

# Comparison of CT and MRI Imaging of Eclampsia with its Clinical Implications

Karnawat Shekhar<sup>1</sup>, Apurva Vohra<sup>2</sup>

<sup>1</sup>Professor and HOD, Department of Radiology, Ananta Institute of Medical Sciences and Research Center, Rajsamand,

<sup>2</sup>Associate Professor, Department of Radiology, Ananta Institute of Medical Sciences and Research Center, Rajsamand.

**Corresponding author:** Apurva Vohra, Associate Professor, Department of Radiology, Ananta Institute of Medical Sciences and Research Center, Rajsamand.

**How to cite this article:** Karnawat Shekhar, Apurva Vohra. Comparison of CT and MRI imaging of eclampsia with its clinical implications. *International Journal of Contemporary Medicine Surgery and Radiology*. 2018;3(1):5-7.

## A B S T R A C T

**Introduction:** One of the multisystem disorders that complicate considerable number of pregnancies in Western countries is Eclampsia. MRI studies of eclampsia describe these as a result of vasogenic edema induced by vasospasm and other changes contributing to pathophysiology of eclampsia. Hence, we conducted the present study to comparatively evaluate eclampsia with various cerebral imaging techniques, along with its clinical implication.

**Material and methods:** The present study included assessment of 30 patients who fulfilled the diagnostic criteria of eclampsia. MRI followed by CT was done in all the patients. Finally specificity and sensitivity of MRI and CT were evaluated by using multivariate regression curves and one Way ANOVA.

**Results:** Headache and multiple seizure episodes were the most commonly seen signs and symptoms seen in 22 and 20 patients respectively. Sensitivity of MRI was found to be above 90% and specificity was found to be 100% with positive predictive value of 100%.

**Conclusion:** In comparison to CT, MRI had more than 90% sensitivity and 100% specificity and hence it is a superior alternative for imaging in an eclamptic patient.

**Key words:** Computed Tomography, Eclampsia, Magnetic Resonance Imaging

## INTRODUCTION

Eclampsia is a multisystem disorder that complicates considerable number of pregnancies in Western countries and it is the chief source of morbidity and mortality around the globe. Overall, 10%–15% of maternal deaths are directly associated with pre-eclampsia and eclampsia. Some epidemiological findings support the hypothesis of a genetic and immunological etiology.<sup>1-3</sup> The risk of pre-eclampsia is 2-fold to 5-fold higher in pregnant women with a maternal history of this disorder. Depending on ethnicity, the incidence of pre-eclampsia ranges from 3% to 7% in healthy nulliparas and 1% to 3% in multiparas. Moreover, nulliparity and a new partner have been shown to be important risk factors.<sup>4-6</sup> MRI studies of eclampsia describe these as a result of vasogenic edema induced by vasospasm and other changes contributing to pathophysiology of eclampsia.<sup>7,8</sup>

Hence, we conducted the present study to comparatively evaluate eclampsia with various cerebral imaging techniques, along with its clinical implication.

## MATERIAL AND METHODS

The present study was initiated in the department of gynaecology and radiology of medical institute and included assessment of 30 patients who fulfilled the diagnostic criteria of eclampsia. Ethical approval was taken from institutional ethical committee and written consent was obtained after explaining in detail the entire research protocol. Exclusion

criteria for the present study included;

- Patients with history of any other systemic illness,
- Patients with any known drug allergy,
- Patients with known cause of migraine, seizure or any other intra-cranial lesion,
- Patients having metallic implants anywhere in the body,
- Patients having claustrophobia

MRI followed by CT was done in all the patients. Complete blood count, platelet count, urine albumin and other biochemical tests was done in each of these patients. As per hospital protocol, the patients were managed.

## STATISTICAL ANALYSIS

Specificity and sensitivity of MRI and CT were evaluated by using multivariate regression curves and one Way ANOVA.

## RESULTS

Sensitivity of MRI was found to be above 90% and specificity was found to be 100% with positive predictive value of 100%. Neurological signs and symptoms among patients in the present study are shown in Table 1. Headache and multiple seizure episodes were the most commonly seen signs and symptoms seen in 22 and 20 patients respectively. Visual complaints and speech abnormality were the other commonly seen neurological signs and symptoms.

