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Case Report
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Rare Presentation of Pediatric Renal Artery Stenosis

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Abstract

This case involves an 11-year-old boy with no past medical history who presents with a new-onset seizure and was found to have an elevated Blood Pressure (BP) of 132/90 in the emergency department. The patient's mother reported that he has been experiencing right-sided abdominal pain and throbbing headaches for 1 week. In the emergency department, a Computed Tomography (CT) angiogram of the abdomen and pelvis was performed and highlighted significant right renal artery stenosis, right renal atrophy, and delayed parenchymal enhancement of the right kidney. Subsequent renal angiography with balloon angioplasty successfully restored perfusion to the right kidney with follow-up imaging showing significant improvement in parenchymal enhancement. This case report discusses the rare presentation of seizure as the initial manifestation of pediatric renal artery stenosis.

Keywords: Pediatric; Emergency; Seizure; Hypertension

Introduction

The following case is an example of a rare and nonspecific presenting symptom for Renal Artery Stenosis (RAS). It is important to recognize secondary Hypertension (HTN) in pediatric patients as prompt intervention may reverse end-organ damage and prevent long-term morbidity.

Case Presentation

The patient is a previously healthy 11-year-old boy who presents to the emergency department after generalized shaking for two minutes witnessed by his mother. Upon arrival to the emergency department initial vitals revealed a BP of 132/90, heart rate of 112, O2 saturation 99%, and temperature of 98.9°F. The patient's mother reported that he has been experiencing intermittent throbbing headaches for 1 week associated with right-sided abdominal pain. Physical exam revealed a young boy with a confused demeanor, clear lung sounds, tachycardia, regular rhythm without murmurs, and a soft, non-tender, non-distended abdomen. Complete blood count, metabolic profile, and inflammatory markers were largely unremarkable. CT of the head revealed no evidence of hemorrhage or masses. CT of the abdomen and pelvis with Intravenous (IV) contrast was subsequently performed and highlighted significant right RAS, right renal atrophy, and delayed parenchymal enhancement of the right kidney [1,2].

Renal angiography confirmed significant right RAS with no evidence of thrombus. Balloon angioplasty was performed, and subsequent CT imaging showed dramatic improvement in right renal perfusion and parenchymal enhancement Figures 1 and 2.

Discussion

RAS is the condition in which the artery supplying the kidney is narrowed, leading to ischemia and poor perfusion. This in turn stimulates a series of physiological responses. The kidney, when it senses a reduction in blood flow, activates the Renin-Angiotensin-Aldosterone System (RAAS). Activated RAAS increases BP by constricting the blood vessels and increasing sodium and water retention. As a result, secondary HTN develops. The chronic reduction in renal perfusion from RAS may ultimately progress to renal atrophy and cause the gradual loss of kidney function. Pediatric RAS most commonly presents as asymptomatic HTN but may also present with symptoms of end organ damage such as kidney failure, heart failure, headache, visual disturbances, electrolyte disturbances, and seizures [3-6]. Secondary HTN due to RAS presenting as a new-onset seizure in children is very rare and the exact incidence is unknown. Case reports document seizures, including status epilepticus, as an initial presentation in children with RAS, but these remain rare events

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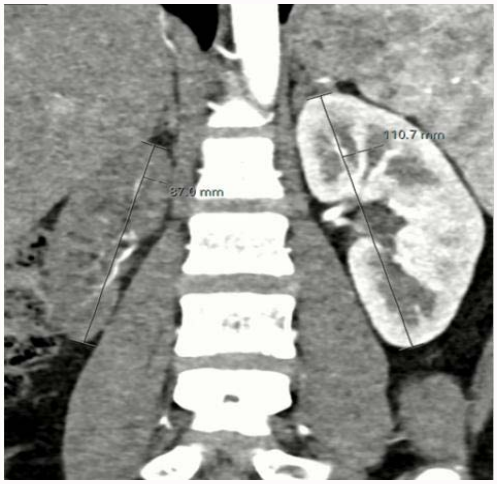

Figure 1: Is a coronal CT abdomen and pelvis with IV contrast that highlights the dramatic difference in size between the right and left kidney, lack of parenchymal enhancement in the right kidney, and poor corticomedullary differentiation in the right kidney.

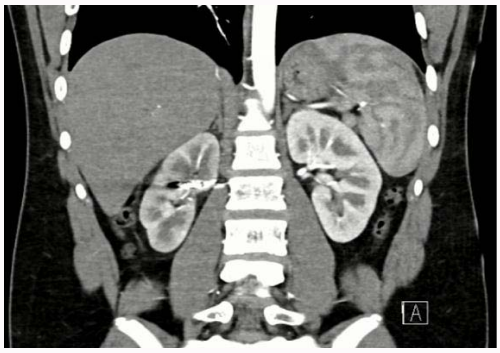

Figure 2: Is a coronal CT abdomen and pelvis with IV contrast status post right renal angioplasty that highlights successful revascularization of the right kidney and significant improvement in corticomedullary differentiation.

relative to the overall number of cases [7]. RAS is an important cause of secondary HTN in adolescents; therefore, it must be addressed early in the disease process. Diagnosis of HTN is often delayed in the pediatric population because children do not routinely undergo BP measurements and interpretation of BP measurements vary with age, sex, and height [3]. It is estimated that renovascular HTN accounts for approximately 5% to 25% of all cases of pediatric HTN [2,3]. Therefore, clinicians must remain vigilant in screening, identifying, and promptly treating renovascular diseases in the context of pediatric HTN. Initial therapy for secondary HTN consists of antihypertensive medications to control BP. Medical management for RAS is often combined with procedural interventions for definitive treatment; this typically involves an endovascular approach such as renal artery angioplasty and stenting [7-10]. In the pediatric population, repeated angioplasty is preferred over stent placement due to concerns of vessel growth and long-term patency. Surgical interventions – such as renal artery implantation, bypass grafting, patch angioplasty, or nephrectomy – are indicated for complex, refractory cases or when endovascular therapy fails [10,11]. Treatment regimen is individualized based on a patient's age, anatomy, etiology, and response to medical therapy and often relies on a multidisciplinary approach to optimize outcomes. In this case report, given the patient's unilateral disease, renal atrophy, and severe HTN with neurological sequela, an endovascular intervention with renal artery balloon angioplasty was performed with technical success.

Conclusion

RAS, though uncommon in adolescents, is an important cause of secondary HTN that must be identified. This case is an example of a rare and nonspecific presenting symptom for RAS as the patient first presented to the emergency department with a new-onset seizure. It is crucial to recognize and treat RAS in pediatric patients early in the disease process as timely interventions may prevent end-organ injury and long-term morbidity. There are only case reports of pediatric patients presenting with new-onset seizure or status epilepticus that is secondary to unilateral RAS and the exact incidence is unknown. With this report, we hope to highlight this rare presentation of an uncommon condition in the pediatric population.

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