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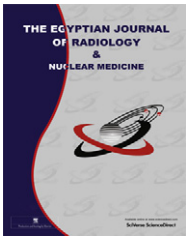

ORIGINAL ARTICLE

Posterior reversible encephalopathy syndrome with atypical regions in eclamptic patients: A challenge for radiologists

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KEYWORDS

PRES;
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Abstract *Purposes:* To determine the distribution and incidence of atypical regions of involvement of PRES in eclapmtic patients by using MR imaging.
Material and methods: A prospective study was approved by the ethical committee of our institution during the period between October 2011 and March 2012. Twenty two registered eclamptic patients (age ranged from 20–38 years; average 29 years) who had clinical signs and symptoms of PRES were recruited in the study, all patients were referred from Gynecology and Obstetric department, for brain MRI to evaluate PRES after clinical suspicion. All images were reviewed for the presence of high signal intensity on FLAIR and T2WI, for the severity of the vasogenic brain edema, on the basis of the extent of hyperintensity on FLAIR imaging. DWI was also interpreted for the presence or absence of areas of restricted diffusion corresponding to the hyperintensity areas on T2WI and FLAIR images.
Results: The most common clinical presentations were seizures, and altered mental status seen in 11 patients (50%). Other clinical presentations included headache (4 [18.1%]), visual disturbance in one patient and loss of consciousness in one patient. Most commonly involved location was the parieto-occipital brain region, which was seen in 19 (86.3%) of the (22) patients. This was followed by the frontal lobe in 13 patients (59%), the temporal lobe in 3 (13.6%), Basal Ganglia in 3 patients and cerebellum in 3 patients, 11 (50%) had subcortical involvement of white matter edema and 9 (40.9%) had cortical involvement. Lesions were asymmetric in nearly half of the cases (n = 10[45.5%]), unilateral in 3 patients. Restricted diffusion was present in 9 patients (40.9%),

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and no hemorrhage was present in all patients. As regarding severity of edema in FLAIR, half of patients had moderate edema ($n = 11$) while only 2 patients had severe edema and 9 had mild edema.

Conclusion: PRES can affect anterior circulation structures and atypical regions fairly frequent than commonly known. However, a posterior predominance is certainly seen in each lobe. Atypical regions of involvement represents a challenge for radiologist and necessitate strict clinical correlation and follow up.

1. Introduction

Eclampsia is clinically defined as seizure or coma, which is associated with pregnancy-induced hypertension (1). The incidence of eclampsia becomes high in the developing countries, in Egypt, the incidence range from 1.8% to 7.1% (2).

Posterior Reversible Encephalopathy Syndrome (PRES) is a diverse clinicoradiologic syndrome with diverse clinical presentations and characteristic MRI features (3). It is described as a reversible neurologic syndrome with a variety of presenting symptoms; the patients typically manifested by headache, altered mentation, visual disturbance, severe hypertension, and generalized seizures (4).

PRES is commonly identified in patients with eclampsia, and in those who have undergone organ transplantation (5). Also it has reported in patients with other pathologic entities such as Wegener granulomatosis, systemic lupus erythematosus (SLE), nonspecific renal inflammatory conditions (glomerulonephritis, hepatorenal syndrome), hypertension, and postchemotherapy (5).

The exact mechanism of PRES is still unknown, however it may be due to cytotoxic effects on the vascular endothelium that lead to increase permeability and vasogenic edema, other possibility includes impairment of the cerebral autoregulation with disruption of the blood–brain barrier. The predilection for the posterior circulation and watershed zones is believed to be related to its sparse vasomotor sympathetic innervation (6,7).

The typical MR imaging findings in patients with eclamptic encephalopathy include low signal intensity on T1-weighted images and high signal intensity on FLAIR and T2-weighted images in the parieto-occipital cortical and subcortical white matter. Lesions typically show no diffusion restriction (1).

Recently, however, there have been many reports on atypical manifestations of PRES in which main lesions were discovered in areas of the brain other than the parieto-occipital lobes, (8–10) such as brainstem, basal ganglia, and cerebellum (11). The atypical imaging appearances include contrast enhancement, hemorrhage, and restricted diffusion on MRI (11). The atypical form of PRES is very difficult to distinguish from other diseases of the brain that shows similar imaging findings such as anoxic encephalopathy, Central Pontine Myelinolysis (CPM), Extrapontine Melinolysis (EPM), hypoglycemic encephalopathy, and deep venous thrombosis (12).

The aim of this study was to determine the distribution and incidence of atypical and typical regions of involvement of PRES in eclapmtic patients by using MR imaging.

2. Patients and methods

2.1. Patients

This study has approved by the ethical committee of our institution during the period between October 2011 and March 2012. Twenty-two eclamptic patients were included in this study (age ranged from 20 to 38 years; average 29 years) who had clinical signs and symptoms of PRES , all patients were referred from the Gynecology and Obstetric department, for brain MRI to evaluate PRES after clinical suspicion.

2.2. Inclusion criteria

Inclusion criteria for the confirmation of PRES were based on complete or partial expression of the typical PRES pattern, reversibility of the findings of suspected PRES on follow-up MR imaging, when available ($n = 9$), or on clinical symptom resolution with complete return to baseline neurologic status ($n = 13$) (when follow-up MR imaging was unavailable).

2.3. Exclusion criteria

Eclamptic patients lacking both clinical and MR imaging follow-up were excluded from this study. Eclamptic patients with contraindications to MRI examination and patients with other brain diseases that mimic PRES were also excluded.

2.4. MRI technique

MRI examination of the brain was performed without *intravenous contrast* for all patients in this study using 1 Tesla closed MR Imager (Gyroscan, Intera, Philips, Netherlands) and a standard head coil. The utilized protocol included unenhanced axial T1-weighted and FLAIR images, axial and coronal T2-weighted images in all patients, with diffusion-weighted imaging (DWI) in all patients. The MRI examination included only the brain and it did not extend to involve the Spinal Cord.

2.4.1. Sequence parameters

All MRI sequences have been obtained with spin echo or turbo spin-echo with an acquisition matrix of 256×256 pixels. T2-weighted images (TR/TE = 2233/110), T1-weighted images (TR/TE = 537/15) and FLAIR images (TR/TE = 6000/120, inversion time = 2000) have been obtained with 5-mm slice thickness, 1-mm inter-slice gap and 230 mm FOV. DWI has performed with the following parameters: Line scan pulse sequence with b-value of 0 and 900 s/mm2, superior–inferior direction of diffusion encoding gradient, TR/TE = 334/137,