

Original Research Article

Posterior reversible encephalopathy syndrome in preeclampsia - A prospective study

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Abstract

Background: Posterior reversible encephalopathy syndrome (PRES) which is a clinic-radiological manifestation sometimes also seen in PE and eclampsia.

Materials and methods: 30 cases of preeclampsia or eclampsia cases that had CNS manifestations were studied with MRI before and after neurological recovery. All 100% cases had prompt and total recovery in 1-2 weeks.

Results: Headache, Blurring of vision, and vomiting were the common clinical manifestations. Parieto-occipital lobes were commonest sites of cerebral involvement.

Conclusion: Most patients with PRES have a suggestive combination of symptoms MRI is crucial for diagnosing, monitoring the course, and assessing treatment effectiveness. Repeated cerebral imaging helps to support the diagnosis. Early recognition and resolution of the underlying cause is the keystone of management.

Key words

PRES, Preeclampsia, Parieto-occipital edema.

Introduction

Posterior reversible encephalopathy syndrome (PRES) - first described by Dr. Hinchey in 1996. Preeclampsia eclampsia syndrome is an extremely morbid disease occurring in 4-7% of

all pregnancies. It is a multi-organ disease, including the central nervous system (CNS). PE can develop in pregnancy, during delivery and postpartum. Postpartum it is seen in the first days after delivery.

Posterior reversible encephalopathy syndrome (PRES) which is a clinic-radiological manifestation sometimes also seen in PE and eclampsia.

Image diagnostics such as computer tomography (CT) and magnetic resonance imaging (MRI) of the CNS performed on patients with PE and eclampsia have revealed PRES in several cases; these instances are possibly a variant of hypertensive encephalopathy [1]. Approximately 1/3 of the patients have normal or slightly elevated blood pressure [2-5] like for PE, the most common symptoms of PRES are headache, visual abnormalities (cortical blindness, blurred vision, photophobia, hemianopia), and seizures. Nausea and altered mental state or confusion are also common in PRES [3, 4, 6-8].

Typical signs of PRES are best detected by T2-weighted and fluid-attenuated inversion recovery (FLAIR) MRI, which is the golden standard. CT scans only reveal 50% of the lesions [7]. Typical findings are symmetric edema involving the white matter of the posterior regions of the cerebral hemispheres. White matter lesions in the occipital lobes, posterior parietal lobes, and posterior temporal lobes, in that order, are classic findings. Lesions in the frontal lobes, cerebellum, and pons may be seen, but seem to be minor and only visible in addition to injuries in the other brain structures mentioned above [1, 3-6].

The past 20 years have seen much research into the pathogenesis [1] and discussion whether PRES always is a part of the clinical picture of preeclampsia. Definitive, convincing answers are still missing.

PE can be present in many atypical ways, and therefore be very insidious; and it may suddenly take a very rapid course. Fast diagnosis is of utmost importance.

Imaging in PRES

- Useful to exclude alternative diagnoses
- CT/MR imaging of the brain

- MRI is superior - T2/FLAIR Hyperintensities
- Focal regions of symmetric hemispheric edema
- The parietal and occipital lobes are most commonly affected
- Followed by the frontal lobes, the inferior temporal-occipital junction, and the cerebellum

Treatment of PRES

- No specific treatment for PRES
- General measures-aimed at maintaining ABC of the patient
- Symptomatic therapy
- Anti hypertensives
- Reduce blood pressure by 25% within first few hours
- Pronounced fluctuations of blood pressure need to be avoided
- Excessive or rapid blood pressure reduction could provoke cerebral ischemia.
- Anticonvulsants
- Correction/Removal of the underlying cause
- Termination of pregnancy

These cases have to be differentiated from other diseases closely resembling these features

- Subarachnoid hemorrhage due to the symptoms of acute headache and the feeling of a snap in the head. Two of the most common symptoms for a typical subarachnoid hemorrhage.
- Intracerebral catastrophes such as cerebral thrombosis and sinus thrombosis due to nausea, dizziness, and vomiting. Pregnant women or women in the puerperal period are at higher risk.
- HELLP. Preeclampsia can develop into HELLP, a syndrome characterized by hemolysis, elevated liver enzymes, and low platelets.
- Migraine due to headache and nausea.

Materials and methods

This study was done over a period of 5 years in King George Hospital, Viakhapatnam from January, 2013 to January, 2018.

Inclusion criteria

- Severe preeclampsia and eclampsia cases with neurological manifestations apart from seizures.
- All eclampsia cases with poor regain of consciousness beyond 72 hours after completing magnesium sulfate treatment.
- All cases of status eclampticus.
- All cases of eclampsia that on admission was unconscious.

Exclusion criteria

- Cases on ventilator support.
- Cases having other complications like HELLP syndrome or renal failure or DIC or hepatic failure.
- Cases in whom other causes for CNS manifestations were established.