## DISCUSSION

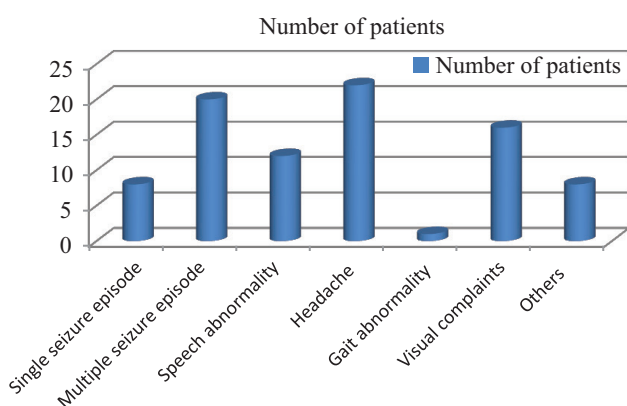
In the present study, we comparatively evaluated eclampsia

Signs and symptoms	Number of patients
Single seizure episode	8
Multiple seizure episode	20
Speech abnormality	12
Headache	22
Gait abnormality	1
Visual complaints	16
Others	8

**Table-1: Neurological signs and symptoms**

CT findings	MRI findings		Total
	MRI positive	MRI negative	
CT positive	21	0	21
CT negative	3	6	9
Total	24	6	30

**Table-2: Specificity and sensitivity of CT and MRI**



**Figure-1: Neurological signs and symptoms**

with various cerebral imaging techniques, along with its clinical implication. We observed that sensitivity of MRI was more than 90% were as specificity was 100%. Hence for the investigation of eclamptic patients, MRI is a useful modality. Chang WN et al evaluated the brain lesions of eight eclamptic patients with computed tomogram (CT) and magnetic resonance imaging (MRI) and correlate their radiologic lesions with the neurologic symptoms. They recorded and followed up the neurologic presentations of eight eclamptic patients. They received brain CT and MRI the first two days after the development of seizures, then follow-up study of the brain lesions with MRI. Correlation of their radiologic brain lesions with neurologic presentations was also done. Radiologic studies of these patients showed hypoxic-ischemic brain lesions and brain edema involving the temporo-parieto-occipital junctions; these lesions were bilateral and relatively symmetrical in distribution. Other involved regions of the brain included the basal ganglia, periventricular white matter, internal and external capsules and scattered lesions involving various lobes. Almost all the radiologic brain lesions had had total resolution in the follow-up MRI study. Besides generalized tonic-clonic seizure, the other neurologic presentations included headache, blurred vision, and dizziness. Although the brain lesions involved many regions, the temporo-parieto-occipital junction is the most frequently involved area. The incidence

of appearance of brain lesions in radiologic study is greatly affected by the temporal relationship of the scan to the development of seizure. Visual disturbance and headache have a good correlation with radiologic findings, i.e. occipital lobe involvement and diffuse brain edema, respectively. However, some of the other neurologic presentations do not have comparable radiologic lesions.<sup>9</sup>

Hiremath R et al evaluate spectrum of causes and their characteristic findings in peripartum head ache and seizures on computed tomography and magnetic resonance imaging. The study included a total of Forty subjects with peripartum headache and seizures and underwent computed tomography and magnetic resonance imaging for a duration of 1 year. Subjects between 18 to 38 years of age were included in the study. There was a history of eclampsia in 15 subjects and remaining 25 patients had normal blood pressure. There were no brain parenchymal or cerebral vascular abnormalities on imaging amongst 9 subjects. Eleven patients showed features of eclamptic encephalopathy. There were 17 patients who showed cortical venous thrombosis with 14 patients having parenchymal changes. One patient each had signs of meningoencephalitis, ischemic watershed territory infarct and region of gliosis. Eclamptic encephalopathy and cortical venous thrombosis are considered as the major reasons for post partum headache and seizures. Use of CT and MRI in the early time of the disease helps in identifying the lesion and reaching to the appropriate treatment.<sup>10</sup> Patil MM et al studied the neuropathophysiology behind an eclamptic seizure to reduce the morbidity associated with it. Prospective study design included 30 patients for the study. All patients were admitted in the eclampsia room with h/o convulsions. All patients were put on MgSO<sub>4</sub> therapy and antihypertensives. The patients who are refractory to the treatment such as having recurrent convulsions despite therapy MgSO<sub>4</sub> were selected for neuroimaging with CT scan. Neuroimaging is done using Phillips Tomoscan CT scanner where slices of 10-mm thickness were taken through the entire brain in the transaxial plane. Abdomen shielding is done with lead shield to prevent radiation hazard. Eclampsia patients who were refractory to the treatment with MgSO<sub>4</sub> and antihypertensives have been found to have very significant and morbid CNS pathological conditions. Neuroimaging in these patients have done a pivotal role in identifying the abnormality and rectifying it with medical means which had definitely improved patient's condition and have reduced morbidity.<sup>11</sup>

