Case Report

Sudden bilateral loss of vision in a 19-year-old man

Suzanne Pirotta, Gabriella Sciriha, David Cauchi, James Vassallo, Thomas Fenech

Abstract

***Introduction*:** Posterior Reversible Leukoencephalopathy Syndrome (PRES) is caused by ischaemia commonly affecting the posterior cerebral vasculature. It presents with sudden decreased vision, headaches, nausea, vomiting, seizures, and altered mental status.

Case presentation: A 19-year-old male presented to the ophthalmic emergency complaining of sudden bilateral loss of vision, which was down to light perception He reported headaches, nausea, and drowsiness since the previous day. He was a known case of hypertension secondary to IgA nephropathy. Magnetic resonance imaging (MRI) with STIR and FLAIR sequences showed foci of hyperintensity within the occipital lobes bilaterally. This confirmed the suspected diagnosis of PRES.

Discussion: Aetiological factors of PRES include sudden increase in blood pressure, eclampsia, porphyria, renal disease, and Cushing syndrome. These lead to blood-brain barrier injury either by hyper- or hypo-perfusion, endothelial dysfunction, changes in blood vessel morphology, hypocapnea, or immune system activation. Histopathological changes in PRES include activated astrocytes, scattered macrophages and lymphocytes, often in the absence of inflammation or neuronal damage.

Conclusion: PRES is usually a reversible neuro-ophthalmological condition, however prompt recognition and appropriate management is important to prevent permanent brain injury or even death.

Keywords

Posterior Reversible Leukoencephalopathy Syndrome, PRES, seizures, occipital lobe, hypertension.

Suzanne Pirotta
Department of Ophthalmology,
Mater Dei Hospital
Msida

Gabriella Sciriha
Department of Ophthalmology,
Mater Dei Hospital
Msida

David Cauchi
Department of Ophthalmology,
Mater Dei Hospital
Msida

James Vassallo*
Department of Ophthalmology,
Mater Dei Hospital
Msida
jamesvassallo2000@yahoo.com

Thomas Fenech
Department of Ophthalmology,
Mater Dei Hospital
Msida

**Corresponding Author*

Introduction

Posterior reversible encephalopathy syndrome was first described by Hinchey *et al* [1] in 1996. It is caused by ischaemia, usually due to a sudden increase in blood pressure commonly affecting the posterior cerebral vasculature. It presents with headaches, nausea, vomiting, decreased vision, seizures, and altered mental status. Other causes of PRES include eclampsia, porphyria, renal disease, Cushing syndrome and adrenocortical disease, as well as immunosuppressive or cytotoxic drugs.[1-2]

To explain the pathophysiology of hypertensive PRES two theories have been proposed: 1) Severe hypertension leading to failed auto-regulation with subsequent hyperperfusion and endothelial injury causing vasogenic oedema; 2) vasoconstriction and hypoperfusion leading to brain ischaemia and consequent vasogenic oedema. Non-hypertensive PRES may be due to an immune response to endogenous or exogenous stimuli.[3]

PRES is usually a reversible condition, however prompt recognition and appropriate management is important to prevent permanent brain injury or even death.

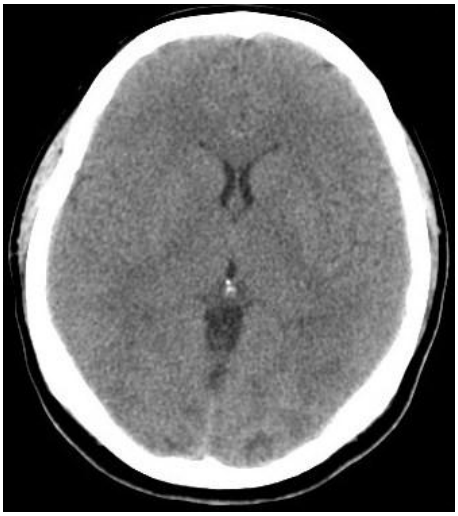
In this paper we present a case of a young gentleman with IgA nephropathy who presented with

sudden, severe, bilateral loss of vision due to PRES.

