RESEARCH
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CLINICAL AND NEUROIMAGING EVALUATION IN SEVERE PREECLAMPSIA AND ECLAMPSIA WITH OBSTETRIC OUTCOME

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Abstract
Introduction: Preeclampsia and eclampsia are two clinical situations that are exclusively associated with pregnancy. Preeclampsia is defined as the new onset of hypertension (blood pressure [BP] ≥140/90) and either proteinuria or end-organ dysfunction or both after 20 weeks of gestational in women who was previously normotensive.
Aims: The aim to study the neurological complication in severe preeclampsia and eclampsia.
Materials and Method: The present study was a Prospective longitudinal type of observational study. This Study was conducted from February 2018 to May 2019 at department of Obstetrics & Gynaecology, Calcutta National Medical College, Kolkata. Total 50 patients were included in this study.
Result: In our study most of the patients were presented with Eclampsia (62 %) and 38 % presented with severe eclampsia. In above table 70 % had GCS more than 13 and 30 % had GCS less than 13. 81 % patients had normal opthalmoscopic findings and 4 patients (19%) had abnormal opthalmoscopic findings like constriction of retinal artery, cotton wool spots. In this above table 56 % patients had proteinuria + 2 by urine dipstick, 22 % had +3 proteinuria, 20 % had +1 & 2 % had +4 proteinuria. Occipital lobe of brain was most common area of brain involved (78.57%) followed by Parietal Lobe (75 %).
Conclusion: In conclusion, comprehensive clinical and neuroimaging evaluations play a pivotal role in the management of severe preeclampsia and eclampsia. These assessments not only aid in understanding the extent of cerebral involvement but also facilitate timely interventions that can mitigate maternal and fetal risks. By integrating clinical findings with advanced imaging techniques, healthcare providers can make more informed decisions, leading to improved obstetric outcomes. Early diagnosis, prompt treatment, and continuous monitoring are essential in reducing the morbidity and mortality associated with these hypertensive disorders of pregnancy.
Keywords: Preeclampsia, Eclampsia, Obstetric outcome and Cerebral edema.

INTRODUCTION

Preeclampsia and eclampsia are two clinical situations that are exclusively associated with pregnancy [1]. Preeclampsia is defined as the new onset of hypertension (blood pressure [BP] ≥140/90) and either proteinuria or end-organ dysfunction or both after 20 weeks of gestational in women who was previously normotensive. Eclampsia is a complication of preeclampsia, characterized by convulsion or coma not attributable to any organic neurological disease. The incidence of eclampsia is around 1 in 2000 deliveries in developed countries [2]. In India, reported incidence of eclampsia varies from 0.179 to 3.7 % [3]. According to WHO hypertensive disorders contribute 12% of all maternal mortality worldwide [4]. MMR according to 2001-2013 SRS survey hypertension in pregnancy contribute 5 % [5]. The incidence of perinatal mortality ranges from 14.6 % to 17.4% [6]. Neurological events, such as eclampsia and intracranial haemorrhage are some of the primary mechanisms by which preeclampsia exerts its fatal maternal influence along with acute pulmonary oedema and hepatic rupture.

There are several neurological manifestations of preeclampsia syndrome. Each signifies severe involvement and requires immediate attention. First, headache and scotoma are thought to arise from cerebrovascular hyperperfusion. Convulsions are diagnostic for eclampsia, are caused by excessive release of excitatory neurotransmitters. Blindness is rare with preeclampsia, but it complicates eclamptic convulsions in up to 15% of women [7]. Generalized cerebral edema may develop and is usually manifest by mental status changes that vary from confusion to coma.

Two theories have been proposed to explain these cerebral abnormalities; forced dilatation and vasospasm. Forced dilatation theory suggest that the lesion in eclampsia is caused by loss of cerebrovascular autoregulatiion. According to vasospasm theory cerebral overregulation occurs in response to acute severe hypertension, with resultant ischemia, cytotoxic edema and infarction. MRI demonstrates transient hyperintense T2 lesions in the sub cortical regions of the parieto-occipital and temporal lobes with occasional involvement of basal ganglia and /or brainstem. With the advent of imaging technologies like MRI

in tertiary care centres, nowadays diagnosis of PRES is becoming common. The aim to study the neurological complication in severe preeclampsia and eclampsia.

