

Ethical considerations

The patient has given consent for publication of his case.

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Rev Argent Cardiol 2020;88:561-563.
<http://dx.doi.org/10.7775/rac.v88.i6.19397>

Renal Artery Aneurysm with Bilateral Renal Artery Stenosis

We report the case of a 23-year-old female patient with a history of hypothyroidism, chronic anemia due to thalassemia, obesity, sedentary lifestyle, and hereditary family history (father with type 2 diabetes). The patient refers a 3-year history of hypertension (HTN), with off-target systolic and diastolic blood pressure of 180/120 mmHg despite combination therapy with 4 drugs: hydrochlorothiazide, valsartan, amlodipine and carvedilol. The patient also refers FCI dyspnea (NYHA classification). On physical examination, the patient was lucid, oriented, and tolerating decubitus; blood pressure in the right arm was 190/120 mmHg and in the left arm, 192/120 mmHg. Cardiovascular system: Normal, regular S1 and S2; no S3; apex beat in the 5th left intercostal space. IBD. Preserved peripheral pulses.

Complementary studies

Electrocardiogram: Sinus rhythm, left ventricular overload. Chest X-ray: CTI <0.5. Doppler echocardiography: LVDD: 49 mm, LVSD: 33 mm, IVS: 13 mm, PW: 13 mm, LVMI: 130 g/m², aortic root: 29 mm, LA: 35 mm, RVDD: 15 mm, EF: 60%, ShF: 40%, TAPSE: 23 mm, normal wall motion, aortic peak gradient 8.8 mmHg. Lab tests: red blood cells 4.7; hemoglobin 9.3 mg%; hematocrit 32%; glycemia 81 mg/dL; cholesterol

120 mg/dL; urea: 34 mg/dL; creatinine 0.88 mg/dL; creatinine clearance 124.5 mL/min; hematuria (-); HIV (-); VDRL (-); microalbuminuria 3.06 mg/L, proteinuria 12.24 mg/24 h.

Abdominal X-ray and abdominal ultrasound performed due to suspected secondary, probably renovascular, hypertension, were normal. In turn, renal ultrasound revealed an anechoic mass of 1.95 cm and 1.44 cm in the right renal pelvis. Doppler ultrasound of the renal arteries showed peak systolic velocity (PSV) in the main right renal artery (RRA) of 210 cm/s (NV <180 cm/s), resistance index (RI) >0.7 (NV <0.70), and acceleration time of 0.13 cm/s (NV <0.1). Peak systolic velocity in the left main renal artery (LRA) was 173 cm/s, and RI 0.65. Renal digital subtraction angiography evidenced a severe lesion in the middle third of the LRA, another severe lesion in the middle third and posterior RRA and a narrow neck saccular aneurysm was targeted in the main RRA bifurcation. After evaluating the therapeutic options, endovascular exclusion of the aneurysm and embolization with 5 coils (Barricade Coil System) was chosen: one of 9 x 30, two of 8 x 27 and two of 7 x 19 mm, resulting in aneurysm compaction. A main RRA angioplasty with a 4.30 mm x 16 mm stent was then performed. The following month, an angioplasty with a 4.0 mm x 16 mm Corflex stent in the main LRA was performed.

The patient made good progress after the procedure: Color Doppler ultrasound of the renal arteries: RRA: PSV: 170 cm/s, RI: 0.63; LRA: PSV: 165 cm/s, RI: 0.60; and ABPM: Systolic night-day HTN, grade I non-dipper. Selective renal angiography at one year was normal. The patient remains normotensive and under treatment with carvedilol, amlodipine, aspirin, and statins, and has discontinued clopidogrel.

In the study for suspected secondary hypertension refractory to treatment, we chose Doppler ultrasound of the renal arteries with 85% sensitivity and 92% specificity. Our patient was diagnosed RRA stenosis, and the evaluation was supplemented with renal artery angiography with digital subtraction, a gold standard method with 94% sensitivity and 93% specificity. Renal Doppler ultrasound may be negative in 10-20% of the cases, which would explain the lack of diagnosis of LRA stenosis.

Renal artery aneurysm (RAA) is a rare vascular entity (0.09-0.3% of all aneurysms) –usually saccular and mostly of extraparenchymal– affecting the bifurcation of the renal artery. (1) This condition often presents with hypertension due to renal artery stenosis or renal ischemia secondary to thromboembolization distal to the aneurysm. Mean age of presentation is 40-60 years; however, in young women with severe hypertension -in the absence of obesity, contraceptives and parenchymal renal disease-, the etiology is often attributed with more prevalence to fibromuscular dysplasia (FMD), a non-inflammatory vascular disease, or atherosclerosis, and less frequently, to congenital or fungal disorders, polyarteritis nodosa, trauma, syphilis, or tuberculosis. (2)



Fig. 1. (A & B): Selective arteriography of the right renal artery showing a sacular image with caudal pole adjacent to the main bifurcation of that artery, is a specific finding of a right renal artery aneurysm. **(C):** Left main renal artery stenosis.



Fig. 2. (A & B): Selective arteriography of the right renal artery showing aneurysmal embolization with 5 Barricade coils. **(C):** Left renal artery angioplasty.

Associated complications including RA thrombosis, hematuria due to aneurysm rupture, renal infarction due to aneurysmal dissection and hypertension have been described. Aneurysmal rupture is rare (3%) but fatal. Rupture during pregnancy has a mortality rate of 50% for the mother. (3)

There are 2 registries: One is from the University of Michigan Hospital, in which the RAA were: 68% solitary, 31.5% multiple, and 19% bilateral, with average size of 1.5 cm. (4) Their presentation can produce flank pain in 15% of the patients, hematuria in 30%, and hypertension in 55%; the latter triggers the rupture in 90% of cases. The other is the ARCADIA Registry (Assessment of Renal and Cervical Artery Dysplasia), in which 48% of the cases had multisite FMD, and 20% had bilateral pathology. Among patients with a renal presentation, the prevalence of cervical lesions was higher in patients with bilateral than in those with unilateral RA lesions. (5) In our patient, results from the Doppler ultrasound of the neck vessels, abdominal aorta, and iliac, subclavian, brachial, radial, and bilateral ulnar arteries was normal.

Considerable controversy continues to surround the treatment of these aneurysms: specifically, what size of RAA needs surgery in asymptomatic patients; experts recommend repair in diameters ranging from 15 mm to 30 mm, although treating diameters > 20 mm is generally accepted.

Endovascular treatment is used, either direct aneurysm embolization, extended-release coils and stents

with aneurysm embolization, or surgery only for complex lesions in case of large aneurysms with high risk of perforation or radiological signs of expansion. Nephrectomy is necessary only if the aneurysm is ruptured.

Renal angioplasty is the treatment of choice for renal artery stenosis due to FMD. (6) Other indications for revascularization include hemodynamically significant lesions, bilateral lesions, accelerated hypertension, and in patients with uncontrolled blood pressure despite drug therapy, as in our case.

Fibromuscular dysplasia should be considered in young women with the combination of aneurysm and renal artery stenosis. Renal artery angioplasty and endovascular exclusion of the aneurysm with coils should be the treatment of choice in these cases.

Conflicts of interest

None declared.

(See authors' conflicts of interest forms on the website/ Supplementary material).

Ethical considerations

Not applicable

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