Original Research Paper

Volume - 13 | Issue - 04 | April - 2023 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Radio-Diagnosis

ROLE OF IMAGING IN POSTERIOR REVERSIBLE ENCEPHALOPATHY SYNDROME

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ABSTRACT **Introduction:** Posterior reversible encephalopathy syndrome (PRES) is a neurological disorder which is characterised by variable symptoms, which include visual disturbances, headache, vomiting, seizures and altered consciousness. The exact pathophysiology of PRES has not been completely explained, but hypertension and endothelial injury seem to be almost always present. Vasoconstriction resulting in vasogenic and cytotoxic edema is suspected to be responsible for the clinical symptoms as well as the neuro-radiological presentation.A diagnosis of PRES should be considered in the setting of acute neurological symptoms in patients with renal failure, blood pressure fluctuations, use of cytotoxic drugs, autoimmune disorders, or eclampsia. **Materials and methods:** The study was a hospital based descriptive study conducted at Department of Radio-Diagnosis in GSL medical college and hospital, Rajahmundry. **Results:** Most common area involved appears to be the posterior regions – parietal and occipital lobes accounting for about 66%. The most common cause is postpartum hemodynamic instability. **Conclusion:** PRES refers to a radiological and clinical syndrome that is characterised by a range of neurological signs appearing in association with abnormalities of the white matter and the grey matter predominantly affecting the posterior regions. Imaging, especially MRI, plays an essential role in diagnosing this condition and early management.

KEYWORDS : Diffusion Magnetic Resonance Imaging Hypertension Posterior reversible encphelopathy syndrome Pre-Eclampsia

INTRODUCTION:

Posterior reversible encephalopathy syndrome (PRES) is a neurological disorder which is characterised by variable symptoms, which include visual disturbances, headache, vomiting, seizures and altered consciousness. The exact pathophysiology of PRES has not been completely explained, but hypertension and endothelial injury seem to be almost always present. Vasoconstriction resulting in vasogenic and cytotoxic edema is suspected to be responsible for the clinical symptoms as well as the neuro-radiological presentation.[1]

A diagnosis of PRES should be considered in the setting of acute neurological symptoms in patients with renal failure, blood pressure fluctuations, use of cytotoxic drugs, autoimmune disorders, or eclampsia.[2]

Early diagnosis by diffusion weighted MRI scans, and differentiation from other causes of altered sensorium i.e. seizures, meningitis and psychosis, is extremely important to initiate treatment and prevent further complications. Although most cases resolve successfully and carry a favorable prognosis, patients with inadequate therapeutic support or delay in treatment may not project a positive outcome.1

To evaluate radiological findings of clinically diagnosed posterior reversible encephalopathy syndrome. To confirm diagnosis in clinically suspicious cases of PRES. To description and interpretation of imaging findings is to present the various settings in which this condition develops and its patterns of expression. sought to investigate whether certain imaging characteristics in PRES are associated with clinically significant patient outcomes

MATERIALS AND METHODS:

The study was conducted in the department of radiodiagnosis, gsl medical college, rajahmundry to study the role of imaging in posterior reversible encephalopathy syndrome.

SOURCE OF DATA: the subjects of the study are patients of both sexes referred to the DEPARTMENT OF RADIODIAGNOSIS, GSL MEDICAL COLLEGE, RAJAHMUNDRY to undergo CT/ MRI from the period of JANUARY 2022 TO OCTOBER 2022 who satisfy the inclusion and exclusion criteria.

SAMPLING CRITERIA :

INCLUSION CRITERIA :

All the patients with clinically diagnosed history of posterior reversible encephalopathy syndrome undergoing CT/ MRI .

All the patients with clinical features suggesting posterior reversible encephalopathy syndrome undergoing CT/ MRI .

EXCLUSION CRITERIA:

Patients with claustrophobia.

Patients with history of metallic implants(valve replacements, dentures).

RESULTS:

In this study 15 cases were studied – in which the most common area involved appears to be the posterior regions – parietal and occipital lobes.

The most common cause is postpartum hemodynamic instability.

Fig 1a:T1W :AXIAL SECTION

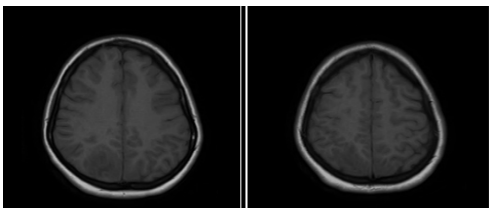

Fig 1b:ADC :AXIAL SECTION

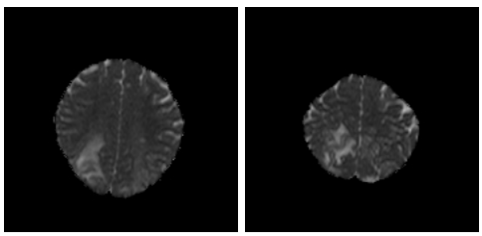

Fig1c: T2W: AXIAL SECTION SAGGITAL SECTION

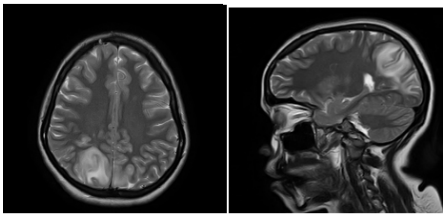

Fig 1a,b,c: Case of 26yr old postpartum patient presented with headache. Both axial and saggital section of ADC and T2 sequences of MRI, lesions appear as iso-intense or low signal intensity on T1-weighted images, and high signal intensity on T2-weighted images.

