Clin Kidney J (2013) 6: 98–99
doi: 10.1093/ckj/sfs168
Advance Access publication 9 December 2012

Nephroquiz

CKJ

What is the association of acute renal failure, angiotensin-converting enzyme inhibitor and angiotensin II receptor blocker in a young patient?

Selçuk Yüksel[1], Ali Koçyiğit[2], Ebru Uzun[1], Emre Tepeli[3], Vefa Özcan[4] and Tülay Becerir[1]

[1]Department of Pediatric Nephrology, Pamukkale University School of Medicine, Denizli, Turkey, [2]Department of Radiology, Pamukkale University School of Medicine, Denizli, Turkey, [3]Department of Genetics, Pamukkale University School of Medicine, Denizli, Turkey and [4]Department of Cardiovascular Surgery, Pamukkale University School of Medicine, Denizli, Turkey

Correspondence and offprint requests to: Selçuk Yüksel; E-mail: selcukyuksel.nephrology@gmail.com

Keywords: middle aortic syndrome; renovascular hypertension; Williams–Beuren syndrome

Case

A 13-year-old girl was admitted to the hospital with unconsciousness and oliguria. She had also suffered from vomiting and weakness for 7 days. Her medical history was remarkable for delay in motor skills and mental retardation. No other investigation was performed until 2 months previously when she visited another clinic for complaints of palpitation, fatigue and sweating. For hypertension and obesity, treatment with ramipril and losartan plus hydrochlorothiazide was started.

She was confused and mildly dehydrated; blood pressure, 97/50 mmHg; pulse, 97/min. She was an overweight child with a body mass index of 28 kg/m^2. Serum urea nitrogen 135 mg/dL (48.18 mmol/L), creatinine 7.2 mg/dL (636.48 µmol/L) and uric acid 13.3 mg/dL (791.08 µmol/L) were high and other biochemical parameters with urinalysis were normal. Her urine output was 250 mL in the previous 24 h. All medications were stopped, and she was followed with appropriate intravenous fluid. On the fifth day, the renal function test and the urine output were normal. After recovery of renal function completely, severe hypertension occurred within several days, and the mean systolic and diastolic pressure, without significant differences between the lower and upper extremities, were 180 and 120 mmHg. All biochemical markers, electrolytes, plasma catecholamines, cortisol and thyroid hormones, serum renin activity, aldosterone, serum complements, anti-ds-DNA, ANA and vanillylmandelic acid in 24-h urine and abdominal/renal Doppler ultrasonography were normal. An echocardiography showed mild left ventricle hypertrophy without coarctation. Grade 2 hypertensive retinopathy was documented by fundoscopic examination. She was very endearing, friendly, loquacious and empathetic associated with her typical facial features (Figure 1).

Question

In light of the clinical and laboratory signs, what is the most likely diagnosis, and what is the cause of the development of acute renal failure in this patient?

Answer

Syndromic facial features such as flat nasal bridge, long philtrum, prominent lips with open mouth and periorbital fullness, mild motor-mental retardation, a typical personality (friendly and outgoing) and severe hypertension were observed. These clinical findings were compatible with Williams–Beuren syndrome (WBS) (Figure 1). She was evaluated by fluorescent *in situ* hybridization which revealed a deletion of 7q11.23, thus confirming the diagnosis of WBS. Although there was no evidence for hypertension etiology in previous echocardiographic and renal Doppler evaluations, stenosis of medium and large-sized arteries, which are the hallmarks of WBS, might be elsewhere in the aorta. Therefore, abdominal and thoracic aortas were evaluated by computed tomography angiography (CTA) imaging. CTA demonstrated a stenotic segment of the abdominal aorta between the celiac artery and 1 cm inferior to the right renal artery origin. The rest of the aorta had a normal dimension. The calibration of both renal arteries as well as that of the celiac and superior mesenteric artery was in the normal range. Mid-aortic stenosis was the initial diagnosis (Figures 2 and 3). Until she was finally admitted to our intensive care unit in a semi-comatose state with renal failure, she had regularly used two antihypertensive drugs, angiotensin-converting enzyme inhibitor (ramipril) and angiotensin II receptor blocker (losartan). Although the bilateral renal arteries were intact, narrowing of the abdominal

Fig. 1. Facial features of the patient.

