Original Article

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Reversible Posterior Leukoencephalopathy Syndrome (RPLS) in Late Onset Postpartum Eclampsia- A Retrospective Study

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Abstract

Background: Reversible posterior leukoencephalopathy syndrome (RPLS) or Posterior reversible encephalopathy syndrome (PRES) is a unique clinicoradiologic entity characterized by acute onset headache, seizures, blindness and altered mental state associated with reversible vasogenic edema of the brain. It is a major complication of eclampsia, but data on clinicoradiological features of PRES in late-onset postpartum eclampsia are scarce. The objective is to analyze the clinicoradiologic features and outcome in a cohort of late postpartum eclampsia patients with PRES. **Subjects and Methods:** Eighteen patients of late postpartum eclampsia with clinical as well as neuroimaging features consistent with PRES were included in this retrospective study. All had undergone magnetic resonance imaging (MRI) with diffusion-weighted imaging (DWI) and apparent diffusion coefficient(ADC) mapping. Data on age, antepartum history, peak systolic and diastolic blood pressures, clinical features, time to neuroimaging, location of lesions on brain imaging and presence of associated ischemia or hemorrhage in MRI were collected and analyzed. **Results:** The mean age was 25.72± 3.23 years. The average duration between labor and clinical symptoms was 8.5 days. 13/18 patients (72.2%) had elevated blood pressure at admission. Mean systolic and diastolic blood pressures were 143.88 (120-180) and 93.88 (80-100) mm Hg respectively. Headache was the presenting feature in 16 patients. The parieto-occipital regions were the most frequently involved followed by the cerebellum (7/18) and frontal lobe (4/18). Atypical regions were not involved. Clinical recovery had been noted in all. **Conclusion:** PRES associated with late postpartum eclampsia, an entity of limited awareness can present without antecedent preeclampsia. Radiological changes are the key to early diagnosis.

Keywords: Posterior reversible encephalopathy syndrome, Eclampsia, Postpartum period

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Introduction

Reversible posterior leukoencephalopathy syndrome (RPLS) or Posterior reversible encephalopathy syndrome (PRES) is a clinical as well as a radiologic entity associated with diverse etiologies, among which eclampsia is one of the most common. Most cases of preeclampsia and eclampsia occur between the 20th week of pregnancy and 48 hours postpartum. Late postpartum eclampsia (LPE), which presents between 48 hours to 4 weeks postpartum is quite uncommon and poses a diagnostic challenge since many cases present without prior preeclampsia.[1] While recent reports have shown the frequent occurrence of PRES in eclampsia, PRES concurrent with late postpartum eclampsia is relatively rare and literature is limited to few case reports.[2–4]

The objective of the present study was to analyze the clinicoradiologic features and outcome in a cohort of late postpartum eclampsia patients with PRES.

Subjects and Methods

This retrospective study was carried out from a tertiary care center in South India. Patient recruitment and data collection were carried out using electronic medical records. Inclusion criteria were 1) acute/ subacute onset of neurologic symptoms like seizures, headache, altered sensorium, vision disturbance or focal deficit in the late postpartum period (48 hours to 4 weeks). 2) Neuroimaging features suggestive of PRES namely focal or diffuse vasogenic edema otherwise unexplained. Exclusion criteria were patients with brain edema secondary to ischemic, inflammatory, infectious or hemorrhagic causes.

All patients had undergone magnetic resonance imaging (MRI) with diffusion-weighted imaging (DWI) and apparent diffusion coefficient(ADC) mapping to distinguish vasogenic from cytotoxic cerebral edema. The study was approved by and conducted in accordance with Institutional ethics committee requirements.

The medical records were reviewed and data on the following variables were noted. Age, Antepartum details (parity, prior hypertension), time since delivery, clinical symptoms and signs at presentation including blood pressure at admission. The time to neuroimaging, topography of lesions in brain imaging and the presence of associated ischemia or hemorrhage in MRI were documented. Statistical analysis was performed with Statistical Package for Social Sciences (SPSS, SPSS Inc., Chicago.IL, USA) version 24. Descriptive statistics were presented as mean±SD. Qualitative variables were represented in the form of frequencies and percentages.

Results

Eighteen patients were included and the mean age was 25.72± 3.23 years (range: 21-32 years). The average duration between labor and clinical symptoms was 8.5 days. 13/18 Patients (72.2%) had elevated blood pressure at admission. Mean systolic and diastolic blood pressures were 143.88 (120-180) and 93.88 (80-100) mm Hg respectively. 2 patients had a history of mildly elevated blood pressure in the antepartum period, but none had associated edema or proteinuria and were not on medications. Headache was the presenting feature in 16 patients and seizures were encountered in 14 patients. [Table 1] shows the clinical features among patients during the course of the illness.