TABLE 1:

	OCCIPITAL	PARIETAL	FRONTAL	TEMPORAL	CEREBELLAR	BASAL GANGL
CASE 1	✓	✓				
CASE 2	✓	✓	✓	✓	✓	✓
CASE 3	✓	✓	✓	✓	✓	✓
CASE 4	✓	✓	✓	✓	✓	✓
CASE 5	✓	✓	✓	✓	✓	✓
CASE 6	✓	✓	✓	✓	✓	✓

TABLE 2:

ETIOLOGY	CASES
POSTPARTUM	11
CHRONIC RENAL FAILURE	2
EPILEPSY	2

TABLE 3:

AGE	CASES
0-20	5
20-40	10
MEAN AGE	22.1

TABLE 3:

GENDER	CASES	%
MALE	5	33.3
FEMALE	10	66.6

DISCUSSION:

Posterior reversible encephalopathy syndrome (PRES), first described by Hinchey et al. in 1996 [5] , is a neurotoxic syndrome occurring due to the susceptibility of the posterior circulation to variations in blood pressure. It is classically characterized by a symmetric parieto-occipital white matter edema. The imaging manifestations may vary and can include atypical locations and hemorrhage. Clinical features of PRES range from headache, altered mental status, seizures and loss of vision to even loss of consciousness. The term describes potentially reversible imaging findings and symptomatology that is shared by a diverse group of diseases such as hypertension, glomerulonephritis, eclampsia, preeclampsia and drug intoxication.

Pathogenesis[6] With respect to pathogenesis, the vascular theory of PRES is the most widely acceptable. The posterior circulation has a relatively sparser sympathetic innervation than the carotid circulation. The cerebral blood flow is regulated by the dilatation and constriction of vessels, which maintains an adequate tissue perfusion. A rapid rise in blood pressure overwhelms the normal autoregulatory mechanisms, which leads to the dilatation and subsequent leakage of cerebral arterioles with resultant vasogenic edema. The breakdown of autoregulatory mechanisms is usually seen when the systolic blood pressure is in the range of 170–190 mmHg. However, it may also be seen at lower levels of the systolic blood pressure. PRES may also occur in chronic/untreated/ inadequately treated essential hypertension. Even though this theory proposes cerebral hyperperfusion as the cause of imaging abnormalities, some PET studies have actually shown cerebral hypoperfusion in PRES[6]. Another theory suggests a systemic inflammatory state causing endothelial dysfunction as the cause of PRES[7]. This theory is supported by the common association between PRES and systemic inflammatory conditions such as sepsis, preeclampsia, transplantation and auto immune diseases. The occurrence of PRES even in the absence of any systemic inflammation contradicts this theory. Thus, the exact pathogenesis is still not completely understood.[8]

Settings in which posterior reversible encephalopathy syndrome may be likely to develop[3]. There are a number of factors that favour the development of PRES: Arterial hypertension: this is the classic setting and it was the first factor to be described (hypertensive encephalopathy). Moderately to severely elevated blood pressure is reported in 75% of patients. eclampsia or pre-eclampsia: this link has often been drawn , even in women with normal blood pressure. Late development of this condition has been reported, as late as several weeks after the birth. chemotherapy regimens and organ transplants that require patients to use immunosuppressant medications especially allogeneic bone marrow transplants Septicaemia and severe infections, sometimes resulting in organ dysfunction . chronic renal failure and dialysis . autoimmune diseases: systemic lupus erythematosus, scleroderma, Wegener's granulomatosis, etc . This link has often been found, even during periods when patients are not being treated with immunosuppressant drugs.

CONCLUSION:

PRES refers to a radiological and clinical syndrome that is characterised by a range of neurological signs appearing in association with abnormalities of the white matter and the grey matter predominantly affecting the posterior regions. The distinctive clinical context as well as the quick reversibility of the clinical and radiological abnormalities is suggestive of cerebral vasogenic oedema secondary to vasculopathy. Imaging, especially MRI, plays an essential role in diagnosing this condition[3]. Given the high mortality related to intracranial complications in eclampsia patients, we recommend early consideration of cranial MRI in the management of preeclampsia patients to evaluate the presence or absence of PRES as well as the extent and nature of brain edema.

ABBREVIATIONS:

PRES: Posterior reversible encephalopathy syndrome
MRI: Magnetic resonance imaging
DWI: Diffusion-weighted imaging
T1W: T1-weighted
T2W: T2-weighted
FLAIR: Fluid attenuated inversion recovery
SPIR: Spectral presaturation inversion recovery
ADC: Apparent diffusion coefficient

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