Hypertensive encephalopathy in a teenage female due to renal artery stenosis: a case report

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Abstract

Hypertensive encephalopathy is a critical neurological condition characterized by altered mental status, seizures, and other neurological symptoms resulting from severe hypertension. While it is more commonly observed in adults, cases involving adolescents are rare and warrant special attention. This study aims to explore the literature concerning hypertensive encephalopathy specifically in teenage females resulting from renal artery stenosis (RAS). It discusses the clinical presentation, diagnostic modalities, dan underlying pathophysiology for this condition. Hypertensive encephalopathy in adolescents can be caused by renal artery stenosis, as this case report highlights. In order to achieve successful outcomes, it is imperative to diagnose patients promptly, manage them appropriately, and perform interventional procedures when needed.

Keywords: neurological condition, Hypertensive encephalopathy, neurological symptoms, renal artery stenosis.

Resumen

La encefalopatía hipertensiva es una afección neurológica crítica caracterizada por alteración del estado mental, convulsiones y otros síntomas neurológicos resultantes de una hipertensión grave. Si bien se observa con mayor frecuencia en adultos, los casos que involucran a adolescentes son raros y merecen atención especial. Este estudio tiene como objetivo explorar la literatura sobre la encefalopatía hipertensiva específicamente en mujeres adolescentes como resultado de estenosis de la arteria renal (RAS). Se analiza la presentación clínica, las modalidades de diagnóstico y la fisiopatología subyacente de esta afección. La encefalopatía hipertensiva en adolescentes puede ser causada por estenosis de la arteria renal, como destaca este informe de caso. Para lograr resultados exitosos, es imperativo diagnosticar a los pacientes con prontitud, tratarlos adecuadamente y realizar procedimientos intervencionistas cuando sea necesario.

Palabras clave: condición neurológica, encefalopatía hipertensiva, síntomas neurológicos, estenosis de la arteria renal.

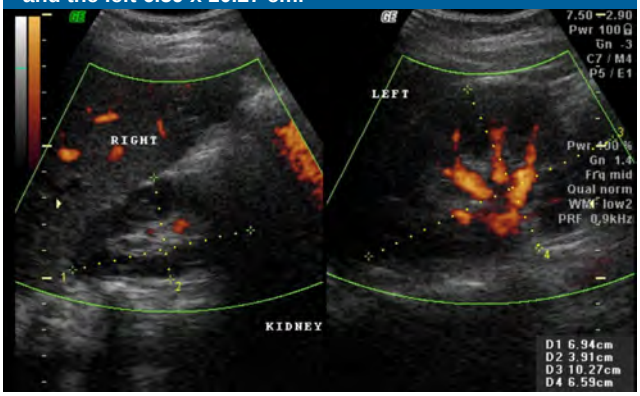
Introduction

It is known that hypertensive encephalopathy can cause acute neurological symptoms, such as headache, altered mental status, seizures, and visual disturbances, caused by severely elevated blood pressure[1-5]. The condition predominantly affects adults and is rare in teenagers. When it occurs in adolescents, there is often an underlying pathology that requires thorough investigation and management[6,7]. Although hypertension in children is less common than in adults, it is believed that the condition's origin can be traced back to childhood[8,9]. In about 70% of cases, it is caused by renal diseases, and in kids, it is the first sign of these conditions. Approximately 1 to 5% of children and around 15% of young adults experience hypertension, while over 60% of individuals above the age of 65 suffer from this condition[10,11]. Renal artery stenosis, a narrowing of one or both renal arteries, can lead to secondary hypertension and potentially cause hypertensive encephalopathy in susceptible individuals[12-15]. In teenagers, this condition can be particularly challenging to diagnose and manage, especially when it is associated with renal artery stenosis[16-18]. This paper aims to present a case study of hypertensive encephalopathy in a teenage female patient with renal artery stenosis and to provide a comprehensive review of relevant literature.

Case Report

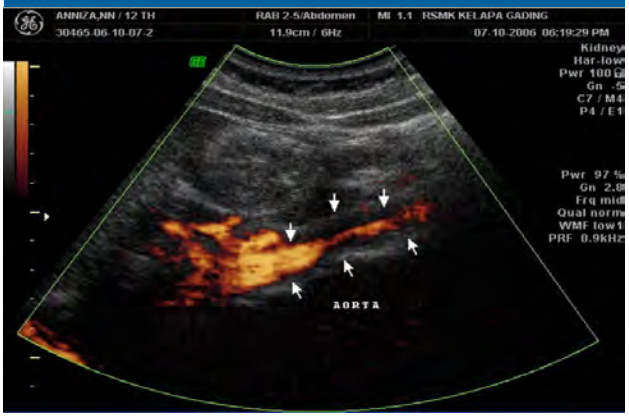
There was a 12-year-old girl who previously had no symptoms of headache, confusion, or seizures who presented to the emergency room suddenly with severe headache and confusion. Her blood pressure was measured at 190/110 mmHg. Neurological examination revealed altered mental status, visual disturbances, and hypertonia. The patient underwent an abdominal ultrasound examination, and it was found renal size asymmetrical**:** The right kidney measured 6.9 cm in length, while the left kidney measured 10.3 cm in length. This indicates that the right kidney is relatively smaller than the left kidney and colour flow vascular decreased in right kidney (Figure 1).