MATERIALS AND METHODS

Study design: Prospective longitudinal type of observational study

Place of study: Department of Obstetrics & Gynaecology, Calcutta National Medical College, Kolkata

Duration of Study: Approximately 1 year from February 2018 to May 2019

Sampling technique: After taking informed consent, the patients' details will be collected on pre-designed performa which will include obstetric history taking, examination and investigations.

Study population: The cases for the study will include antepartum and postpartum eclampsia and severe pre eclampsia attending antenatal clinic, obstetric emergency and those admitted in the labour room and obstetric wards.

Sample size: Total of 50 samples has been included in this study.

Inclusion criteria:

- Patients with Eclampsia.
- Patients with severe Preeclampsia with neurological sign and symptoms (headache, Visual symptoms, such as scotomota, amaurosis, blurred vision, diplopia, chromatopsia, or homonymous hemianopsia, confusion, focal neurodeficit, hemiparesis).
- Coma in pregnancy or early puerperium
- Patients with atypical eclampsia

Exclusion criteria:

- Women who are known case of Hypertension, Epilepsy.
- Seizures due to metabolic disturbances, space occupying lesions or intracerebral infections.
- Mild pre eclampsia without neurological signs and symptoms.

Statistical Analysis:

For statistical analysis, data were initially entered into a Microsoft Excel spreadsheet and then analyzed using SPSS (version 27.0; SPSS Inc., Chicago, IL, USA) and GraphPad Prism (version 5). Numerical variables were summarized using means and standard deviations, while categorical variables were described with counts and percentages. Two-sample t-tests, which compare the means of independent or unpaired samples, were used to assess differences between groups. Paired t-tests, which account for the correlation between paired observations, offer greater power than unpaired tests. Chi-square tests (χ^2 tests) were employed to evaluate hypotheses where the sampling distribution of the test statistic follows a chi-squared distribution under the null hypothesis; Pearson's chi-squared test is often referred to simply as the chi-squared test. For comparisons of unpaired proportions, either the chi-square test or Fisher's exact test was used, depending on the context. To perform t-tests, the relevant formulae for test statistics, which either exactly follow or closely approximate a t-distribution under the null hypothesis, were applied, with specific degrees of freedom indicated for each test. P-values were determined from Student's t-distribution tables. A p-value ≤ 0.05 was considered statistically significant, leading to the rejection of the null hypothesis in favour of the alternative hypothesis.

RESULT

Table 1: Distribution of study population according to Clinical Diagnosis (n = 50)

		NO OF PATIENTS	%
Provisional Diagnosis	ECLAMPSIA	31	62
	SEVERE PREECLAMPSIA	19	38
	TOTAL	50	100
Level of Consciousness	GCS > 13	40	80
	GCS 13 OR <13	10	20
	Total	50	100
Opthalmoscopic Findings	NORMAL	18	85.7
	ABNORMAL	4	19
	TOTAL	22	100

Table 2: Areas of Brain involvement in MRI among the study population (N =28)

Areas of Brain involvement in MRI	NO OF PATIENTS	%
FRONTAL	7	25
PARIETAL	21	75
TEMPORAL	7	25
OCCIPITAL	22	78.57
BASAL GANGLIA	3	10.7
PONS	3	10.7
CEREBELLUM	1	3.57
PERIVENTRICULAR	1	3.57