Case Presentation

In January 2012 a 19-year-old Caucasian male presented to the ophthalmic emergency with sudden bilateral loss of vision down to light perception associated with headaches, nausea, and drowsiness since the previous day. He had been diagnosed with hypertension secondary to IgA nephropathy at the age of 16 years and was on perindopril 8mg nocte. An ophthalmological assessment did not reveal any abnormality, with normal pupillary reflexes to light and no fundal pathology. On examination he was agitated but had no focal neurological signs and a GCS of 15. His blood pressure was 230/140mmHg, pulse rate was 95bpm, and body temperature was 37˚C. He was referred to the main A&E department for urgent medical/neurological review and further management. Neurological examination showed normal power in all four limbs, normal sensation, no neck stiffness, and down-going plantar reflexes. His GCS began to deteriorate and he suffered two episodes of witnessed seizures in the casualty department. Complete blood count, liver function tests, erythrocyte sedimentation rate, C-reactive protein and coagulation screen were all normal. His serum creatinine was 328µmol/l and serum potassium 6. A CT scan of the brain revealed hypodensities in both occipital lobes (Figure 1).

***Figure 1**: PRES - Initial axial CT showing occipital hypodensity*



MRI with STIR and FLAIR sequences showed foci of hyperintensity within the occipital lobes bilaterally (Figure 2). The rest of the brain was normal.

The patient was admitted to the intensive therapy unit and was started on intravenous labetolol and phenytoin. In order to control his hypertension he was gradually started on calcium channel blockers, angiotensin receptor blockers, and alpha-agonists. An echocardiogram showed concentric left ventricular hypertrophy and no regional wall motion abnormality. He also required haemodialysis on several occasions to control his renal failure. Repeat MRI one month later showed complete resolution of the vasogenic brain oedema (Figure 3). This confirmed the suspected diagnosis of PRES. The patient spent 37 days in the intensive therapy unit and was fit for discharge two months after admission.

***Figure 2**: PRES - Axial view MRI FLAIR showing occipital hyperintensity*

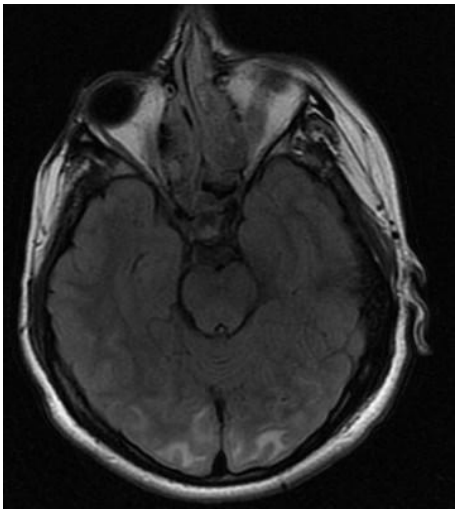
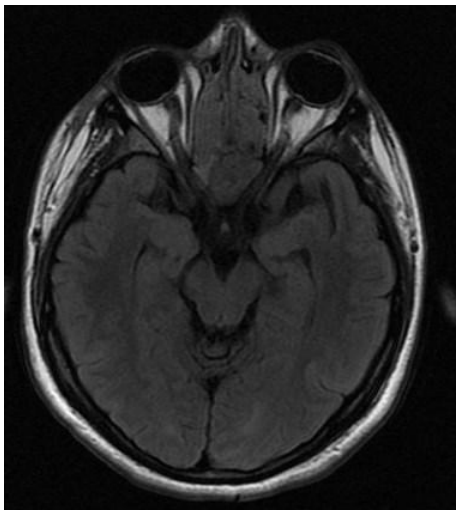


***Figure 3**: PRES - Axial view MRI FLAIR after 1 month showing resolution of previous changes*



Discussion

The differential diagnoses that have to be considered when a patient presents with confusion, headaches, nausea, and/or vomiting, associated with blurred vision include: PRES, cerebrovascular accidents, intracranial haemorrhage, space-occupying lesions, raised intracranial pressure (idiopathic or secondary to other pathology), hypertensive encephalopathy, meningitis, encephalitis, and migraine.

