

Endovascular Revascularization of the Renal Artery in Senegal: About 3 Cases

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Case Report

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Abstract: This is a series of 3 young patients with renovascular hypertension resistant to antihypertensive treatments. Echodoppler renal arteries, angioscanner and renal arteriography led to the diagnosis of stenosis of the renal artery. They had angioplasty without stenting for one and associated with bare stenting for the other two. During the follow-up, there was a disappearance of hypertension in all her patients without major complications. These preliminary findings, without prejudice to the etiologies, are superimposable on literature data and constitute the beginning of our renal artery endovascular revascularization activity.

Keywords: Renal Artery, Renovascular HTA, Angioplasty, Stenting.

INTRODUCTION

Stenosis of the renal arteries may interest to the origin, trunk, or intra-parenchymal branches. The main causes of these lesions are atherosclerosis, dysplastic lesions and Takayasu inflammatory lesions [1]. Rarer causes are possible such as embolism, dissection, aneurysms and congenital malformations of the renal artery [2]. Renal artery stenosis (ARS) plays a major role among secondary causes of high blood pressure (HBP) [3]. Clinically, the discovery of an abdominal murmur in a HBP patient should lead to a renovascular origin [1]. The treatment aims at normalizing the blood pressure figures and preserving the nephronic capital, allowing a renal revascularization, either by surgery or angioplasty. We report 3 cases of renal artery stenosis revascularized in the Thoracic and Cardiovascular Surgery Department of the University Hospital Center of Fann, Dakar.

CASES REPORT

Case-1

PN is 16 years woman. She consulted for HBP discovered 4 months ago and who was resistant to medical treatment with nifedipine and atenolol. In her medical history, there were several hospitalizations for decompensation like heart failure. On physical examination, aortic breath was noted and distal pulses were well perceived. Renal arterial ultrasound was not contributive and urography showed delayed secretion and excretion of the left kidney. MRI angiography of the aorta showed multi-stage narrowing of the renal artery, abdominal aorta, primary iliac artery, axillary artery and brachial arteries. At the level of the renal arteries (Figure-1), there was bilateral proximal complete stenosis.

In biology, CRP was elevated to 38.4 mg/l and renal function was retained. Renal arteriography was performed using the Seldinger technique, which confirmed significant ostial stenosis of the right renal artery. We performed a balloon angioplasty. There was good arterial permeability at angiographic control. The immediate operative follow-ups were simple. Blood pressure and renal function are normal at first month

postoperative control. The duration of hospitalization was 2 days. The follow-up at 8 months shows a stabilization of blood pressure without antihypertensives and renal artery patency at duplex scanning.

Case-2

RB is a 23-year-old patient who was seen for high blood pressure three years ago. Her HBP was resistant to medical treatment with bisoprolol, amlodipine and indapamide. Examination of the left upper limb noted an abolition of pulse without evidence of ischemia. The left carotid carotid pulse was absent.

Doppler ultrasound of the supra aortic trunks revealed diffuse parietal thickening of the brachiocephalic arterial trunk and common carotids with significant reduction of their caliber responsible for damping the internal carotid flow.

CT angiography revealed long and tight stenosis of the subclavian and left axillary arteries in a context of diffuse parietal arterial thickening. At the aorto-abdominal level, there was bilateral short stenosis of the renal arteries after their origin about 13 mm to

the right and 10 mm to the left. In addition, there was superior mesenteric artery occlusion and celiac trunk stenosis related to the presence of an arched ligament.

In biology, uremia and creatinemia were normal; there was an inflammatory syndrome with accelerated VS at 42mm and CRP at 96 mg / l. Endovascular renal artery revascularization was decided on a left femoral puncture. Arteriography confirmed stenosis of 90% of the left renal artery (Figure -2) and 35% of the right. Angioplasty of the left renal artery with bare balloon and set up a bare stent of 5 mm x 4 cm. the control was satisfactory with good renal perfusion (Figure-3). The postoperative course was simple and the patient was discharged from hospital on D3 postoperatively. The control at the 2nd postoperative month noted a normalization of the tension and that at 13 months showed a permeability of the renal arteries and an amendment of the hypertension without antihypertensives. In addition, the diagnosis of Takayashu Disease was confirmed and corticosteroid treatment with methotrexate-based immunosuppressive drugs was initiated.

Case-3

FS is a 24-year-old woman with high blood pressure who was diagnosed with recurrent headache. His treatment is made of amlodipine and ramipril. She is asthmatic. Physical examination is strictly normal. Renal ultrasonography noted good corticomedullary differentiation but was not contributive to renal vascularity. CT angiography of the renal arteries noted a very tight ostial stenosis greater than 70% of the right renal artery with renal asymmetry at the expense of the right kidney. In biology there was no particularity, especially the renal function was normal. Retrograde arteriography of the right femoral artery confirmed a very tight right renal arterial of about 90% (Figure-4). The arterial wall was irregular downstream with ectasia of the distal portion. Balloon angioplasty was performed and a 5 mm x 5.5 cm stent was placed. Angiographic control was satisfactory with good arterial permeability (Figure-5). The patient had a fever of 38.5 ° C for 4 days postoperatively immediately resolved by antimalarial treatment and paracetamol. She left the hospital on day 14 with normal kidney function and persistent high blood pressure. Control at 2 months shows normalization of blood pressure and renal arterial patency. At month 8, there was normalization of blood pressure without antihypertensives and renal artery patency at duplex scanning.

ETHICAL CONSIDERATIONS

This work is carried out after the written consent of the patients concerned.