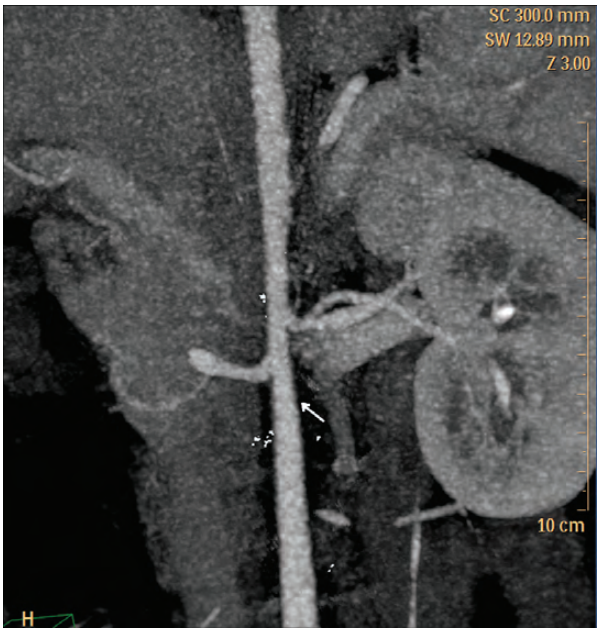

Fig. 2. Multiple projections reformatted maximum-intensity projection coronal image shows the stenotic segment of the mid-aorta which ends at 1 cm inferior to renal arteries (arrow).

aorta, which was covered with suprarenal, interrenal and infrarenal stents, gave rise to bilateral renal hypoperfusion. In renal hypoperfusion, angiotensin II increases efferent arteriolar resistance, which in turn increases capillary hydrostatic pressure, thereby maintaining the glomerular filtration rate despite decreased renal perfusion [1]. In our patient, a physiological adaptation effect of angiotensin II was completely blocked with ramipril and losartan, and therefore blood flow through the kidneys decreased, eventually leading to acute renal failure.

Discussion

WBS is an autosomal-dominant disorder, which is known to be a contiguous gene deletion or microdeletion syndrome at chromosome 7q11.23 [2]. Estimated to occur in approximately one in 10 000 persons, WBS is characterized by multiple cardiovascular and craniofacial structural abnormalities as well as mental retardation, hypertension and a characteristic personality [2, 3]. The most common detectable arteriopathy is supravalvular aortic stenosis. Other cardiovascular anomalies also have been described including peripheral pulmonic stenosis, ventricular septal defect, coarctation of the aorta, patent ductus arteriosus and peripheral arterial abnormalities [4]. However, middle aortic syndrome is very rare in patients with WBS [1].

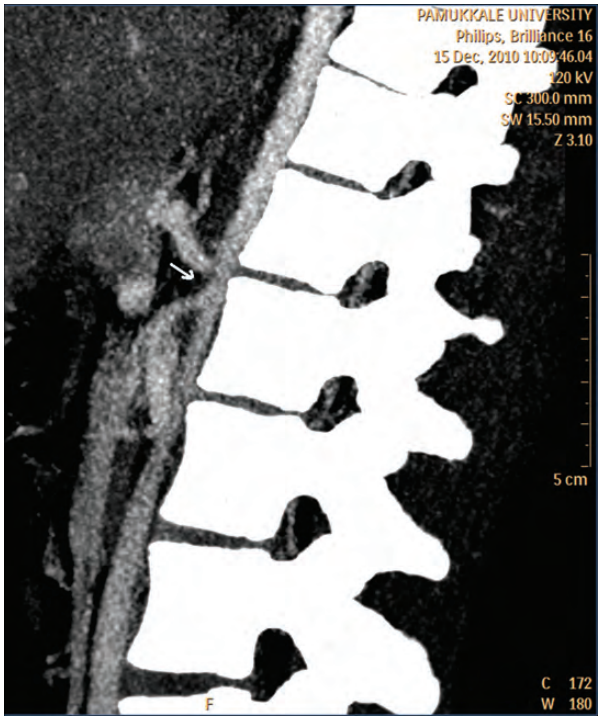

Fig. 3. Multiple projections reformatted maximum-intensity projection sagittal image reveals the stenotic segment of the mid-aorta which starts from the orifice of the celiac artery (arrow).

Severe hypertension in children and adolescents may result from many different etiologies. Awareness of the specific signs and symptoms can help to detect the underlying cause of hypertension. Before any antihypertensive treatment, the underlying etiology of hypertension should be clarified exactly.

Consent

Written informed consent was obtained from the parents of the patient for publication of this case report and all accompanying images.

Conflict of interest statement. None declared.

References

1. Tullus K, Brennan E, Hamilton G *et al*. Renovascular hypertension in children. *Lancet* 2008; 371: 1453–1463
2. Pober BR, Johnson M, Urban Z. Mechanisms and treatment of cardiovascular disease in Williams–Beuren syndrome. *J Clin Invest* 2008; 118: 1606–1615
3. Pober BR. Williams–Beuren syndrome. *N Engl J Med* 2010; 362: 239–252
4. Collins RT II, Kaplan P, Somes GW *et al*. Cardiovascular abnormalities, interventions, and long-term outcomes in infantile Williams syndrome. *J Pediatr* 2010; 156: 253–258

Received for publication: 11.9.12; Accepted in revised form: 31.10.12