

Value of CT Scan Brain findings among Eclampsia patients: an experience from a Rural Medical College of West Bengal, India

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Abstract: Background: Eclampsia is defined as the occurrence of one or more convulsions in association with raised blood pressure and proteinuria in a pregnant or puerperal woman, usually between 20 weeks of gestation to 6 weeks after confinement. In developing countries, eclampsia is one of the important reasons of adverse maternal and perinatal outcomes. Scientific evidences supported abnormal findings on neuro imaging have been noted in majority of the women with eclampsia with preponderance of parieto-occipital lobes involvement in the distribution of posterior cerebral arteries. The present study was conducted with an aim to evaluate the values of the CT Scan brain findings among eclampsia patients. A hospital based observational study which was cross-sectional in nature was carried out for a period of 6 months among 69 eclampsia patients those admitted in the Midnapore Medical College and Hospital, West Bengal. Relevant investigations and CT scan of brain performed after stabilizing the mother. Maternal and fetal outcomes were evaluated. The data was entered and analyzed by using the SPSS 21.0 statistical software package. CT scan of brain revealed edema (50.7%) was found the commonest pathological findings followed by ischemia/infarction (17.4%), granuloma (7.2%), haemorrhage (5.8%) and haematoma (1.4 %). Also around 17.4 % of the patients were found normal CT scan findings. The commonest area of involvement was found occipito-parietal lobe of the brain. To conclude, early recognition of the disorder and prompt management by control of blood pressure, removal of the offending medications or treatment of associated diseases is essential to prevent irreversible brain damage. CT scan of brain in eclampsia can provide useful intra-cerebral information and should be done in cases with severe neurologic manifestations, if possible for every eclampsia patient. .

Keywords: Eclampsia, CT Scan, Brain, Neuro imaging.

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I. Introduction

Eclampsia is defined as the occurrence of one or more convulsions in association with raised blood pressure and proteinuria in a pregnant or puerperal woman, usually between 20 weeks of gestation and the first 48 hours postpartum.¹ In contrast, late postpartum encephalopathy (LPE) occurs between 48 hours and 1 month postpartum, frequently in women who have had a normal pregnancy and delivery and have no signs of a pre-eclamptic syndrome.^{2,3} Hospital incidence in India is between 1 in 500 to 1 in 30. It occurs more commonly in primi-gravida, nearly 75% of all eclampsia. Nearly half (50%) of the eclampsia occurred between 36 weeks of gestation to term. Convulsions in eclampsia occur 50% in antenatal period, 30% intrapartum, 20% in postpartum period. Maternal mortality in India due to eclampsia is 2 to 30% and perinatal mortality is 30 to 50%.⁴ Cerebral complications are the major cause of deaths in eclampsia. Cerebral complications have no permanent neurologic deficits, and there is evidence which suggests that the neuro pathophysiology of eclampsia may be related to changes in cerebral blood flow. Proposed mechanisms include hypertensive encephalopathy, cerebral vasospasm, cerebral edema and petechial hemorrhage. Abnormal findings on neuro imaging have been noted in as many as 80-90% of women with eclampsia.^{4,5}

Most common lesions are seen in parieto-occipital lobes in the distribution of posterior cerebral arteries. This lesion occurs as a result of vasogenic oedema induced by endothelial damage and other changes contributing to pathophysiology of eclampsia.^{6,8}

Imaging is interesting for a better understanding of the pathophysiology of eclampsia, but in the clinical practice, the decision to perform CT imaging should be more restrictive.^{9,10} Patients presenting with history of uncomplicated eclampsia, without focal neurological deficit should not be investigated by these techniques. Patients with focal neurologic deficit, or signs of mass effect, or decrease in the level of consciousness should undergo CT scan as a first choice, in order to exclude haemorrhagic lesions or other major complications. Cerebral CT may be normal or may reveal transient white matter hypodensities. Occasionally, haemorrhagic

lesions can be found in more severe forms.¹¹ Goal of CT scan was to define abnormalities that may be treated and decreases the morbidity and mortality associated with the condition.¹² Considering those facts in mind, the present study was planned with an aim to evaluate the pattern of CT Scan brain findings among eclampsia patients.

II. Material And Methods

Study Design and Study Setting: An institution based, observational, analytic study was conducted which was cross-sectional nature among the indoor eclampsia patients those were admitted under the Department of Gynaecology and Obstetrics, Midnapore Medical College and Hospital, Paschim Medinipur, WestBengal, India.

