

DOI: <https://dx.doi.org/10.18203/2320-1770.ijrcog20223257>

Original Research Article

Computed tomography brain scan findings in eclampsia

K. N. Madhavi, Guguloth Karuna, B. S. V. Sivaranjani, Mokana Sreevalli*

Department of Obstetrics and Gynecology, Guntur Medical College, Guntur, Andhra Pradesh, India

Received: 15 November 2022

Accepted: 28 November 2022

***Correspondence:**

Dr. Mokana Sreevalli,

E-mail: sreevalli806@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Eclampsia is characterized by sudden onset of generalized tonic-clonic convulsion or coma in pregnancy or postpartum unrelated to other cerebral conditions. It is a life-threatening complication of pregnancy; the exact cause is still not conclusively elucidated. Recent studies using computed tomography and magnetic resonance imaging (MRI) gives valuable neuroimaging findings to determine the prognosis and early management of neurovascular complications that will reduce maternal mortality and morbidity.

Methods: This is a prospective study done over 6 months to study population was chosen by eclampsia patients who were admitted through the emergency ward and also indoor patients who developed eclampsia after admission. A total of 50 patients were analyzed. Computed tomography (CT) scan of brain performed after a confinement of fetus and after stabilizing the mother. Maternal and fetal outcomes were observed in these cases.

Results: A total of 50 eclampsia patients and their CT scan findings were studied. In these positive CT scan findings were noticed in 23 patients. 1 patient expired with massive cerebral hemorrhage and cerebral oedema (40%) was the most common CT scan finding and the most common area is the parietal lobe (32%) followed by the occipital (8%) and frontal 4% and all lobes (1%).

Conclusions: CT scan findings provide valuable information about the neurovascular complication in eclampsia patients, early diagnosis and prompt management of these complications will reduce maternal and perinatal mortality to some extent.

Keywords: CT scan, Eclampsia, Brain lesion

INTRODUCTION

Eclampsia is characterized by sudden onset of generalized tonic-clonic convulsions or coma in pregnancy or postpartum, unrelated to other cerebral conditions in the patients with signs and symptoms of preeclampsia.¹ Hypertensive disorders are considering one of the major causes of maternal and perinatal morbidity and mortality around the world.

Depending on the time of occurrence of convulsions before during or after labor eclampsia is designated as antepartum intrapartum or postpartum eclampsia. Literature ranges 38-53% antepartum, 15-20% intrapartum (or) and 11-44% in the postpartum period. Post-partum

eclampsia occurs within the first 48 hours, few cases may present beyond 48 hours to as late as 4 weeks in the postpartum period named as late postpartum encephalopathy. Eclampsia most commonly occurs in primigravida nearly 75% of all eclampsia cases. 56% of eclampsia are seen from 36 weeks of gestation to term.

Hypertensive disorders are the major cause of maternal and perinatal mortality and morbidity. Around 50,000 deaths were annually due to eclampsia.² Hospital incidence in India is between 1 in 500 to 1 in 30. Maternal mortality in India due to eclampsia is 2 to 30% and perinatal mortality is 30-50%.³

Eclampsia affects all the major organs that include the cardiovascular, hematological, renal, hepatic and

cerebrovascular system of which cerebrovascular complications are the major cause of death in eclampsia when promptly recognized and treated symptoms and radiological changes can be reversed in some women it can progress to ischemia massive infarction and deaths.^{4,5} Most common lesions are seen in the parieto-occipital lobe 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 the pathophysiology of eclampsia.⁶

The most frequently used imaging techniques are the computed tomography (CT) scan of the brain and magnetic resonance imaging (MRI) of the brain. CT scan majorly helps in diagnosing cerebral oedema and hemorrhage and other features suggestive of hypertensive encephalopathy.⁷ Patients with decreased levels of consciousness and focal neurological deficits should undergo a CT scan as a first choice to exclude major cerebrovascular complications. A cerebral CT scan may be normal or may reveal transient white matter hypo densities.

The main purpose of this study was to detect cerebrovascular abnormalities as early as possible and that may be treated early will decrease the maternal morbidity and mortality associated with this condition.

METHODS

This study was a prospective study of CT scan of brain conducted on 50 cases of eclampsia patients who were admitted at the department of obstetrics and gynecology at GGH, Guntur from January 2021 to June 2021 after approval by ethics committee the study population were chosen by random sampling, who were eclampsia patients admitted through emergency and also indoor patients who develop eclampsia after admission.

Inclusion criteria

Patients with eclampsia (at least one episode of seizures in women with more than 20 weeks of gestation or less than 6 weeks postpartum with blood pressure more than 140 mmHg and 90 mmHg with proteinuria.