[Table 2] shows the imaging features of patients studied. The parieto-occipital regions were the most frequently involved followed by the cerebellum (7/18), frontal lobe (4/18) and the temporal lobe (1/18). These regions had hyperintensities on T2-weighted images as well as fluid-attenuated inversion recovery (FLAIR) sequences in MRI. [Figures 1 & 2] Diffusion-weighted imaging (DWI) revealed high signal intensity with no regions of restricted diffusion while apparent diffusion coefficient (ADC) mapping did not show corresponding low signal intensity suggestive of vasogenic edema. The vasogenic edema in the frontal lobe was found to be linear along the superior sulcus. None of the patients had lesions in atypical locations such as basal ganglia or brainstem. One patient had focal cortical infarct with petechial hemorrhages in both parieto-occipital lobes. The mean duration between onset of symptoms and neuroimaging was 2.2 days.

The duration of follow up was variable (4 weeks- 6 months). Clinical recovery had been noted in all patients. Repeat imaging had been performed in 13 patients and the lesions had disappeared in all.

Table 1: Clinical findings of Patients with Late postpartum eclampsia

Clinical findings	Number of patients (n=18)
Headache	16
Seizures	14
Visual disturbances	9
Altered mental status	5
Focal neurologic deficit	2

Table 2: Location of abnormalities in brain imaging

Topography of lesion	Number of patients (n=18)
Parieto-occipital lobes	18
Cerebellum	7
Frontal lobe	4
Temporal lobe	1

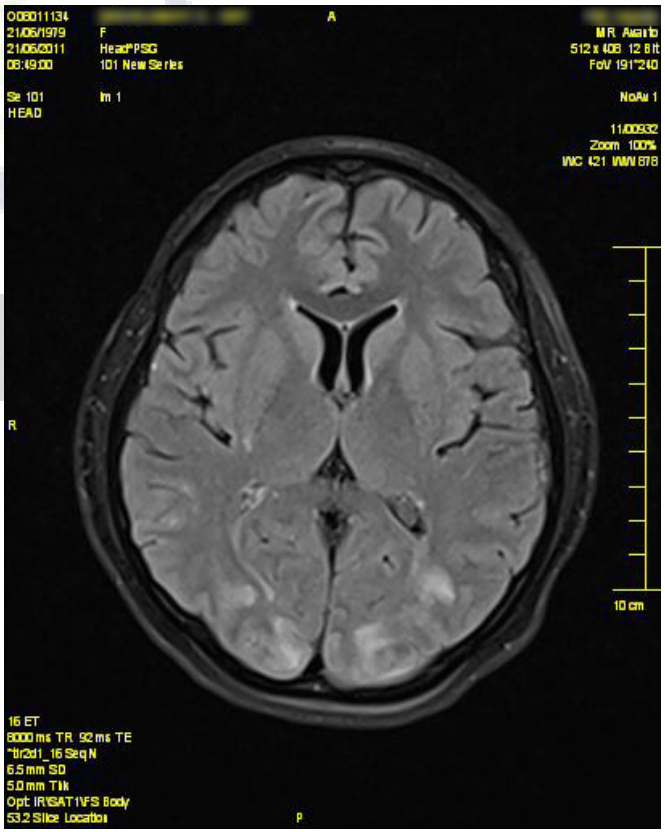

Figure 1: Axial MR image showinghyperintensities in bilateral parieto-occipital lobes on FLAIR sequence suggestive of vasogenic edema

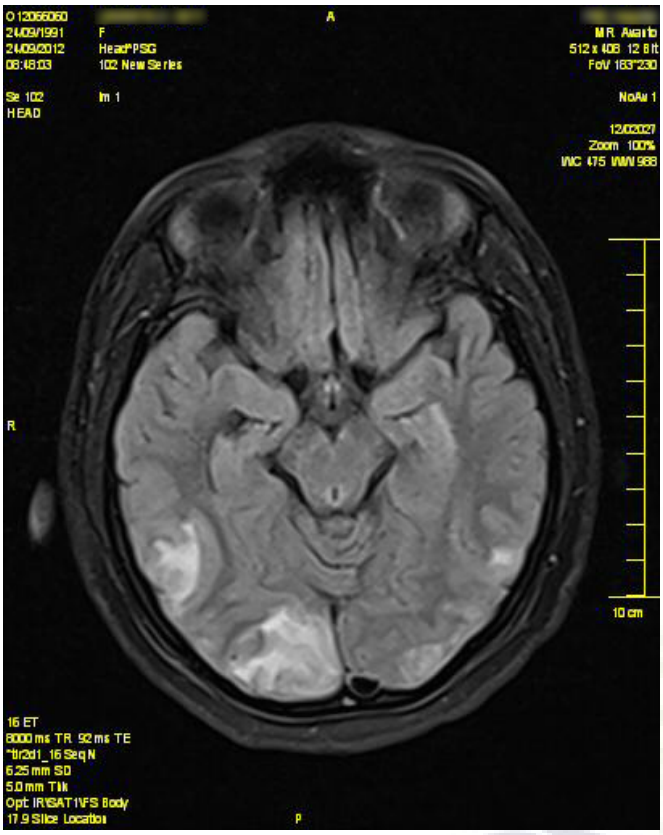

Figure 2: Axial MR image showing hyperintensities in bilateral occipital and posterior temporal lobes on FLAIR sequence suggestive of vasogenic edema

