



# Posterior Reversible Encephalopathy Syndrome: Nitroglycerine a Friend or a Foe?

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Received: 7 July 2020 / Accepted: 1 December 2020 / Published online: 2 January 2021  
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## Abstract

Posterior reversible encephalopathy syndrome (PRES) refers to a clinico-radiological entity with characteristic features on neuroimaging and rapid onset of nonspecific symptoms including headache, seizure, altered consciousness and visual disturbance. It is a neurotoxic state in response to the acute changes in blood pressure leading to vasogenic oedema. It is often but not always associated with hypertension. However, control blood pressure is one of the mainstays of management in such cases. Nitroglycerine (NTG) is a potent vasodilator and is one of the drugs for treatment of hypertensive emergencies. It is found to worsen the cerebral oedema in PRES which is considered due to failure of cerebral blood pressure autoregulation. Here, we report two such cases where patients with PRES deteriorated with NTG infusion. However, the neurological condition of the patients improved drastically the next day. NTG could have further enhanced vasodilation, thus aggravating developing PRES, after autoregulation was lost because of high blood pressure.

**Keywords** Posterior reversible encephalopathy syndrome · Pre-eclampsia · Nitroglycerine · Eclampsia

## Introduction

Posterior reversible encephalopathy syndrome (PRES) is a clinico-radiological entity which manifests as a rapid onset of symptoms including headache, seizure, altered consciousness and visual disturbance. PRES can develop in association with various conditions. However, regardless of the underlying cause or associated condition, the main abnormality is cerebral vasogenic oedema, the pathogenesis of which is still not clear. Most cases occur in young to middle-aged adults with a marked female predominance

[1]. As the name suggests, it is typically reversible once the underlying cause is removed. However, patients with severe manifestations of PRES, such as coma and/or status epilepticus, may require admission to the intensive care unit (ICU) [2]. Permanent neurological impairment or death occurs in a minority of patients if not treated promptly. Intravenous nitroglycerine is a well-recognized treatment of acute hypertension and hypertensive encephalopathy. Here, we report two cases of pre-eclampsia with hypertensive emergency, one of them developed PRES and the other had worsening of PRES with nitroglycerine.

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## Case 1

A 39-year-old primigravida with 32 weeks of gestation, conceived with ICSI after 14 years of infertility had antepartum eclampsia. She presented with post-ictal confusion to obstetric emergency. At the time of presentation, her blood pressure and pulse rate were 180/110 mm Hg and 70 per minute, respectively. Intravenous labetalol 20 mg slow was initiated and also injection magnesium sulphate loading dose 4 gm slow intravenous and 3 gm intramuscular in each buttock (Dhaka regimen) was started. After stabilizing the haemodynamic status, the caesarean section was done. A male

baby 1.52 kg was delivered. In the immediate postoperative period, she had an episode of bradycardia, after which Labetalol infusion was stopped and nitroglycerine (NTG) infusion was started. Her blood pressure was controlled (140/90 mm Hg) but her mental status further deteriorated. She was agitated, had hallucinations and was restless. Multidisciplinary approach was planned. She was suspected to have PRES. NTG infusion was stopped and labetalol infusion was restarted. CT scan revealed features suggestive of PRES. Patient improved drastically the next day after stopping NTG. She was started on tablet haloperidol 0.5 mg twice daily. Later, she was started on tab enalapril 5 mg twice daily and nifedipine 10 mg twice daily. She was discharged with her new born on the 16th day from admission.