Lakhdar R et al investigated the clinical and imaging features cerebrovascular complications during pregnancy and in post partum period. A retrospective study was performed from November 2002 to October 2010. The imaging modalities like cerebral computed tomography (CCT) with and without contrast was done in 94% of cases, magnetic resonance imaging (MRI) was done in in 30.6% of cases that were completed by venous angiography, MRI in 27.2% of the cases and angiography MRI of Willis polygon in 11.3% of cases and by cerebral angiography in 13.6% of cases. Posterior reversible encephalopathy syndrome (PRES) is diagnosed in 61.4% of cases followed by meningo-cerebral haemorrhage (MCH) in 2 was done amongst 9.5% and finally

cerebral venous thrombosis (CVT) and arterial ischemia was performed amongst 4.5% of cases each one. The cerebrovascular complications were seen in 86.3% of the cases during the postpartum period and they were associated with the eclampsia or preeclampsia amongst 90.9% of the cases. It was confirmed that the presence of hematoma in the 13 subjects with MCH and there was a presence of hypodense lesion in one case with ischemic stroke. CCT show direct and indirect signs of cerebral venous thrombosis. MRI confirmed the diagnostic of PRES and showed cortical subcortical hyper signal on T2 and FLAIR and hypo signal on T1 sequences. There were presence of hemorrhagic lesion in 2 cases of MCH, thrombosis in the case of cerebral venous thrombosis and ischemic lesion in the case of ischemic stroke. Early recognition of stroke during the peri partum period by cerebral imaging is of great importance for quick diagnosis and treatment in order to improve the maternal morbidity and mortality.<sup>12</sup>

## CONCLUSION

From the above results, the authors conclude that in comparison to CT, MRI had more than 90% sensitivity and 100% specificity and hence it is a superior alternative for imaging in an eclamptic patient.

## REFERENCES

1. Sibai B, Dekker G, Kupferminc M. Pre-eclampsia. *Lancet*. 2005;365(1):785–799.
2. Pottecher T, Luton D. *Prise en Charge Multidisciplinaire de la Prééclampsie*. French. Issy Les Moulineaux, France: Elsevier; Masson SAS; 2009.
3. Carty DM, Delles C, Dominiczak AF. Preeclampsia and future maternal health. *J Hypertens*. 2010;28(3):1349–1355.
4. Duley L. The global impact of pre-eclampsia and eclampsia. *Semin Perinatol*. 2009;33(5):130–137.
5. Zhang J, Zeisler J, Hatch MC, Berkowitz G. Epidemiology of pregnancy-induced hypertension. *Epidemiol Rev*. 1997;19(6):218–232.
6. Huppertz B. Placental origins of preeclampsia: challenging the current hypothesis. *Hypertension*. 2008;51(4):970–975.
7. Sohlberg S, Mulic-Lutvica A, Lindgren P, Ortiz-Nieto F, Wikstrom AK, Wikstrom J. Placental perfusion in normal pregnancy and early and late preeclampsia: a magnetic resonance imaging study. *Placenta*. 2014;35(3):202–206.
8. Valensise H, Vasapollo B, Gagliardi G, Novelli GP. Early and late preeclampsia: two different maternal hemodynamic states in the latent phase of the disease. *Hypertension*. 2008;52(5):873–880.
9. Chang WN1, Lui CC, Chang JM. CT and MRI findings of eclampsia and their correlation with neurologic symptoms. *Zhonghua Yi Xue Za Zhi (Taipei)*. 1996;57(3):191–7.
10. Hiremath R, Mundaganur P, Sonwalkar P, N S V, G S N, P S. Cross Sectional Imaging of Post Partum Headache and Seizures. *Journal of Clinical and Diagnostic Research: JCDR*. 2014;8(12):RC01-RC05.
11. Patil MM. Role of Neuroimaging in Patients with

Atypical Eclampsia. *Journal of Obstetrics and Gynaecology of India*. 2012;62(5):526–530.

12. Lakhdar R1, Baffoun N, Hammami N, Nagi S, Baccar K, Drissi S, Kaddour C. Neuroradiological pattern of peripartum cerebrovascular disease medicating transfer to determine care unit. *Tunis Med*. 2012;90(3):223–32.

**Source of Support:** Nil; **Conflict of Interest:** None

**Submitted:** 16-11-2017; **Published online:** 28-12-2017