Study Period: The study was conducted from April 2018 to November 2018 (for a period of 08 months).

Study Participants: Pregnant (≥ 20 weeks of gestation) or puerperal (within 6 weeks after confinement) woman, those admitted at the Midnapore Medical College and Hospital, Paschim Medinipur, West Bengal with history of convulsions were considered as the study participant. Also the admitted ante-natal and post-natal patients those developed convulsions during the period of their staying in the hospital were also included as the study participants in the present study. The following inclusions and exclusion criteria were used for the selection of the study participants.

Inclusion criteria: Patients with eclampsia (at least history of one episode of convulsion) among pregnant (≥ 20 weeks of gestation) or puerperal (within 6 weeks after confinement) woman with systolic blood pressure ≥ 140 mm of Hg and or diastolic blood pressure ≥ 90 mm of Hg with urine albumin of more than 0.3gm/L with or without edema. For detection of urine albumin, bedside dipstick test was used.

Exclusion criteria: The following criteria were used in the present study.

- Women who were known case of epilepsy.
- Seizures due to metabolic disturbances, space occupying lesions, intra-cerebral infections, poisoning or trauma.

Sample size and Sampling Technique: The present study included all the eclampsia patients those met the inclusion criteria during the data collection period. A total 69 eclampsia patients were included for the study purpose.

Ethical Issues: The study was approved by the 'Institutional Ethics Committee' of the Midnapore Medical College, Paschim Medinipur, West Bengal, India. Informed written consent was obtained from either the responsible adult family member of the study subjects or the study participants herself after explained the purpose and expected outcome of the study.

Methods of Data Collection: A pre-tested and pre-designed semi-structured questionnaire was used as the data collection tool. Basic socio-demographic information including age, parity, gestational age, previous medical or obstetric history was taken. Detailed history of convulsion (s) like duration and time, numbers of convulsion and premonitory symptoms were sought. CT Scan of the brain was performed by using the 16-slice multi CT GE machine at the 'NIRNOY ET. AL. CT SCAN UNIT' of the Midnapore Medical College and Hospital, which is run by the public private partnership (PPP) model.

Basic bio-chemical investigations like urine albumin (by dipstick) are measured, complete hemogram, platelet count, serum uric acid, serum creatinine, liver enzymes were measured. Standard treatment protocol with MgSO₄ was followed for every patients. If patient was undelivered, assessment of cervix and delivery of fetus done accordingly either by induction of labour or caesarian-section. CT scan performed after preferably after confinement as well as haemodynamic stabilization of the patient.

Data Entry and Analysis: After thorough verification, data were entered and analyzed by using the SPSS 21.0 software package (statistical package for social sciences). The categorical variables were expressed in terms of numbers and percentages. Results were expressed by means of either tables or figures.

III. Result

Total 69 eclampsia patients were included in this present study. On CT Scan of brain, the commonest pathological findings was found edema (50.7%; 35 out of 69) followed by ischaemia/infarction (17.3%; 12 out of 69), granuloma (7.2%; 05 out of 69), hemorrhage (5.7%; 4 out of 69) and haematoma (1.4%; 1 out of 69). Also around 17.4 % of the patients (were found normal CT scan findings. [Figure-1]

Figure-2 showed the area of brain involvement among the study participants on the basis of CT scan brain findings. It was evident that the most common site of the brain involved was all lobes of brain (24.6%; 17 out of 69) followed by occipito-parietal region (20.3%; 14 out of 69), parietal lobe (15.9%; 11 out of 69), fronto-parietal region (14.5%; 10 out of 69), and all lobes (17 cases). It was also evidenced that interestingly that in totality, parietal lobe involvement was around 75.4% (total 52 out of 69 patients) ; occipital lobe involvements was 44.9 % (31 out of 69 patients) and frontal lobe involvement were 46.4% (32 out of 69 patients). Some CT scan findings of the present study were documented below.