PRES is a neurotoxic state which results in a unique

brain imaging appearance. The basic PRES pattern shows changes in the cortex, with subcortical and deep white matter involved to varying degrees.[4-8]

Various aetiological factors have been implicated in the pathophysiology of PRES. These lead to blood-brain barrier injury either by hyper- or hypo-perfusion, endothelial dysfunction, changes in blood vessel morphology, hypocapnea, or immune system activation.[3,9-10]

In hypertension-induced PRES, there is failure of cerebral autoregulation which predominantly affects the vertebrobasilar system, probably due to sparse sympathetic innervation of the posterior circulation. As a result, the parietal and occipital lobes are most commonly affected.[11-12]

PRES is also associated with sepsis, usually due to Gram-positive organisms. In these patients blood pressure is often normal or only minimally increased. On imaging, vasogenic oedema is greater in normotensive patients than in severely hypertensive ones.[13]

The autoimmune diseases that have been associated with PRES include systemic lupus erythematosus, Wegener's granulomatosis, systemic sclerosis, and polyarteritis nodosa. These patients are usually managed with intermittent courses of immunosuppressants to keep the disease under control.[14-19]

PRES is also recognized in patients undergoing bone marrow or stem cell transplants, especially when high-dose myeloablative regimens are applied.[20-26] It usually occurs in the first month after allogeneic bone marrow transplantation, with the rest occurring in the subsequent year.[20,24,26-27] Several PRES-related risks co-exist in post-transplant patients. Immunosuppressive drugs, such as cyclosporine, can induce endothelial injury that leads to vasoconstrictive effects, increased sympathetic activation, and coagulation abnormalities.[28-33] Effects of chemotherapy and infection in immunosuppressed patients further contribute to toxicity.

PRES has also been strongly associated with toxaemia of pregnancy.[34-39] Although blood pressure is high in the majority of cases, it has also been reported to be normal in others.[40-41]

Histopathological changes in PRES include activated astrocytes, scattered macrophages and lymphocytes, often in the absence of inflammation, ischaemia or neuronal damage. Demyelination, neuronal anoxic damage, laminar necrosis and old haemorrhage in the white matter and cortex have also been shown to occur on autopsy.[20,42]

MRI is the gold standard imaging modality to diagnose PRES. The commonest findings on MRI are focal areas of vasogenic oedema in the white matter of the posterior cerebral hemispheres. These changes are usually in a watershed distribution.[4-8] The medial part of the occipital lobe is not affected in PRES, therefore differentiating it from bilateral posterior cerebral artery infarcts.[43] The aetiological factor of PRES does not seem to affect the radiological appearance.[44]

In hypertension-induced PRES, repeat MRI after blood pressure control usually shows improvement or complete resolution of the radiological findings.

Conclusion

The pathophysiology of PRES is not completely understood. Hypertension with failed autoregulation and hyperperfusion is the primary theory for the mechanism of brain oedema.[21,45-47] Other mechanisms proposed include endothelial dysfunction, hypoperfusion, and vasoconstriction which compromise the blood-brain barrier.[48-49]

The controversies with the hypertension-hyperperfusion theory are highlighted by the absence of hypertension in 20-40% of patients.[8,13,42] And in mild hypertension, the blood pressure does not typically reach the limit of autoregulation.[50]

The outcome of this condition depends on timely diagnosis and prompt management. Treating the underlying cause is usually enough to reverse the condition. However, if the brain insult is prolonged, irreversible infarction can occur. Cerebral damage is augmented if haemorrhage and raised intracranial pressure ensue.[51]

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