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Case Report

POSTERIOR REVERSIBLE ENCEPHALOPATHY SYNDROME SECONDARY TO MILD RENAL ARTERY STENOSIS INDUCED HYPERTENSION IN CHILD

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ABSTRACT

Introduction: Posterior Reversible Encephalopathy Syndrome (PRES) is a rare neurological condition characterized by symptoms like impaired consciousness, seizures, visual impairment, headache, nausea, and vomiting. These symptoms are associated with imaging findings of vasogenic edema, particularly in the posterior or parieto-occipital lobes, which is generally reversible.
Case Report: We report a case of a 7-year-old girl with a history of hypertension who presented with sudden loss of consciousness for 1 minute, brief seizures, blurred vision for 24 hours post-seizure, vomiting, dizziness, and altered mental status lasting a week. A CT scan revealed vasogenic edema in the bilateral parieto-occipital lobes. After hypertension treatment, her symptoms resolved, confirming the diagnosis of PRES. She was discharged in stable condition.
Discussion: PRES is a rare but serious condition in children, often linked to hypertension and other underlying conditions, such as kidney or blood vessel abnormalities. Early diagnosis and blood pressure management are crucial for preventing brain damage. Medications like nicardipine and amlodipine are commonly used to control hypertension in PRES. Although amlodipine is frequently used, further research is needed to assess its long-term effectiveness in children. It is also important to identify and address the underlying causes of hypertension, such as renal issues. In severe cases, procedures like kidney artery surgery may be necessary.
Conclusion: This case highlights PRES in a young patient caused by hypertension due to renal artery stenosis. Timely hypertension management is critical in children with neurological symptoms such as altered consciousness and vision changes. PRES should be considered in such cases.

Keywords: posterior reversible encephalopathy syndrome; stereotypic seizures; cortical blindness; multiple vomiting

INTRODUCTION

In rare cases, the posterior circulation's incapacity to manage auto-regulate changes in blood pressure can lead to vasogenic edema and hyperperfusion in the parieto-occipital areas, resulting in PRES (Posterior Reversible Encephalopathy Syndrome). Clinical signs such as focal neurologist defect, visual abnormalities, reduced consciousness, and seizure patterns can be indicative of PRES. By using radiological findings, PRES can be diagnosed.[1] PRES most frequently affects the subcortical and the deep

white matter of posterior parieto-occipital lobes. There may also be involvement are brainstem, cerebellum, frontal lobe, temporal lobe, and basal ganglia.[2]

In the pediatric population, the true cause of PRES is idiopathic. However, children who have a history of using corticosteroids and cytotoxic drugs, hypertension, collagen vascular disease, and renal diseases are at a higher risk of acquiring this syndrome.[3] The pathophysiology of PRESS is related to degeneration of cerebral vascular endothelial structure, possibly as a result of significant blood pressure fluctuations that impair auto-regulation of cerebral blood flow. PRES can also arise in a state of hypotension and sepsis.[4] Permanent brain damage may result from delayed treatment. One prevalent cause of hypertension in young people is renal artery stenosis.[5]

CASE REPORT

A 7-years-old girl with a medical history of hypertension, sudden loss of consciousness lasting 1 minute, stereotypic seizures lasting 5 to 10 seconds with unknown etiology, had a history of blurred vision for approximately 24 hours after the seizures, multiple projectile vomiting, dizziness and altered mental status for 1 week. A CT scan of the brain at the previous referring hospital visit was performed and was positive for indistinctly demarcated hypodense areas in the subcortex of the bilateral parieto-occipital lobes with narrowing of the ventricular system, cisterna, gyrus, sulcus and fissura sylvii areas (Figure 1). From this description, the patient's provisional diagnosis was PRES because it leads to a state of multiple vasogenic oedema of the parieto-occipital bilateral hemispheres, where the posterior circulation region is involved.