Figure 1. Colour flow Doppler ultrasound right and left kidney, renal size asymmetrical, the right 3.91 x 6.94 cm and the left 6.59 x 10.27 cm.



A stenosis was observed in the abdominal aorta at the level of the origin of the right renal artery. The degree of stenosis appeared to be severe, which may be contributing to reduced blood flow to the right kidney (Figure 2). Laboratory investigations showed no elevated serum creatinine levels. Renal imaging, including Doppler ultrasonography and computed tomography angiography (CTA), confirmed the presence of right renal artery stenosis. The degree of stenosis is estimated to be severe. The right renal artery appeared markedly smaller in calibre compared to the left renal artery.

Figure 2. A stenosis was observed in the abdominal aorta at the level of the origin of the right renal artery.



The size of the right kidney was observed to be smaller than that of the left kidney, consistent with the findings from the previous ultrasound examination. (Figure 3). The brain MRI report stated of the brain indicated cerebral oedema and hypertensive changes.

Figure 3. CTA examination of the abdominal region was performed.

Focal Significant Stenosis in Abdominal Aorta at Right Renal Artery Level: A focal area of significant stenosis was identified in the abdominal aorta at the level of the origin of the right renal artery.

The patient was diagnosed with hypertensive encephalopathy secondary to renal artery stenosis. She was initiated on antihypertensive medications and underwent an endovascular procedure to alleviate the stenosis. Her blood pressure gradually normalized, and her neurological symptoms resolved over the following weeks.

Results

Renal artery stenosis is the most common secondary cause of hypertension and predominantly caused by atherosclerosis[11,15]. Hypertensive encephalopathy in adolescents is a rare entity, often necessitating an in-depth evaluation to determine the underlying cause[7,18]. Renal artery stenosis, although infrequent, has been reported as a potential cause of secondary hypertension leading to hypertensive encephalopathy in young individuals. The condition can be attributed to congenital abnormalities, fibromuscular dysplasia, or atherosclerosis affecting the renal arteries.

Clinical Presentation

Hypertensive encephalopathy due to renal artery stenosis often presents with non-specific neurological symptoms such as severe headaches, altered consciousness, and seizures[5,6]. In teenagers, these symptoms may be attributed to various other causes, making early diagnosis challenging.

Diagnostic Modalities

Patients with secondary hypertension usually have improved blood pressure and a decreased risk of cardiovascular damage and end-organ dysfunction after diagnosis and treatment, so knowing the imaging appearances of common causes is important[3,14].

Accurate and timely diagnosis of hypertensive encephalopathy in teenagers with renal artery stenosis is crucial. Diagnostic modalities include:

- Blood Pressure Monitoring: Continuous blood pressure monitoring is essential to assess the severity and control of hypertension[9-12].
- Renal Imaging: Doppler ultrasound, CTA, and MRI can help identify renal artery stenosis[1,9].
- Neuroimaging: Brain imaging (MRI or CT scan) can reveal cerebral oedema and other neurologic abnormalities[16,17]. Haemorrhages associated with hypertension usually happen in deep brain regions like the basal ganglia and thalamus. This is because blood vessels in these areas are situated near the high-pressure circle of Willis[3].
- Laboratory Tests: Blood tests may show elevated creatinine levels and signs of end-organ damage.

Pathophysiology

As a result of renal artery stenosis, the renin-angiotensin-aldosterone system is activated, which increases blood pressure. This sustained hypertension can eventually lead to the breakdown of the blood-brain barrier, cerebral oedema, and other neurological manifestations seen in hypertensive encephalopathy[8,13].

Treatment Strategies

Management of hypertensive encephalopathy in teenage females with renal artery stenosis typically involves:

- Blood Pressure Control: Rapid reduction of blood pressure with antihypertensive medications, such as intravenous agents (e.g., nicardipine, labetalol), to avoid further cerebral injury[5,16].
- Renal Revascularization: Interventional procedures like angioplasty with or without stenting may be considered to correct the renal artery stenosis[10,12].
- Seizure Control: Antiepileptic drugs may be necessary to manage seizures[2].
- Prognosis

Timely diagnosis and appropriate treatment can lead to a favourable outcome in many cases. However, delayed recognition and treatment may result in significant neurological sequelae or even death.

Conclusions

Hypertensive encephalopathy in teenagers remains a challenging diagnosis, requiring thorough investigation to identify the underlying aetiology. This case report highlights the importance of considering renal artery stenosis as a potential cause of hypertensive encephalopathy in adolescents. Timely diagnosis, appropriate medical management, and interventional procedures can lead to successful outcomes. In order to gain a better understanding of the prevalence and management of such cases, particularly in children, more research and case studies are needed.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent form. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understand that name and initials will not be published, and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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