Exclusion criteria

Women who were known cases of epilepsy with seizures due to metabolic disturbances, space-occupying lesions, intracerebral infections poisoning and trauma were excluded from the study.

A total of 50 patients were taken according to inclusion criteria. Information regarding age, parity and gestational age, previous medical or obstetric history was taken.

A detailed history of convulsions was noted. Basic investigations like urine albumin (by dipstick) are measured. Complete hemogram, platelet count, serum uric acid, serum creatinine, liver function test (LFT), renal

function test (RFT), were recorded. CT scan was done after stabilizing the patient with antihypertensive and magnesium sulphate (MgSO₄), after a confinement of the fetus.

RESULTS

CT scan of the brain was performed on 50 patients with eclampsia. The most common age group in the present study was in the range of 20-30 years (88%), <20 (10%), and >30 (2%) was represented in this study (Table 1).

Table 1: Demographic features and clinical types of eclampsia.

Age in years	No.	Percentage
<20	5	10
20-30	44	88
>30	1	2

Most of the patients in the antenatal period at the time of presentation are primi 28 (56%) second gravida 13 (26%) followed by third gravida 2 (4%) fourth gravida 7 (14%) (Table 2).

Table 2: Parity.

Parity	No.	Percentage
Primi	28	56
G2	13	26
G3	2	4
G4	7	14

Most of the patients in the antenatal period at the time of presentation, 34% of the patients in 29-36 weeks, 26% in 37 to 40 weeks and 28% in the postpartum period followed by 12% of patients in 20-28 weeks (Table 3).

Table 3: Gestational age.

Gestational age (weeks)	No.	Percentage
20-28	6	12
29-36	17	34
37-40	13	26
Postpartum period	14	28

In this study 60% of the patients are antepartum eclampsia, 12% intrapartum eclampsia, postpartum (28%) and both antepartum and postpartum is 12% (Table 4).

Positive findings were noted in 54% of patients. cerebral oedema was noted in 40%, hemorrhage in 4% and cerebral infarction in 2% of patients. One patient died because of a massive cerebral hemorrhage (Table 5).

The most common affected areas were the parietal region (32%) followed by the occipital region (8%) frontal region (4%) and all lobes (2%) (Table 6).

Table 4: Types of eclampsia.

Types of eclampsia	No.	Percentage
Antepartum eclampsia	30	60
Intrapartum eclampsia	6	12
Postpartum eclampsia	14	28
Both	6	12

Table 5: Distribution of brain lesions and brain areas in CT scan findings.

Brain lesions	No.	Percentage
Normal	27	54
Oedema	20	40
Hemorrhage	2	4
Infarction	1	2

Table 6: Brain areas.

Brain areas	No.	Percentage
Normal	27	54
Parietal	16	32
Occipital	4	8
Frontal	2	4
All lobes	1	2

DISCUSSION

Hypertensive disorders in pregnancy predominantly eclampsia was considered as the major cause of maternal and fetal morbidity in developing countries. The main etiology associated with this condition is abnormal placentation and hyper placentosis. Vasospasm which follows vasoconstriction as a result of severe hypertension is thought to cause local ischemia, arterial necrosis and distribution of the blood-brain barrier which leads to cerebral edema.⁸ These are due to irregularities in the autoregulation of cerebral circulation.⁹

The cerebral vasospasm produced by a combination of reactions to hypertension prostaglandin deficiency defects in the NOS gene coding for nitric acid synthesis and endothelial damage plays an important role in producing ischemia and infarction in the brain tissue.^{7,10} The impaired blood coagulation system and the abnormalities and deficiencies of platelets predispose to intracranial bleeds.¹¹

In the present study, 50 women with eclampsia were selected according to the inclusion and exclusion criteria and a CT scan of the brain was done. The findings obtained were analyzed. In the present study majority of the patients were in the 20-30 years age group (88%), and the most common are primigravidae (56%), this was similar to the findings of Patil et al.⁶

In this study majority of the patients were in the antepartum period at the time of presentation (60%), and 28% of patients were in the postpartum period at the time of presentation.

A study of 76 patients by Mc Kinney et al, showed that the incidence of brain regions involvement as parieto-occipital 98.7%, temporal 68.4%, thalamus 30.3%, cerebellum 34.2%, brain stem 18.4% and basal ganglia 11.8%.¹²

The present study was almost similar to the above study as parietal and occipital lobes represents 32% and 8%.