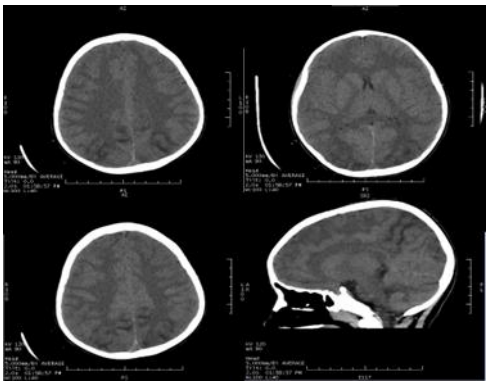

Figure 1. Multiple vasogenic edema in bilateral parietal-occipital hemispheres supported the PRES features.

At this admission, the patient was already in a fairly stable blood pressure of 112/72 mmHg. Other vital

signs were unremarkable. There weren't any remarkable conditions of hypertension, diabetes, or autoimmune-related conditions in the family history. Physical examination revealed only oedema of both lower limbs with feet and tenderness of the epigastric region, but no abnormal results were found on cardiovascular and respiratory examination. The pupils were responsive to light and bilaterally 2 mm in size. Initial findings of the fundoscopic examination were normal. Both Brudzinski's and Kernig's signs were negative, and there was no stiffness in the neck. The majority of the testing of the cranial nerve was normal. Both of the upper and lower extremities' main joints have a 5/5 power rating. The sensory assessment showed out normal. Cerebellar proofs were preserved. Lab results showed normal leukocyte count with a value of 12,820/mm3, thrombocytosis - 589,000/mm3, haemoglobin - 12.4 gm%/dL, hypoalbuminemia - 3.15 gm/dL. Electrolytes were normal with blood sodium level - 136.8 mmol/L, and blood potassium level - 4.77 mmol/L.

Based on the data from the previous hospital, this patient weighing 21.8 kg was given nicardipine 1 mg continuously via syringe pump for the first 4 hours until her blood pressure stabilized at 112/76. In our hospital, the patient continued conservative treatment with oral antihypertensive 1 x 2.5 mg amlodipine followed by intravenous administration of seizure medication phenobarbital 3 x 80 mg. On the third day of hospitalization, the patient's blood pressure suddenly rose to 162/139 mmHg and dose of amlodipine was increased to 1 x 5 mg. To evaluate the cause of hypertension, an abdominal doppler ultrasound was performed (Figure 2), which showed suggestively mild stenosis of bilateral renal arteries. Based on radiological evidence and clinical features, diagnosis enforcement of PRES secondary linked to hypertension caused by mild stenosis of the renal arteries was made. On subsequent follow up patient’s conditions, blood pressure was controlled with improvement in clinical symptoms. The case was reported on 2024/07/26 and the treatment was completed by 2019/07/31.

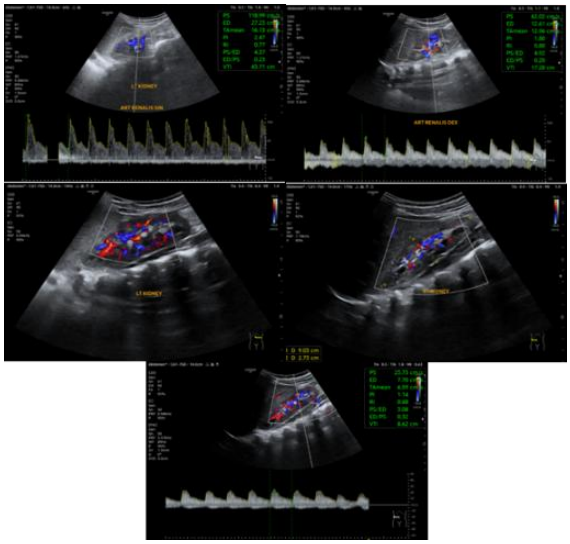

Figure 2. Doppler ultrasound showed suggestive of mild bilateral renal artery stenosis

