)

Variables	Vaginal Delivery (n=172)	Cesarean Delivery (n=180)	p-value
Maternal Death	23 (13.40%)	11 (6.11%)	0.021 ^a
Maternal Near-Miss	58 (33.72%)	16 (8.88%)	0.000 ^a
Hepatic Dysfunction	7 (4.06%)	2 (1.11%)	0.079 ^b
Respiratory Dysfunction	14 (8.13%)	4 (2.22%)	0.011 ^a
HELLP	10 (5.81%)	3 (1.66%)	0.039 ^a
DIC	8 (4.65%)	1 (0.55%)	0.015 ^a
Cardiac dysfunction	6 (3.48%)	0 (0%)	0.011 ^b
Renal Dysfunction	5 (2.90%)	4 (2.22%)	0.684 ^b
Sepsis	8 (4.65%)	2 (1.11%)	0.046 ^b
ICU admissions	15 (8.72%)	19 (10.55%)	0.564 ^a
Severe Maternal Outcome	81 (47.09%)	27 (15%)	0.000 ^a

a; Chi-square test, b; Fischer exact test, HELLP, hemolysis elevated liver enzymes and low platelet counts; DIC, disseminated intravascular coagulation; ICU, intensive care unit.

Table 3: Perinatal outcome of the study participants (n=352)

Variables	Vaginal Delivery (n=172)	Cesarean Delivery (n=180)	p-value
Stillbirths	36 (20.93%)	14 (7.77%)	0.000
Early Neonatal Death	18 (10.46%)	9 (5%)	0.054
Perinatal Mortality (Stillbirth+ Early Neonatal Death)	54 (31.39%)	23 (12.77%)	0.000
Preterm	56 (32.55%)	59 (32.77%)	0.965
Low Birth Weight (<2.5 kg)	63 (36.61%)	81 (45.0%)	0.110
IUGR	31 (18.00%)	48 (26.7%)	0.052
Meconium Stained Liquor	18 (10.46%)	46 (25.56%)	0.000

IUGR, intrauterine growth restriction

with a VD, 31.39% and 10.46% respectively. Similar figures were observed in a study by Chaudhuri S et al. who reported a high stillbirth rate of 14.2% in VD ($p < 0.005$, RR 5.81, OR 6.62). The VD group had a high ENND (11.2%, $p < 0.309$, RR 1.94, OR 2.05), and overall perinatal mortality (25.2%, $p < 0.002$, RR 3.1, OR 3.83).¹¹

A randomized trial by Seal et al. also revealed a high neonatal event rate, determined by perinatal mortality, and morbidity (Apgar score of < 7 at 5 minutes, intubation or the need to special care unit for > 1 week) in women with a VD (19.19%, RR 0.52, 95% CI 0.25-1.05).¹⁰

Thus, eclampsia still continues to be a major contributor to maternal and perinatal morbidity and mortality. This study also highlights the poor health conditions in rural ar-

reas of Pakistan, where a lack of required ICU facilities leads to a higher number of potentially preventable complications and eventually a high maternal and perinatal mortality.

Since most deaths in the current study occurred in referred patients, who had convulsions for more than eight hours, strategies should be devised at improving health-care facilities in general and ICU facilities, in-specific at the secondary level hospitals so patients are timely managed, without wasting time in referring patients to tertiary care hospitals.²⁰

The strength of this study was its high sample size and prospective data collection. It was limited by the nonrandom allocation of patients to different modes of delivery, and being a single center. Randomization of eclamptic women into a different mode

of delivery is difficult as they are mostly not oriented and this may impair their consent ability.

CONCLUSION

In conclusion, this study revealed that eclampsia is associated with grave fetomaternal outcomes, but timed delivery after stabilization of the patient is the mainstay of treatment. Delivery by planned CS is associated with lower fetomaternal complications in comparison to VD.

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Conflict of Interest

Authors declared no conflict of interest

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None

Data Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.