ORIGINAL ARTICLE

Status Epilepticus as a Presenting Feature in Posterior Reversible Encephalopathy Syndrome: Tertiary Care Center Experience

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Abstract

Background: Though epileptic seizures are common in posterior reversible encephalopathy syndrome (PRES), status epilepticus (SE) as the presenting feature is rare.

Objective: To study the clinical spectrum and outcome of patients with SE as presenting feature of PRES.

Methods: This is a retrospective study. PRES was diagnosed based on the clinical features and imaging findings on brain MRI (n = 40) which became normal after 6 months follow-up imaging. Patients with SE as the initial manifestation of PRES were identified. Baseline information regarding the clinical presentation, etiology, past history of illness, treatment history, imaging findings, EEG and long-term clinical outcome.

Result: Seizure was the most common presentation seen in 31 patients (77.5%). The etiologies in PRES were preeclampsia, or eclampsia [n = 33 (82.5%)], hypertensive encephalopathy [n = 3 (7.5%)], systemic lupus erythematosus (SLE), AIP, and chronic renal failure (CRF) in one patient each [n = 01 (2.5%)]. Brain MRI showed the involvement of parieto-occipital lobes (n = 33 [82.5%]) mostly. Status epilepticus (generalized convulsive) was the presenting feature in eight cases (20%). Among them, five cases (0.5%) had a history of chronic epilepsy. In the remaining three patients, SLE and acute intermittent porphyria, CRF precipitated the SE.

Conclusion: The study highlights the clinico-etiological spectrum of PRES and the identification of SE within its context leading to the early diagnosis and management if treated early. The role of antenatal care is important for the identification and treatment of etiologies, blood pressure, proper antiepileptic drug compliance and appropriate counseling.

Keywords: Antenatal care, Autoimmune disorder, Eclampsia, Seizures, Status epilepticus.

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Highlights

Awareness of the varying spectrum of clinical presentations, and etiology of posterior reversible encephalopathy syndrome (PRES) leads to early diagnoses and management. The role of antenatal care is important for the identification and treatment of underlying etiologies, blood pressure control, ensurance of antiepileptic drug compliance, and adequate counseling.

Introduction

Posterior reversible encephalopathy syndrome is a clinicoradiological diagnosis. It includes varying neurological symptoms, such as encephalopathy, seizures, headache, and vision disturbances with classical imaging findings of reversible subcortical vasogenic edema without the infraction.[1,2] Preeclampsia or eclampsia, hypertensive emergencies, renal disease, sepsis, exposure to immunosuppressive agents, and rarely autoimmune disorder are the precipitating factors.[2–6] The most common radiologic involvement in PRES is typically the "posterior" parieto-occipital white matter but the atypical areas, such as the cortex, basal ganglia, frontal lobes, and the brain stem can also be involved.[1,7] PRES due to hypertension emergencies is due to failure of cerebrovascular autoregulation, resulting in vasogenic edema.[8] Though epileptic seizures are common in PRES, status epilepticus (SE) as the presenting symptom is rare. Status epilepticus, defined as the ongoing continuous seizure activity for at least 5 minutes (continuous) or as more than two motor seizures without full recovery of consciousness in the interval (intermittent),[9] have been described in 3[1]–13%[10] of patients. Early recognition of SE and its etiology is necessary for the timely management and its long-term sequelae. Published epidemiological data regarding incidence rates for seizure clusters, SE, and rare causes in PRES are scarce for the Indian population and a high index of suspicion will prevent missing the diagnosis.

Objective

To study the clinical profile and outcome of patients with SE as the presenting feature of posterior reversible encephalopathy syndrome.