Discussion

PRES was first reported by Hinchey et al, as a form of reversible predominantly posterior leukoencephalopathy associated with characteristic neuroimaging features of subcortical edema without evidence of infarction.[5] MRI has a vital role in the diagnosis of this clinically inhomogeneous entity. PRES has been increasingly reported in several clinical conditions such as renal failure, hypertensive encephalopathy, allogenic bone marrow transplantation, immunosuppression and preeclampsia-eclampsia.[6]

Although the pathogenesis of PRES is controversial, hypertension and impaired cerebral autoregulation are critical events and eclampsia is a very common predisposing condition. A recent study has reported that PRES is a vital component in the pathogenesis of eclampsia.[7] Late postpartum eclampsia (LPE) differs from eclampsia not only in time course but also in the fact that it can present without a preceding preeclamptic state. Veltkamp et al reported imaging features suggesting PRES in two women with LPE in whom seizures manifested without preceeding preeclampsia.[8] In their series of four LPE patients, Raps et al found the absence of proteinuria in two patients. Edema was absent in three of four patients studied.[9]

This retrospective study reports the clinical and radiological findings of 18 patients with late postpartum eclampsia associated with PRES. Nearly 70% of patients had elevated blood pressure at admission. An acute increase in blood pressure that extends beyond the upper limit of autoregulation with subsequent hyperperfusion resulting in a breakdown of the blood-brain barrier is a widely accepted theory behind PRES.[10,11] This theory is further supported by the observed increase in the diffusion of water (higher ADC) seen in PRES.[12] However the mean arterial pressure noted in our study was 108 mm Hg which is much lower compared to the upper limit of cerebral autoregulation. Schwartz et al have noted that edema of the brain at MR imaging in patients with eclampsia was related to abnormalities in markers of endothelial damage and not with the level of hypertension.[13] Endothelial dysfunction associated with eclampsia decreases the threshold for vasogenic edema and also leads to vasoconstriction and hypoperfusion. In contrast, Liman et al have noted higher mean arterial pressure in PRES associated with eclampsia.[14]

Regarding the topography of lesions, all patients had predominant posterior parietal-occipital lesions. The parietal occipital lobe is especially susceptible to vasogenic edema because of absence of a sympathetic tone in the vasculature of the basilar artery.[13,15] Cerebellum was the next most commonly affected region in our study. Dziewas et al have reported a higher frequency of cerebellar lesions in patients with LPE.[16] The frontal lobe was involved in 4/18 patients and edema was found to be linear along the superior sulcus. Bartynski et al have recognized superior frontal sulcal as one of the three distinct imaging patterns in PRES, encountered in 27% of patients.[6] Our findings reemphasize the fact that PRES is not an entirely posterior occurrence, but appears probably in a gradient-like fashion showing the gradient of sympathetic innervation.[17]

None of the patients with LPE had lesions in atypical locations like basal ganglia or brainstem. This can be attributed to the fact that our cohort of patients did not have an extreme elevation of blood pressures which is known to be associated with the involvement of atypical regions. Our observations are in concordance with that of Liman et al who has noted significant clinicoradiologic differences between eclampsia-related PRES and PRES due to other predisposing causes. PRES related to eclampsia is known to be associated with less severe edematous lesions in the brain, better reversibility and lower frequency of involvement of the brainstem.[18]

One patient in our study was found to have focal cortical infarct with petechial hemorrhages in both parieto-occipital lobes. The frequency of intracranial hemorrhage in association with PRES has been reported to vary between 15 to 32%.[11,19]

Clinical recovery was complete in all patients in our study and repeat MRI at follow-up in 13 patients showed resolution of lesions. Our findings are in agreement with other published reports of PRES in LPE.[8,16] A meta-analysis by Chen et al in 2018 has also reported that PRES is associated with a decreased risk of poor outcomes in individuals with preeclampsia-eclampsia.[20]

As far as we know this is the largest reported series of PRES in association with late postpartum eclampsia so far. The pitfalls of our study include its retrospective design and sample size which was limited. However considering the relatively infrequent occurrence of the disease and the fact that prospective studies are very few in this regard, retrospective studies seem to be the only evidence at present.

Posterior reversible encephalopathy syndrome in association with late postpartum eclampsia, an entity of limited awareness can present without antecedent preeclampsia. Radiological changes are the keys to early diagnosis. With prompt diagnosis and appropriate treatment, neurologic deficit and imaging findings are reversible.

Conclusion

PRES associated with late postpartum eclampsia, an entity of limited awareness can present without antecedent preeclampsia. Radiological changes are the key to early diagnosis.

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