FIG 1: Distribution of study participants according to the different brain lesions by CT Scan

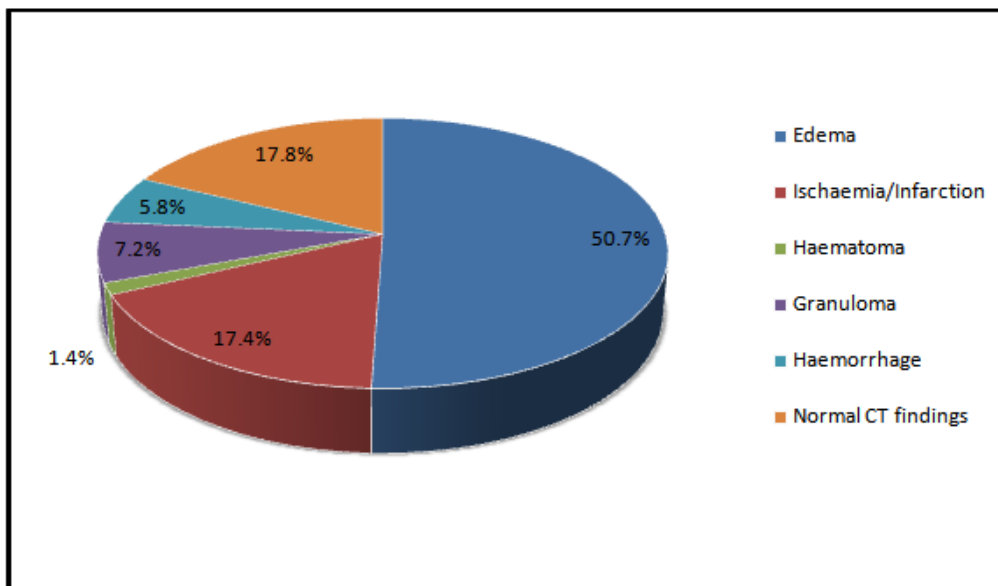


FIG 2: Area of Brain Involvement among the study participants by CT Scan

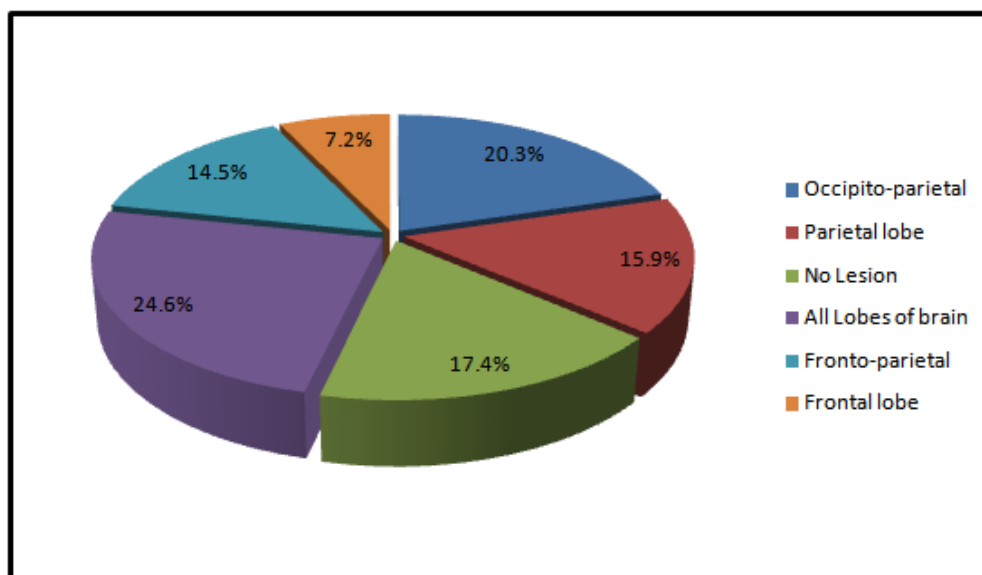
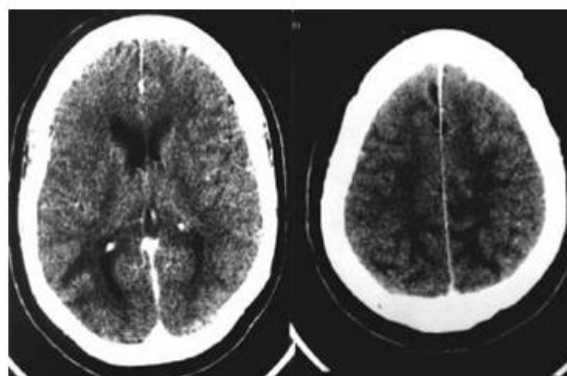


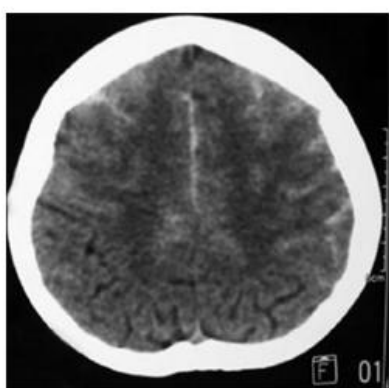
FIG 3: Some CT Scan findings of the present study:



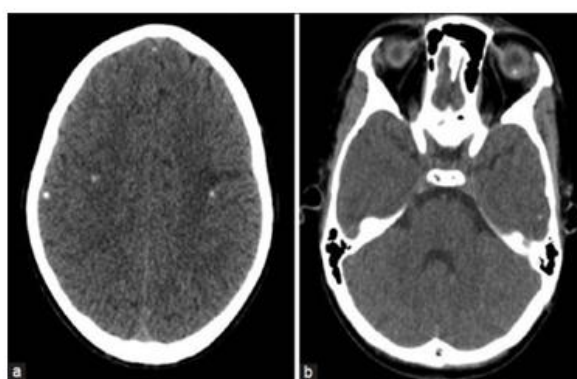
Haemorrhage with sub-cortical edema



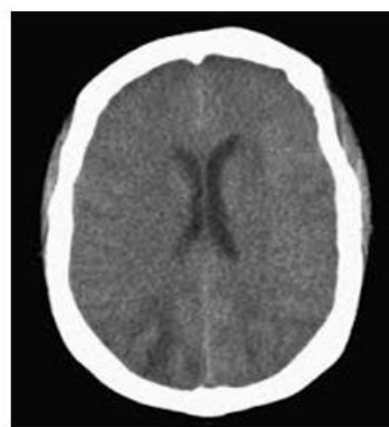
Petechial Haemorrhage



Sub-cortical edema in fronto-parietal region



Granuloma



Sub-dural Haematoma



Infarction

IV. Discussion

Preeclampsia or eclampsia is considered to be primarily a placental disorder. Both poor placentation as well as hyperplacentosis is associated with this condition. Vasospasm which follows vasoconstriction as a result of severe hypertension is thought to cause local ischemia, arteriolar necrosis and disruptions of blood brain barrier which leads to cerebral oedema. It is possible that both vasoconstriction as well as forced vasodilatation causes cerebral edema. These are due to irregularities in the auto regulation of cerebral circulation.

Disruption of the blood-brain barrier occurs due to both the hypertension-induced capillary damage and the immune-mediated endothelial dysfunction. This leads to extravasations of red cells and plasma proteins into peri-vascular space causing cerebral edema. Cerebral vasospasm, produced by a combination of reaction to hypertension, prostaglandin deficiency, defects in the NOS gene (coding for nitric oxide synthase) and endothelial damage, play an important role, producing ischemia and infarction in the brain tissue.

The impaired blood coagulation system and the abnormalities and deficiency of platelets predispose to intra-cranial bleeds. Thus, a varied picture of cerebral pathology showing evidences of cerebral oedema, micro-infarcts, cortical petechiae and pericapillary haemorrhages were observed in the brains of patients with pre-eclampsia or eclampsia, which clinically manifest as headache, visual disturbances, confusion and seizures. Characteristic lesion locations are parietal and occipital lobes, followed by the frontal lobes, the inferior temporal-occipital junction, and the cerebellum.

A study by McKinney AM *et. al.* showed that the incidence of regions involvement was parieto-occipital 98.7%, temporal 68.4%, thalamus 30.3%, cerebellum 34.2%, brainstem 18.4%, and basal ganglia 11.8%.¹³ The incidence of less common manifestations was enhancement 37.7%, restricted diffusion 17.3%, haemorrhage 17.1% and a newly described unilateral variant 2.6%.¹³ Bartynski WS *et. al.* described vasogenic oedema in parietal or occipital regions 98%, frontal lobes 68%, inferior temporal lobes 40%, cerebellar hemispheres 30%, basal ganglia 14%, brainstem 13%, deep white matter 18% and splenium 10%.¹⁴

V. Conclusion

It is evident from study that brain edema was most common cerebral lesion followed by ischaemia /infarction and hemorrhage and parieto-occipital lobe was most common affected area. CT scan of brain can provide useful information to detect different brain lesions in eclampsia which may need specific modification in management protocol to prevent long term neurologic sequels and reduce maternal mortality and morbidity; although these parameters are not included in this study. Several evidences showed that CT scan brain does improve the management a lot among eclampsia mothers significantly. Early recognition of the disorder and prompt management by control of blood pressure, removal of the offending medications or treatment of associated diseases is essential to prevent irreversible brain damage.

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