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Methods

A retrospective study of the clinical profile of all patients diagnosed with PRES from 2015 to 2020 was performed at tertiary care centers neurology department Dr S.N. Medical College in Jodhpur, Rajasthan after taking proper consent and institutional ethics approval. STROBE guidelines have been followed (Supplementary Table 1). PRES was diagnosed based on the clinical features and imaging findings on brain MRI (n = 40) with complete resolution after 6 months follow-up. Patients with SE were identified. Status epilepticus was defined as 30 minutes of continuous seizure activity or a series of seizures without return to full consciousness between the seizures.[9]

Baseline information regarding the clinical presentation, etiology, past history of illness, treatment history, seizure phenotype, imaging findings, EEG and long-term clinical outcome were collected. Patients were treated and managed accordingly and were discharged. Follow-up was done at 3 months and 6 months either telephonically or physically in the neurology department. regarding the outcome of the illness. One was lost to follow-up.

Result

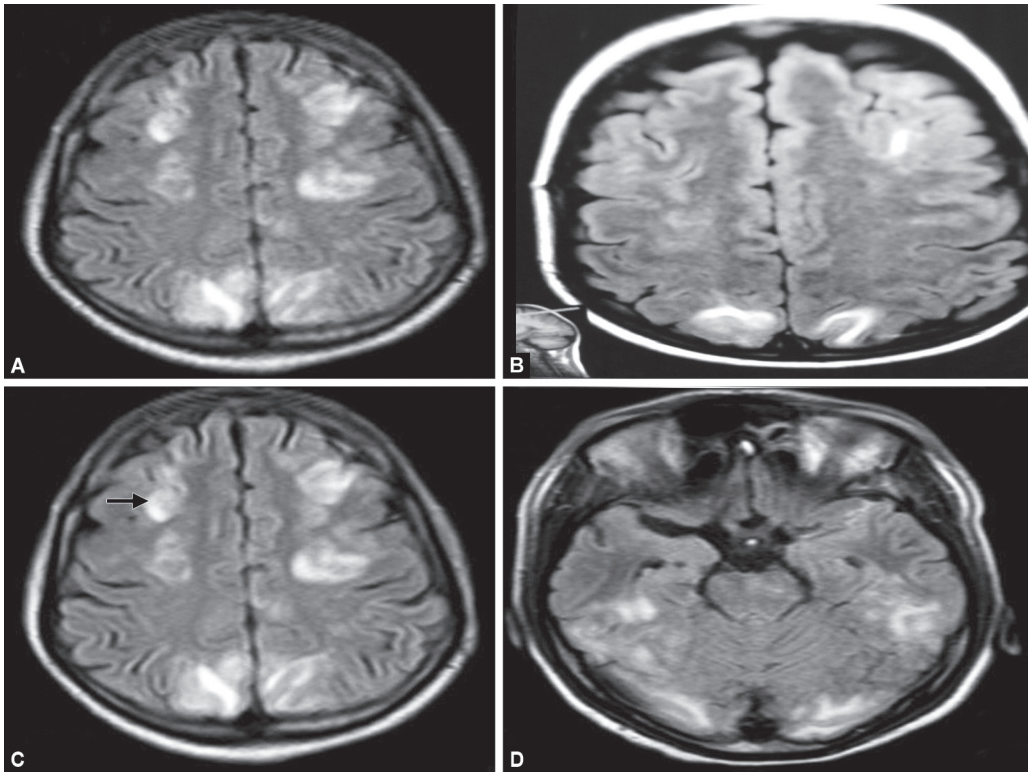
About 40 cases were diagnosed with PRES (Table 1), among which 36 were females and 4 were males. The mean age at presentation was 23 years in females and 46 years in males. Primary etiologies of PRES included preeclampsia, or eclampsia [n = 33 (82.5%)], hypertensive encephalopathy [n = 3 (7.5%)], systemic lupus erythematosus (SLE), acute intermittent porphyria (AIP), acute inflammatory demyelinating polyneuropathy (AIDP), and chronic renal failure (CRF) in one patient each [n = 01, (2.5%)]. The clinical features were seizures, seen in 31 patients (77.5%), headache [n = 16, (40%)], vomiting and altered sensorium in 7 patients each [17.5%]), vision loss (n = 6, [15%]), neurological deficit [n = 4, (10%)]. A single episode of seizure was seen in 11 patients (27.5%), more than one episode in 20 cases (50%), whereas SE was the presenting feature in 8 cases (20%) All had generalized convulsive SE. Among the patients presenting with SE, five cases [0.5%] had a history of chronic epilepsy who either were drug defaulters during pregnancy due to social norms, lack of counseling, or had an inadequate dose. The remaining three patients were diagnosed with SLE, CRF, and AIP respectively. Brain MRI showed the involvement of parieto-occipital lobes [n = 33 (82.5%)], frontal lobe [n = 10 (25%)], basal ganglia [n = 4 (10%)], cerebellum, corpus callosum in two patients each (5%), brain stem and temporal lobe [n = 1 each (2.5%)]. Brain MRI showed typical involvement like holo hemispheric pattern (Fig. 1A), bilateral occipital lobe involvement (Fig. 1B), superior sulcus pattern denoted by black solid arrow (Fig. 1C), and atypical involvement like bilateral temporo-cerebellar (Fig. 1D). Interictal EEG showed generalized spike and slow wave discharges in all patients. Etiologies of PRES were treated along with conservative management. Complete resolution of SE was achieved after adding antiepileptics and treating the etiology. Those diagnosed with SLE, CRF, AIDP, and AIP were treated with immunosuppressive drug, hemodialysis, intravenous immunoglobulin and intravenous injection of heme respectively in conjunction with antiepileptic drugs. All the patients who presented with SE were shifted to ICU among which three were intubated. The outcome of pregnancy was IUD in two cases and preterm in one case. There was one death due to sepsis. Though PRES carries a favorable prognosis, attention is rather needed when the presenting symptom is SE in order to treat urgently and find out the etiology.