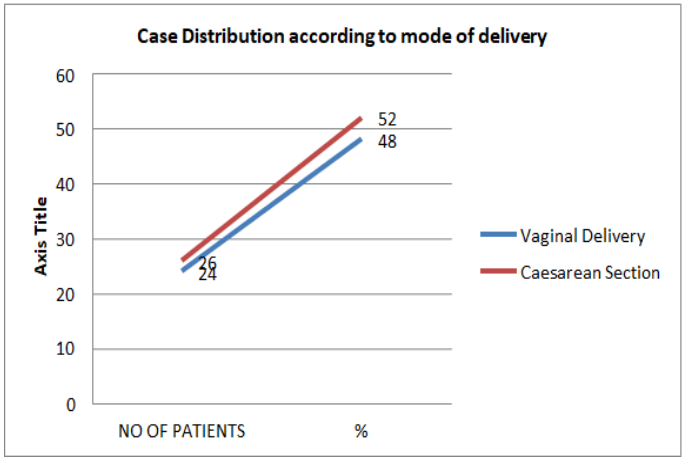

Figure 1: Distribution of study population according to mode of delivery

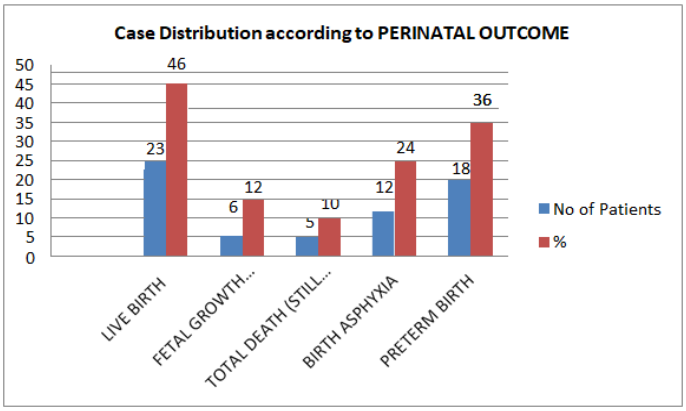

Figure 2: Case Distribution according to PERINATAL OUTCOME

In our study most of the patients were presented with Eclampsia (62 %) and 38 % presented with severe eclampsia. In above table 70 % had GCS more than 13 and 30 % had GCS less than 13. 81 % patients had normal opthalmoscopic findings and 4 patients (19%) had abnormal opthalmoscopic findings like constriction of retinal artery, cotton wool spots. In this above table 56 % patients had proteinuria + 2 by urine dipstick, 22 % had +3 proteinuria, 20 % had +1 & 2 % had +4 proteinuria. Occipital lobe of brain was most common area of brain involved (78.57%) followed by Parietal Lobe (75 %), Frontal lobe and Temporal lobe 25 % each, Basal ganglia (10.7 %), Pons (10.7 %) & periventricular area, cerebellum both 3.57 %. Most of patients was delivered by Caesarean Section (52 %) & 48 % delivered Vaginally. 46 % were live birth, 36 % neonates were preterm. 24 % neonates had birth asphyxia & 12 % had fetal growth restriction. In 5 % cases were still born or early fetal loss.

DISCUSSION

In our study 42% patients are primigravida and 58 % patients were multigravida. In the study by Milliez et al majority of the patients were multiparas. In another 55.82% of the total eclampsia patients were primigravida, followed by 10.33% in 2nd and 3rd gravid [8].

76% population in our study presented in antepartum period and 24 % cases reported during postpartum period. In our study 52 % patients were admitted during 34 to 37 weeks of gestation, 30 % were admitted more than 37 weeks of gestation. Only one case admitted in 21 weeks with severe preeclampsia. As a tertiary care hospital with well equipped ICU set up & MRI facility, most of the cases in our study were eclampsia (62 %) and 38 % of cases were severe preeclampsia. In a similar study 66% of the women presented with postpartum eclampsia while 34% had antepartum eclampsia. The gestational age in women with antepartum eclampsia was 35.56±3.17 weeks. In those with postpartum eclampsia the mean was found to be 3.82±1.93 days postpartum. 84% of the women had ≤3 episodes of seizures while 16% of the women had 4 or more episodes [9].

Headache was most common clinical presentation (66 %) in our study. 62 % of patients were presented with seizure, 42 % with visual complain, 38 % with altered mental sensorium, 8 % presented with epigastric pain, 6 % jaundice and nausea vomiting. In a study in St Jones hospital the common presenting symptoms of PRES were headache (93.3%) and vomiting (53. 3%), epigastric pain in 26.7% patients and visual disturbances (3.3%) [10].