## Case 2

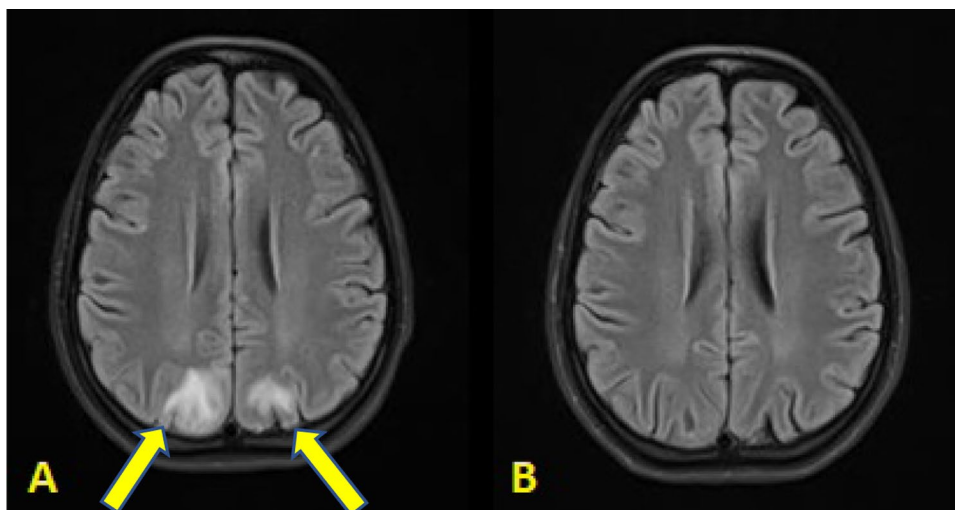
A 25-year-old primigravida was admitted at 36<sup>+5</sup> days of gestation with pre-eclampsia. She was diagnosed with gestational hypertension at 34 weeks and started on tablet labetalol 100 mg thrice daily. On the second day of admission, she had persistent BP of  $\geq 170/90$  mm Hg. Tablet labetalol 200 mg per orally stat was given and she was shifted to eclampsia room. Her blood pressure was controlled and there were no features of imminent eclampsia. The next day, decision for induction of labour was planned. She developed occipital headache with brisk knee jerk. Magnesium sulphate loading dose was administered. Emergency caesarean section was done in view of impending eclampsia with unfavourable cervix with non-reassuring foetal heart rate. A male baby 3.1 kg was delivered. Two hours after surgery, her blood pressure shot up to 160/100 mm Hg. Tablet amlodipine 5 mg was given. After 30 min, blood pressure increased to 164/104. Labetalol 20 mg slow IV with injection and furosemide 40 mg stat were given. Maintenance

magnesium sulphate was continued. The BP was constantly high and she had bradycardia. So, nitroglycerine (NTG) was started at 0.5–1 mcg/kg/min and titrated accordingly. Blood pressure was controlled and maintained at 144/98 mm Hg. After 2 h, the patient had first episode of eclampsia. Magnesium sulphate 2 gm IV was given. After 30 min, she had another episode of convulsion following which she had continued delirium, agitation. She was intubated and kept under sedation with midazolam 0.5 mcg/kg/min and inj. morphine 4.5 mg IV q8 hourly; injection levetiracetam 750 mg IV and injection hydrocortisone 100 mg IV were given. Labetalol infusion was restarted but had to be stopped again after 6 h of restarting due to bradycardia. Tab amlodipine 5 mg was given. She was extubated after 10 h of intubation. MRI was suggestive of PRES (Fig. 1a). Fundus examination revealed serous retinal detachment (SRD). Her blood pressure was then controlled on tab amlodipine 5 mg thrice daily. After 3 days, review fundus examination showed resolving SRD. After 7 days, there was complete resolution of PRES changes on MRI (Fig. 1b).

## Discussion

PRES was first reported in 1996 in a series of acutely ill patients admitted for reversible neurological symptoms with abnormal and also reversible brain imaging. PRES can develop in association with a vast array of conditions. Clinically, PRES is characterized by headache, nausea, vomiting, altered mental functioning, visual disturbances, stupor, coma and tonic–clonic seizures [1]. MRI is the best investigation to diagnose radiologically. Typical MRI findings are T2-hyperintense/T1-hypointense–isointense lesions in a parieto-occipital or multifocal distribution [1, 2]. The cause of PRES is still an enigma. Hypertension with failed autoregulation and hyperperfusion remains a popular

**Fig. 1** **a** FLAIR axial images show hyperintensity in the subcortical white matter of both parietal lobes at their medial aspects (arrows). Mild hyperintensity is also noted in the cortex in the same areas; **b** A follow-up MRI obtained after 7 days shows almost complete resolution of the signal changes



consideration for the developing brain oedema. Regardless of the underlying cause, the main abnormality is cerebral vasogenic oedema, the pathogenesis of which is still under debate [3]. Nitroglycerine dilates cerebral arteries and alters both the global and regional cerebral blood flow, which may augment the autoregulation failure. Although under debate, several findings suggest a pathogenic role of nitroglycerine in the development of PRES. Nitroglycerine triggers attacks in migraineurs; nitroglycerine dilates basal cerebral arteries and alters the global or regional cerebral blood flow; induces headache [3, 4]. The temporal relation between application of nitroglycerine and onset of visual impairment in the presented patient suggests a causal relationship between nitroglycerine and PRES. After autoregulation was lost because of high blood pressure, nitroglycerine further enhanced vasodilation, thus aggravating developing PRES [1, 4].

## Conclusion

NTG should be given with caution to pre-eclampsia patients with hypertension and headache with altered sensorium or irritability as it may worsen the clinical condition. Alternative anti-hypertensives may be preferred in patients with hypertensive emergency in PRES than NTG.

## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

**Case report** The case report involves human participants.

**Informed Consent** Informed consent was obtained (no personal data are presented; only clinical data).

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