Table 1: Clinical profile of patients with posterior reversible encephalopathy syndrome

Variables	*Number of patients [n (%)]*
Demographics	
Males	4
Females	36
Male:female	1:9
Mean age (male : female)	46:23 years
Clinical presentation	
Seizures	31 (77.5%)
Headache	16 (40%)
Vomiting	7 (17.5%)
Altered sensorium	7 (17.5%)
Visual disturbances	6 (15%)
Status epilepticus	8 (20%)
Neurological deficit	4 (10%)
Etiology	
Acute hypertension	3 (7.5%)
Pre-eclampsia or eclampsia	33 (82.5%)
Sepsis	0
Chronic renal failure	1 (2.5%)
Immunosuppression	0
Autoimmune disease	
SLE	1 (2.5%)
AIDP	1 (2.5%)
AIP	1 (2.5%)
Neuroimaging findings	
Parieto-occipital lobes	33 (82.5%)
Frontal lobe	10 (25%)
Temporal lobe	1 (2.5%)
Cerebellum	2 (5%)
Basal ganglia	4 (10%)
Brainstem	1 (2.5%)
Status epilepticus	
Semiology	
GTCS	8 (80%)
Precipitating factor	
H/o chronic epilepsy with antiepileptic drug defaulter	5 (62.5%)
SLE	1 (12.5%)
AIP	1 (12.5%)
CRF on hemodialysis	1 (12.5%)

Discussion

In India, there are about 10 million people living with epilepsy[11,12] in which around 2.73 million are women with epilepsy and 52% of them are in the reproductive (15–49 years) age group[13] PRES poses a diagnostic challenge because of the wide spectrum of presentations and etiologies. In our study, the incidence is more in females compared with males which were similar to the findings of Fugate et al.[14] (65%) and other studies like Vignatelli et al.[15]



Figs 1A to D: (A) Holo hemispheric pattern; (B) Bilateral occipital lobe involvement; (C) Superior sulcus pattern denoted by black solid arrow; (D) Bilateral temporo-cerebellar involvement

