CRURAL COMPRESSION ON AN EXTRAPOLAR RENAL ARTERY: AN IMPORTANT IMAGING FINDING

Roxana Azma,[1] Sofia Sabouri,[2] Armin Nourmohammad[3]

[1] Pediatric Radiology Department, Mofid Children's Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
[2] Radiology Department, Shohada-e-Tajrish Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
[3] Medical imaging center, Shafa yahyaian Hospital, Tehran University of Medical Science, Tehran, Iran.

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ABSTRACT

Stenosis of single renal artery due to compression by median arcuate ligament of diaphragm as a cause for hypertension is a rare entity. We report a case of a young hypertensive male with stenosis of an accessory renal artery by diaphragmatic crura in CT angiography with normal renal vein rennin level.
Key words: Renal artery stenosis, diaphragmatic crural compression, hypertension

Introduction

Renal artery multiplicity is the most common arterial branching anomaly.[1] Gyori et al believed that multiple renal arteries are prone to becoming stenotic, due to their longer course and smaller caliber relative to the main renal artery even in the absence of any extrinsic anatomic compression.[2] In 2013, Sari at al described a case of hypertension in a 44 year-male with stenosis of proximal right single renal artery due to compression by median arcuate ligament.[3] We report a case of a young hypertensive male with stenosis of an accessory renal artery by diaphragmatic crura detected on CT angiography.

Case Report

A hypertensive 24 year-old man who was referred for CT angiography of the renal vessels. Apart from a high blood pressure of 160/80 mmHg, there were no other positive findings in physical exam and laboratory data.

After performing the CT angiography, the axial images from renal arteries were reformatted in to two dimentional coronal, sagittal and oblique planes, as well as, three dimentional maximum intensity projection (MIP) and volume rendering technique.

There was a single artery on the right side with normal diameter. But on the left side three renal arteries were seen originating separately from the abdominal aorta (Fig. 1). The superior artery rose from the posterolateral margin of aorta medial to the left diaphragmatic crus at the level of superior mesenteric artery. As the artery coursed caudally toward the kidney, its proximal part measuring 9 mm in length was compressed between the abdominal aorta and crus of diaphragm. Beyond the crus, the artery diameter was found to be normal (Fig. 2).

The other two arteries originating from lateral aspect of the abdominal aorta caudally with normal diameter. Both kidneys had normal size and contour.

Correspondence : Dr. Roxana Azma
Assistant professor of radiology
Mofid Children's Hospital, Dr. Shariati Avenue,
Tehran, Iran Tel: +982122251737
Email: roxanaazma@gmail.com

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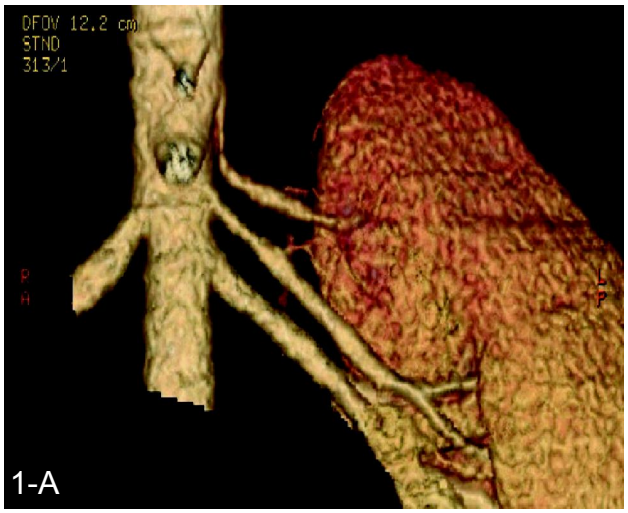
The level of rennin was measured in renal veins bilaterally which revealed to be within normal range. Renal isotope scan results were also normal. Consequently, the clinician decided to put the patient on medical therapy and long term follow up.