When MR imaging–positive patients were compared with MR imaging–negative patients, there was statistically significant difference between them in terms of frequency of the presence of seizure (p=.00652), altered mental sensorium (p=.002). However, the difference was no statistically significant headache (p=.7565), visual symptoms (.06148), epigastric pain (p=.42372), jaundice (p=.70394), nausea vomiting (p =. 70394). In another study the difference in the study groups (MRI finding positive and negative) was statistically significant regarding headache, seizures, depression of consciousness and visual disorder (P value 0.0085, <0.0001, <0.0001 and <0.0001, respectively) [11].

In our study 70 % of our study population were conscious and GCS was more than 13, however 30 % of population had GCS less than 13. 42 % of population had mean arterial blood pressure between 130 to 139, 28 % had BP between 120 to 129 mm of hg, 18 % had more 140 mm of hg & 12 % patients had BP less than 120 mm of hg. In our study, there was no statistically significant difference between mean blood pressure values of cases with or without MR imaging evidence of brain lesions as p value was.3058. But in cases of severe preeclampsia/ eclampsia, brain lesions might occur although blood pressure values are normal but still higher than a patient's routine normal blood pressure [12].

56% patients had abnormal MRI findings and 44% patients had normal MRI findings. In our study most common MRI finding was posterior reversible ischemic encephalopathy 78.57% and only 6 cases (21. 43 %) was detected Infarction. in a large prospective Indian cohort of 104 eclamptic women, 74 (71%) developed posterior encephalopathy syndrome [13].

In our study MgSo4 was given to all patients (100 %). 74 % patients required inj Labetalol, 58 % required ICU admission. Dialysis was required in 6 % of patients for acute renal failure. Inj Frusemide was given in one case for pulmonary edema. In only case another anti convalsant was needed to control seizure. Most of patients was delivered by Caesarean Section (52 %) & 48 % delivered Vaginally. 66 % patients delivered within 6 to 12 hours after admission, 28 % delivered less than 6 hour after admission, 6 % patients delivered more than 12 hours. In another study 80% vaginal deliveries and 18% patients underwent caesarean section. There is no general agreement as to the mode of delivery in eclampsia reserving caesarean section only for obstetrical reasons. On the other hand, Pritchards and Chelsey have favored caesarean section to reduce maternal and perinatal mortality.

Pyrexia was most common complication (20%) during hospital stay. 16 % developed PPH after delivery. Anemia was detected in 8 % cases, respiratory tract infection in 10 % cases. Pulmonary edema was developed in 2 % cases. HELLP syndrome was seen in 10 % cases. Acute renal failure was complicated in 6 % of cases. According to Mattar and Sibai described outcomes in 399 consecutive women with eclampsia, major maternal complications included placental abruption (10%), neurological deficits (7 %), aspiration pneumonia (7%), pulmonary edema (5%), cardiopulmonary arrest (4%), and acute renal failure (4%), death (1%) [14]. 46 % were live birth, 56 % neonates were preterm. 24 % neonates had birth asphyxia & 12 % had fetal growth restriction. In 5 % cases were still born or early fetal loss. In another study birth asphyxia was the common cause for increase in perinatal morbidity. Out of 340 babies 76 (22.35%) were still birth and 264 (77.64%) were live births. In those 92 babies required NICU admission due to above perinatal morbidities. 45 babies out of 92 admitted in the NICU died due to above mentioned perinatal complications [8].

CONCLUSION

In conclusion, comprehensive clinical and neuroimaging evaluations play a pivotal role in the management of severe preeclampsia and eclampsia. These assessments not only aid in understanding the extent of cerebral involvement but also facilitate timely interventions that can mitigate maternal and fetal risks. By integrating clinical findings with advanced imaging techniques, healthcare providers can make more informed decisions, leading to improved obstetric outcomes. Early diagnosis, prompt treatment, and continuous monitoring are essential in reducing the morbidity and mortality associated with these hypertensive disorders of pregnancy.

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