In our study, the most common clinical presentation was seizure, seen in 31 patients (77.5%). These findings are very similar to the study by Fugate et al.[14] (74%). Preeclampsia and eclampsia were the dominant factors responsible for seizures similar to other studies.[16,17]

Preeclampsia is defined as hypertension (blood pressure ≥140/90 mm Hg) and proteinuria (≥300 mg in a 24-hour urine collection) occurring after 20 weeks of gestation in a previously normotensive patient[18] whereas severe preeclampsia is defined as systolic blood pressure (SBP) of 160 mm Hg or greater, a diastolic blood pressure (DBP) of 100 mm Hg or greater, nephrotic-range proteinuria (>3.5 g/24-hour urine), impaired renal function, thrombocytopenia, and/or evidence of microangiopathic hemolytic anemia, hepatocellular injury, pulmonary edema, and neurologic disturbances.[19] It was estimated that mild preeclampsia and severe preeclampsia characterized by new-onset hypertension, proteinuria, and multisystem involvement, is responsible for substantial maternal and fetal morbidity and is a marker for future cardiac and metabolic disease. This American Society of Hypertension, Inc (ASH progress to convulsive form, i.e., eclampsia) in approximately 0.5% of the patients and 2–3% patients, respectively. Renal failure is a well-recognized entity and can be easily identified by raised creatinine level on a routine investigation. In our study, one patient was diagnosed with CRF and was put on three antihypertensive drugs. He defaulted the antihypertensive drugs which led to precipitation of the SE. Subsequently, he was treated with 5 drugs antihypertensive, hemodialysis, and antiepileptics.

There was another case of SLE who was diagnosed by clinical features and subsequent autoantibody panel. There have been cases reported with SLE presenting with PRES.[20]

Similar to one case report,[21] we had another young adolescent female presenting with abdominal pain with psychiatric behavior with hematuria with seizures. Urine porphyrins were positive. Acute intermittent porphyria was suspected and imaging showed bilateral posterior involvement, and was treated with hematinics and supportive management.

So one must definitely evaluate the causes of non-eclamptic patients in PRES.

In our study, 20% (n = 8) of cases presented initially with SE which led to the diagnosis of PRES. Five were in the antepartum period. Though seizures are a recognized entity in PRES, SE is rare. All of them presented with convulsive SE as an initial manifestation of PRES. Five patients had a history of chronic epilepsy and were treatment defaulters. Those women with epilepsy have a higher risk of seizures during pregnancy if they had a history of at least one seizure episode in the pre-pregnancy state.[22] On detailed history taking, three patients had stopped treatment on being pregnant with the social mindset notion that it is ominous to take any medicines. This was either due to a lack of antenatal checks or a lack of awareness among the doctors at the primary health care level and district hospital regarding the detailed evaluation of the patient and proper counseling. The remaining two patients had stopped treatment as they were seizure-free for 1 year and were lost to follow-up. All of them presented in the gynecological emergency department with SE and were managed with antiepileptics, magnesium sulfate, and supportive management. There was one preterm labor and intrauterine death in two cases. In the remaining three cases, SLE, AIP, and CRF precipitated the SE.

Several studies have been done but data regarding SE as a presenting feature in PRES are still lacking in the Indian perspective.

In a study by Kozak et al.,[10] majority of them had focal-onset complex partial SE, unlike our study which had generalized convulsive SE.