DISCUSSION

A neuro-radiologic disorder known as posterior reversible encephalopathy syndrome (PRES) is related to headache, visual abnormalities, nausea, vomiting, seizures, and temporary motor impairments [6]. In children, it is incredibly uncommon. Auto-immune and hematological illnesses, hepatitis C, (HUS) hemolytic uremic syndrome, chronic renal failure, HIV infection, blood transfusions, and immunosuppressive medication therapy are primary factors linked to PRES, with the most common cause is hypertension [7]. Pathogenesis of PRES is not fully understood. Particularly in arterial watershed zones, localized vasodilation and vasoconstriction occur when acute systemic blood pressure increase surpasses the cerebral vasculature's auto-regulatory capability. This is followed by fluid transudation, which disrupts the blood-brain barrier [8].

Vasogenic edema primarily affects the white matter of the occipito-parietal areas, although it can also affect the cerebellum, brain stem, and basal ganglia. The challenge of diagnosing hypertension in pediatric patients, especially during emergencies, is demonstrated by our example. Due to a propensity to attribute high results to causes like pain or measurement error, as well as a lack of understanding of normal values for age, pediatric hypertension is frequently underdiagnosed. An abrupt increase in blood pressure

from baseline levels that are typical for height, age, and gender is known as a hypertensive crisis. When immediate end-organ damage (including to the eyes, heart, or central nervous system) is a possibility, it is referred to as a hypertensive crisis [9].

In the case of patients with PRESS and hypertension, blood pressure control is crucial, and symptomatic therapy is part of the management of PRES. Within the first two hours, MAP (mean arterial pressure) shall be lowered by 20–25% because a rapid drop in blood pressure can cause cerebral ischemia due to altered cerebral perfusion [10]. Nicardipine 1 mg/hour for 4 hours is used to treat our patient's hypertensive emergency, resulting in a blood pressure drop of less than 25% over the initial reading. The patient was still receiving conservative treatment with 2.5 mg of amlodipine once daily as an oral antihypertensive. To achieve a regulated drop in blood pressure, hypertensive situations should be treated with continuous antihypertensive medication infusion, this method safer than bolus injections. Nicardipine administered intravenously at dosages of 1–3 μg/kg/min has been shown to be both efficacious and well tolerated.

The goal is to achieve a maximum 25% drop in blood pressure during the first eight hours, followed by a gradual return to normal over the next 26 to 48 hours. The FDA only recommends amlodipine as a calcium channel blockers antihypertensive medication for children with hypertension [11]. Although amlodipine is recognized as a first-line antihypertensive medication, its effectiveness in treating hypertension in children has not been well documented. Although there is minimal data to support the claim Blood Pressure control rate is only 30% to 50%, the systematic review demonstrated that amlodipine significantly lowers both systolic and diastolic blood pressure in children with various illness conditions [12].

Investigations for an underlying condition are required in children with PRES. The most commonly documented causes of PRES in children are anomalies of the kidneys and urinary tract. Renal-vascular abnormalities such as fibromuscular

dysplasia, hypertiroidsm and artery stenosis are common etiology causes of secondary hypertension in children. Antihypertensive medications, such as calcium channel blockers, β-blockers, or both, are the first line of treatment. After ruling out bilateral stenosis or a single kidney, an ACP inhibitor may be utilized. When drugs are insufficient to manage blood pressure, percutaneous transluminal renal angioplasty may be considered. If dilatation fails or restenosis occurs early, further stent placement may be done [13–15].

CONCLUSION

In conclusion, this case is a Posterior Reversible Encephalopathy Syndrome (PRES) caused by hypertension triggered by renal artery stenosis. In this case we confirm hypertension induced by renal artery stenosis can be a cause of PRES in young patients. Hypertension must be treated in patients with neurological symptoms like loss of consciousness, dizziness, and blurred vision. Suspicion of PRES must be considered a special case.

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Verbal informed consent has been obtained from the patient. No significant identification can be revealed.

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