In the present study out of 23 positive CT scan findings patients, the most common CT scan findings were cerebral oedema, it was seen in 40%, next common was cerebral hemorrhage in (4%) and cerebral infarction in (2%) which are similar to the observations of Richard et al in which cerebral oedema was noticed in 63.79% of the patients.¹³

Bartynski et al described vasogenic oedema in parietal or occipital region 98%, frontal lobes 68%, inferior temporal lobes 40%, cerebellar hemispheres 30%, basal ganglia 14%, brain stem 13%, deep white matter 18% and splenium 10%.¹⁴

In this present study 46% of patients in positive CT scan findings group and 54% in negative CT group needed anti consultant intravenous levetiracetam in addition to MgSO₄ regimen for control of seizures and it was similar to the study by Chakravarthy et al.¹⁵ All patients were treated with anticonvulsant intravenous phenytoin.

In present study when we compared the maternal outcome with the type of CT scan changes one patient who was massive cerebral hemorrhage was expired. All other patients who have cerebral edema 20 (40%) and one has minimal cerebral hemorrhage 4% (2) were recovered which was similar to observation notices by Milliez et al.¹⁶

CONCLUSION

The present study gives evidence that cerebral oedema was the most common cerebral lesion followed by hemorrhage and infarction. The most common affected brain areas are the parietal region followed by the occipital, frontal and temporal regions.

CT scan of the brain can provide lesions in eclampsia, early detection and prompt management of these conditions will prevent long term neurological sequel and reduce maternal mortality and morbidity. Hira and Moodley have shown that CT does change management in 27% of eclamptic mothers which is statistically significant.¹⁷

Early recognition of the disorder and prompt management by control of blood pressure, removal of the offending medications or treatment of associated disease is essential to prevent irreversible brain damage.

Hence, CT scan should be a preferred guide to diagnose and detect pathological brain lesions and early management of these conditions will reduce maternal morbidity and mortality.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Bhide A, Arulkumaran SS, Damania KR, Daftary SN. Arias practical guide to high-risk pregnancy and delivery. A south Asian perspective. 4th edition. 2015;185-232.
2. Das R, Biswas S. Eclampsia; the major cause of maternal mortality in Eastern India. *Ethiop J Health Sci.* 2015;25(2):116.
3. Dutta DC. Hypertensive disorders of pregnancy. Textbook of obstetrics. 8th edition. Jaypee Brothers Medical Published (p) Ltd. 2015;271.
4. Micheal BB. Eclampsia. *Emer Med J.* 2000;74:1-10.
5. Patil MM. Role of neuroimaging in patients with atypical eclampsia. *J. Obste Gynecol India.* 2012;62(5);526-30.
6. Royburt M, Seidman DS, Serr DM, Mashlach S. Neurologic involvement in Hypertensive disease of pregnancy. *Obstet Gynecol Surv.* 1991;46:656-64.
7. Zhu XW. Cerebral lesions in severe PIH. 61 cases study with computed tomographic scan. *Zonghua Chan KC ZA Chi.* 1991;28(5):275-7313.
8. Will AD, Lewis KL, Hinshaw DB Jr, Jordan K, Cousins LM, Hasso AN, et al. Cerebral vasoconstriction in toxemia. *Neurology.* 1987;37:1555-7.
9. Strandgaard. S. The lower and upper limbs for auto regulation of cerebral blood flow. *Stroke.* 1973;4:323.
10. Qurashi AI, Frankel MR, Ottenlips JR. Cerebral hemodynamics in pre-eclampsia and eclampsia. *Aech Neurol.* 1996;53:1226-31.
11. Gant. NF, Daley GC, Chand S Whalley PJ, Mac Donald PC. A Study of angiotensin II!, pressure response throughout primi gravid pregnancy. *Jclin Invest.* 1973;52:2682.
12. Mc Kinney AM, Short J, Jruwit CL, MC Kinney ZJ, Kozak OS, Santa KS, et al. Posterior reversible encephalopathy syndrome: Incidence of atypical regions of involvement and imaging findings. *Am J Roentgenol.* 2007;189:104-12.
13. Richards A, Graham D, Bullock R. Clinicopathological study of neurological complications due to hypertensive disorders of pregnancy. *J Neurol Neurosurg Psychiatry.* 1988;51(3):446-21.
14. Bartynski WS, Boadman JF. Distinct imaging patterns and lesions distribution in posterior reversible encephalopathy syndrome. *Am J Neuro Radiol.* 2007;28:1320-7.
15. Chakravarthy A, Chakrabarty SD, The neurology of eclampsia: some observations. *Neural India.* 2002;50(2):128-35.
16. Milliez J, Dohoun A, Boudra M. Computed tomography of brain in eclampsia. *Obstet Gynecol.* 1990;75(6):975-80.
17. Hira B, Moodley J. Role of cerebral computerized tomography scans in eclampsia. *J Obstet Gynecol.* 2004;2(7):778-9.

Cite this article as: Madhavi KN, Karuna G, Sivaranjani BSV, Sreevalli M. Computed tomography brain scan findings in eclampsia. *Int J Reprod Contracept Obstet Gynecol* 2023;12:xxx-xx.