So, we need to be aggressive regarding awareness and management in order to decrease the mortality and morbidity despite SE being preventable. Thus, unawareness regarding the knowledge of epilepsy, treatment, and its effect during antepartum, intrapartum, and postpartum period, poor health infrastructure, social stigma, poverty, cultural beliefs, and shortage of trained professionals not only cause a poor impact on the maternal and child health but also contribute a treatment gap similar to other studies.[23,24]

Though the study had limitations like a small population ($n = 40$) and a short period (6 months), it gives valuable information not to be overlooked. Recognizing PRES early in eclampsia is important as control of blood pressure leading to the syndrome version. Non-eclamptic causes of PRES should be evaluated for autoimmune causes, such as AIDP, SLE, renal failure, immunosuppression, and AIP. SE can be the initial presentation of PRES and should be investigated for the etiology. Such patients should be managed aggressively. Patients with a history of chronic epilepsy should be warned about pregnancy-related complications. Atypical findings on imaging cannot exclude PRES when clinical features are suggestive of PRES.[25]

Lastly and most importantly, antenatal care plays a very crucial role in identifying and treating associated comorbidities. Blood pressure control, ensurance of proper compliance with antiepileptic drugs, immediate treatment of SE during this period, increasing the awareness of pregnancy-related complications. There is a need to empower primary healthcare workers by educating and training them in order to manage effectively thus decreasing the treatment gap significantly.[11]

Diagnosing PRES with SE as the presenting symptom is uttermost important because timely management of SE and its underlying cause can decrease mortality and morbidity.