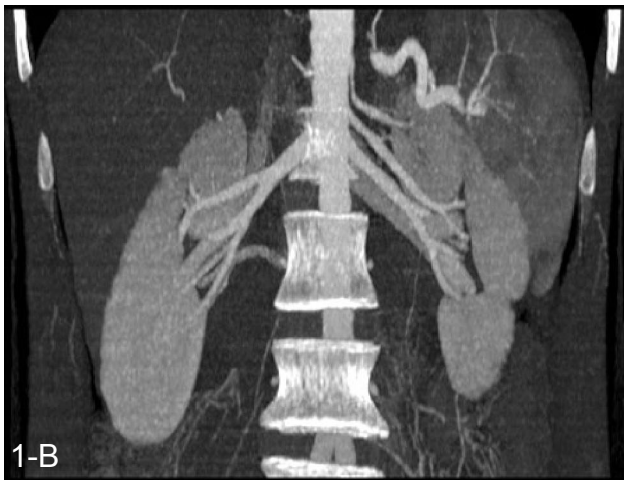
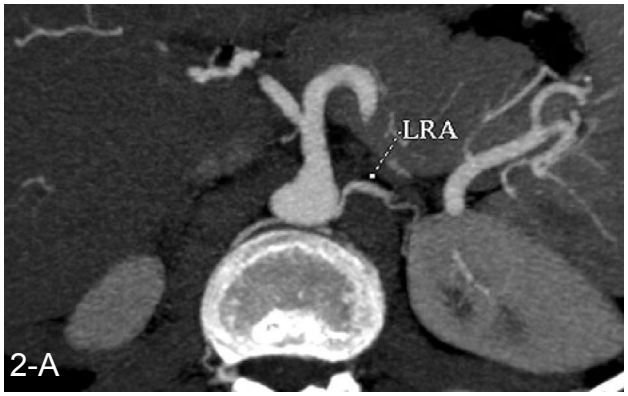


Figure1-A: Three dimentional volume - rendered image and **B:** Coronal reformatted CT angiogram show multiple renal arteries on the left side.The superiormost polar artery shows proximal narrowing



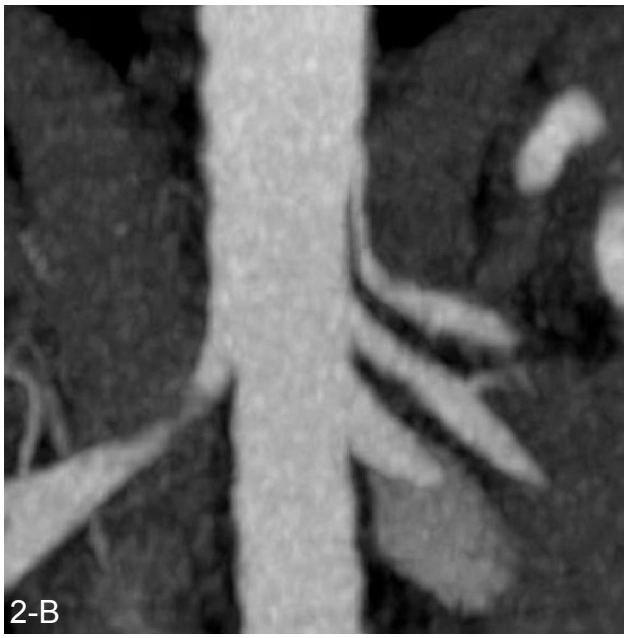


Figure 2-A: Axial CT angiogram and **B:** Coronal reformatted CT angiogram show narrowing in the proximal aspect of left renal artery as it courses between the aorta and left crus of diaphragmatic (LRA: Left renal artery)

Discussion

Among renal arterial branching anomalies, the multiplicity on either side is the most common variation.[1,4]

According to Kumar et al, extra renal arteries are divided in to two groups of hilar (accessory) entering the hilum along main renal artery and polar (aberrant) group which penetrates the renal capsule directly outside of hilum.[1,5] Our patient had 3 renal arteries on the left side comprising of one main and two extrarenal arteries, one hilar and one polar. Gyori et al assumed that supernumerary renal arteries were more likely to become stenotic, due to their longer course and smaller caliber relative to the main renal artery leading to potential underperfusion.[2] Glodney et al found that the level of plasma rennin activity was higher in patients with multiple renal arteries making them prone to arterial hypertension with no causal relationship.[2]

On the other hand, Nomura et al studied 243 renal arteriograms and found no difference in plasma rennin activity between multiple and single renal artery and concluded that multiplicity of renal arteries

is not an etiology for essential hypertension.[6]
Sari et al described a case of a 44 year-old hypertensive female with stenosis of proximal right single renal artery due to compression by median arcuate ligament.[3] However, the plasma rennin activity was not measured by them considering single artery as the etiology of hypertension.[3]
Our case had stenosis in the proximal polar extra renal artery which was clearly depicted in the CT angiography and the level of plasma rennin was measured at the renal vein during angiography which was within normal range. There is no reported case concerning paracrural renal artery course causing compression in the presence of multiple renal arteries. We concluded that presence of multiple renal arteries with paracrural course and crural compression of one artery is a rare anomaly and may not be hemodynamically significant to cause renovascular hypertension.

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