Total no of 30 cases were subjected to MRI scan and findings were discussed with neurology consultants. All cases received preeclampsia or eclampsia treatment with anti-hypertensives and anticonvulsants. Biochemical investigations for hepatic, renal functions, coagulation profile, retinal examination was performed in all cases.

Follow up MRI scans were done in all 30 cases between 7-14 days.

Results

Incidence of various demographic parameters was as per **Table – 1**. Headache, Blurring of vision, and vomiting were the common clinical manifestations (**Table – 2**). Parieto-occipital lobes were commonest sites of cerebral involvement (**Table – 3**).

Discussion

Posterior reversible encephalopathy syndrome is seen, not only in relation to preeclampsia, but in a variety of diseases/ conditions. The most common conditions are post-transplant

conditions, during immunosuppressant treatment, infection/ sepsis, autoimmune diseases, and during cancer chemotherapy [3-6, 8]. The degree of inflammatory response and multi-organ involvement is an interesting common feature. The immune response is highly activated/ modified with increased levels of cytokines, a degree of renal dysfunction, vasoconstriction, coagulation system alterations (thrombocytopenia), and endothelial dysfunction.

Table – 1: showing incidence of various demographic parameters.

Total no of AN admissions in study period	32,460	
Total no of preeclampsia eclampsia cases	4676	Incidence of preeclampsia eclampsia in study centre - 14.40%
Cases with other neurological manifestations	124	Percentage of cases with CNS manifestations in addition to seizures 2.565%
Cases with other systems involved	597	Percentage of cases with other organ dysfunction - 12.76%

Table – 2: showing clinical manifestations.

Presentation	Cases	%
Blurring of vision	14	46.66
Headache	26	86.66
unconscious	6	20
drowsiness	5	16.66
hemiplegia	2	6.66
Vomiting	10	33.33

Table – 3: Radiological manifestations.

Location	Cases	%
Parieto-occipital lobes	30	100
Frontal	10	33.33
Temporal	5	16.66
Basal ganglia, thalamus, cerebellum	14	46.66

Pathogenesis of PRES is thought to be multifactorial yet two different theories are dominating and still being debated. The hyperperfusion theory, also called the “Vasogenic theory,” and “The hypo perfusion/ischemic theory,” also called the “Cytotoxic theory”.

The vasogenic theory is considered to be the most likely and accepted cause of PRES. The theory suggests that due to errors in the central nervous system (CNS) blood pressure auto regulation, and lack of sympathetic innervation of vessels emanating from basilar and vertebral arteries, blood flow in the CNS will increase. This causes elevated capillary filtration pressure and damage to the capillary wall, eventually leading to increased blood–brain barrier permeability and the consequence is cerebral edema [2, 3, 10]. Posterior reversible encephalopathy syndrome is also seen in patients without hypertension and thus makes the assumption of another theory reasonable; “The cytotoxic theory.”

It is thought that patients with chronic hypertension have hypertrophic artery walls, including in the CNS, causing reduced permeability of the blood–brain barrier. Patients with preeclampsia do not have this compensatory effect and even small increases in blood pressure, can cause them to respond with increased permeability of the blood–brain barrier [2, 3].

Ekawa, et al. [13] recommend MRI scans of all asymptomatic patients with severe pregnancy-induced hypertension, and if cerebral changes, as edema, are located immediate delivery should be considered to prevent the development of eclamptic seizures. Whether PRES leaves clinical and radiological sequel, even though the syndrome is called “reversible,” is still being debated.

A study has shown that patients with preeclampsia have a milder form of PRES, with fewer sequela, compared to PRES triggered by other factors [6] and small follow-up studies

have shown that changes on MRI are reversible [1, 8, 12, 14].

On the other hand retrospective studies have found permanent changes on MRI. Some studies have shown that irreversibility depends on severity of the acute phase, assessed on the clinical signs, including the number of seizures, but also based on primary MRI findings. In these studies, it looked like ischemic changes were more consistent with cytotoxic edema [11, 13, 14].

Delayed recognition of PRES causes secondary complications such as status epilepticus, intracranial hemorrhage, and ischemic infarction [6, 8, 10, 15] thus it seems to be of great importance to find the cause triggering the seizures and minimize number of seizures as far as possible, no matter what the underlying cause is. To do that, and optimize the diagnostic procedure it is important that there is close corporation between professionals and specialists in the acute phase. Fast diagnosis is also of great importance when it comes to reassure the couple, who are probably very sensitive and anxious because they have just become parents.

Conclusions

- PE can be very unpredictable and manifests in many atypical ways.
- We have to remember it postpartum at all times.
- Attention should be drawn to the blood pressure during birth. Blood samples and repeated blood pressure measurements to be taken if the blood pressure is elevated.
- Exclude differential diagnosis as fast as possible. Fast initiation of proper treatment may be crucial for the outcome.
- The increase/change in blood pressure and not so much the absolute blood pressure is the peculiarity in PRES. Awareness should be drawn to blood pressure changes.

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