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Supplementary Material

The Supplementary Table 1 is available on the website of www.ijccm.org

References

1. Gokhale A, Kimona A, Kantor S, Prakash S, Manhas Y. Posterior reversible leukoencephalopathy syndrome (PRES) in intensive care unit – Case series. Indian J Crit Care Med 2017;21:772–778. DOI: 10.4103/ijccm.IJCCM_235_17.
2. Goyal G, Jeswani J. Study of clinicoradiological profile in posterior reversible encephalopathy syndrome: An experience from North India. Indian J Crit Care Med 2022;26(4):501–505. DOI: 10.5005/jp-journals-10071-24172.
3. Hauser RA, Lacey DM, Knight MR. Hypertensive encephalopathy. Magnetic resonance imaging demonstration of reversible cortical and white matter lesions. Arch Neurol 1988;45(10):1078–1083. DOI: 10.1001/archneur.1988.00520340032007.
4. Raroque HG, Orrison WW, Rosenberg GA. Neurologic involvement in toxemia of pregnancy: reversible MRI lesions. Neurology 1990;40(1):167–169. DOI: 10.1212/wnl.40.1.167.
5. Bartynski WS, Boardman JF, Zeigler ZR, Shadduck RK, Lister J. Posterior reversible encephalopathy syndrome in infection, sepsis, and shock. AJNR Am J Neuroradiol 2006;27(10):2179–2190. PMID: 17110690.
6. Kur JK, Esdaile JM. Posterior reversible encephalopathy syndrome — An underrecognized manifestation of systemic lupus erythematosus. J Rheumatol 2006;33(11):2178–2183. PMID: 16960925.
7. Bartynski WS, Boardman JF. Distinct imaging patterns and lesion distribution in posterior reversible encephalopathy syndrome. AJNR Am J Neuroradiol 2007;28(7):1320–1327. DOI: 10.3174/ajnr.A0549.
8. Schwartz RB, Jones KM, Kalina P, Bajakian RL, Mantello MT, Garada B, et al. Hypertensive encephalopathy: findings on CT, MR imaging, and SPECT imaging in 14 cases. AJR Am J Roentgenol 1992;159(2):379–383. DOI: 10.2214/ajr.159.2.1632361.
9. Guidelines for epidemiologic studies on epilepsy. Commission on Epidemiology and Prognosis, International League Against Epilepsy. Epilepsia 1993;34(4):592–596. DOI: 10.1111/j.1528-1157.1993.tb00433.x.
10. Kozak OS, Wijdicks EFM, Manno EM, Miley JT, Rabinstein AA. Status epilepticus as initial manifestation of posterior reversible encephalopathy syndrome. Neurology 2007;69(9):894–897. DOI: 10.1212/01.wnl.0000269780.45472.16.
11. Santhosh NS, Sinha S, Satishchandra P. Epilepsy: Indian perspective. Ann Indian Acad Neurol 2014;17(Suppl 1):S3–S11. DOI: 10.4103/0972-2327.128643.
12. Gourie-Devi M, Gururaj G, Satishchandra P, Subbakrishna DK. Prevalence of neurological disorders in Bangalore, India: A community-based study with a comparison between urban and rural areas. Neuroepidemiology 2004;23(6):261–268. DOI: 10.1159/000080090.
13. Thomas SV. Managing epilepsy in pregnancy. Neurol India 2011;59(1):59–65. DOI: 10.4103/0028-3886.76860.
14. Fugate JE, Claassen DO, Cloft HJ, Kallmes DF, Kozak OS, Rabinstein AA. Posterior reversible encephalopathy syndrome: Associated clinical and radiologic findings. Mayo Clin Proc 2010;85(5):427–432. DOI: 10.4065/mcp.2009.0590.
15. Vignatelli L, Tonon C, D'Alessandro R. Bologna Group for the Study of Status Epilepticus. Incidence and short-term prognosis of status epilepticus in adults in Bologna, Italy. Epilepsia. 2003;44(7):964–968. DOI: 10.1046/j.1528-1157.2003.63702.x.
16. Brewer J, Owens MY, Wallace K, Reeves AA, Morris R, Khan M, et al. Posterior reversible encephalopathy syndrome in 46 of 47 patients with eclampsia. Am J Obstet Gynecol 2013;208(6):468.e1–e6. DOI: 10.1016/j.ajog.2013.02.015.
17. Bembalgi S, Kamate V, Shruthi KR. A study of eclampsia cases associated with posterior reversible encephalopathy syndrome. J Clin Diagn Res 2015;9(7):QC05–QC7. DOI: 10.7860/JCDR/2015/14039.6276.
18. Report of the National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy. Am J Obstet Gynecol. 2000 Jul;183(1):S1–S22.PMID: 10920346.
19. Lindheimer MD, Taler SJ, Cunningham FG, American Society of Hypertension. ASH position paper: Hypertension in pregnancy. J Clin Hypertens Greenwich Conn 2009;11(4):214–225. DOI: 10.1111/j.1751-7176.2009.00085.x.
20. Leroux G, Sellam J, Costedoat-Chalumeau N, Le Thi Huong D, Combes A, Tieulié N, et al. Posterior reversible encephalopathy syndrome during systemic lupus erythematosus: four new cases and review of the literature. Lupus 2008;17(2):139–147. DOI: 10.1177/0961203307085405.
21. Sarala Kumari D, Arumilli MN, Siva Kumar Reddy L, Reddy DN, Motor R. Acute intermittent porphyria presenting with posterior reversible encephalopathy syndrome: a rare cause of abdominal

pain and seizures. Indian J Crit Care Med Peer-Rev Off Publ Indian Soc Crit Care Med 2020;24(8):724–726. DOI: 10.5005/jp-journals-10071-23532.
22. Thomas SV, Syam U, Devi JS. Predictors of seizures during pregnancy in women with epilepsy. Epilepsia. 2012;53:e85–e88. DOI: 10.1111/j.1528-1167.2012.03439.x.
23. Meinardi H, Scott RA, Reis R, Sander JW. ILAE Commission on the Developing World. The treatment gap in epilepsy: The current situation and ways forward. Epilepsia 2001;42(1):136–149. DOI: 10.1046/j.1528-1157.2001.32800.x.
24. Scott RA, Lhatoo SD, Sander JW. The treatment of epilepsy in developing countries: Where do we go from here? Bull World Health Organ 2001;79(4):344–351. PMID: 11357214.
25. Bartynski WS. Posterior reversible encephalopathy syndrome, part 1: fundamental imaging and clinical features. AJNR Am J Neuroradiol 2008;29(6):1036–1042. DOI: 10.3174/ajnr.A0928.