ICONOGRAPHY

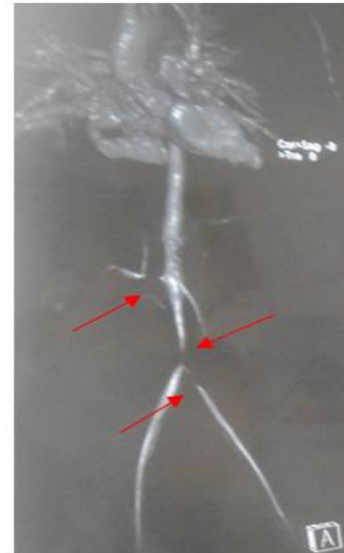


Fig-1: MRI angio multiple-stage stenosis of the abdominal aorta, iliac and right renal artery

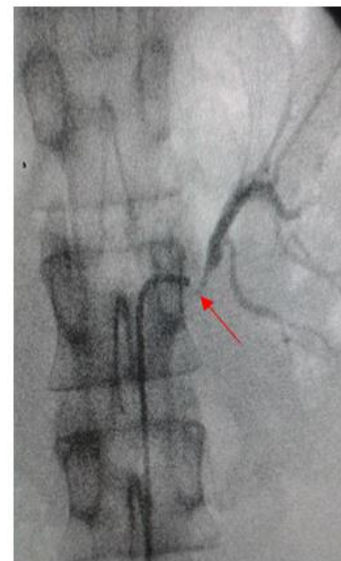


Fig-2: Angiography: almost complete ostial and post-ostial stenosis of the left renal artery

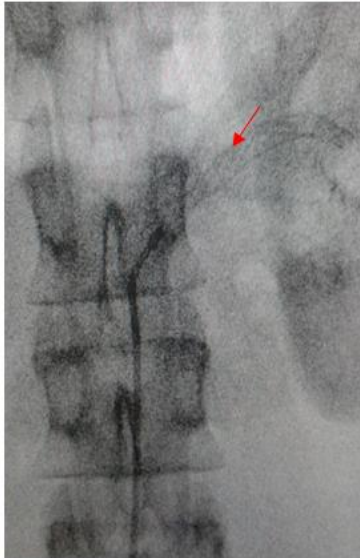


Fig-3: Stent of the left renal artery in place

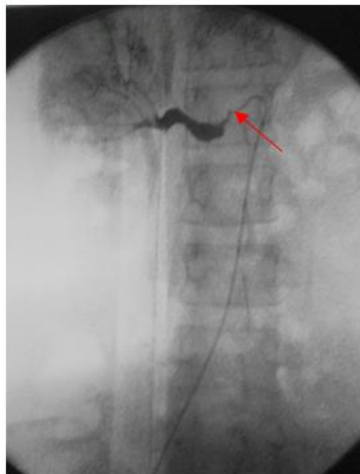


Fig-4: Confirmation of stenosis of the right renal artery at arteriography

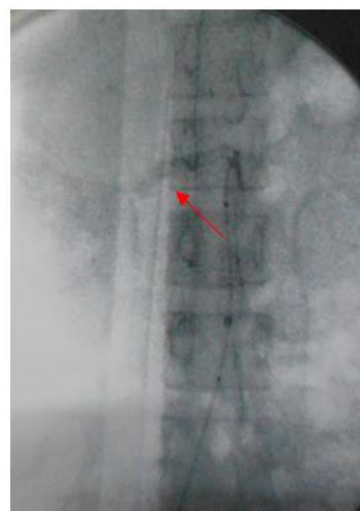


Fig-5: Stent of the right renal artery in place

DISCUSSION

Renal arterial stenosis is anatomically defined when luminal diameter reduction exceeds 50%. Hemodynamics instead sets this threshold at 60% reduction in diameter or 80% reduction in area [4].

All our patients were young with a maximum age of 24 while Gloviczki *et al.*, [5] had a mean age of 65 years in a series of 14 patients with unilateral renal artery stenosis. This major age difference is related to the etiology of the stenosis in their study. Atherosclerosis occurs in generally elderly patients with cardiovascular risk factors was the main cause found. On the other hand, for us, two causes of ARS were evoked in our patients: the 1st case and the 2nd case, in addition to the renal arterial damage, there were lesions which interested the aorta and its main branches of division all in an inflammatory context in young female subjects pointing to Takayasu arteritis [6]. Our 3rd case is a young woman with a recent HTA, in whom, the renal angiography did not find the classic appearance in "pearl necklace" but an arterial parietal irregularity with an area of ectasia; this picture was suggestive of fibromuscular dysplasia (FMD), which is a group of non-atherosclerotic and non-inflammatory diseases of the muscularis of the arterial walls [7].

The HBP rebelling medical treatment was the way of revealing the RAS in all our patients thus defining the renovascular syndrome [8]. Nevertheless, the physical examination found aortic breath in the first case, very suggestive of renovascular disease. However this criterion is neither sensitive nor specific, because the frequency of an "innocent" abdominal breath is far from negligible in the general population and can reach 6.5 to 31% [1].

Function and renal volume were preserved in all cases. This could be explained on the one hand that the diagnosis was made very early as soon as the signs appeared. The evolution of the stenosis towards the complete obstruction taking place during 4 to 5 years in 49% of the cases. On the other hand, the hemodynamic repercussions of stenosis on glomerular perfusion are not always proportional to the degree of this stenosis [3].

Renal vascular ultrasound was prescribed in 2 cases but was not contributive; the diagnosis was therefore made by CT angiography and angio-MRI and confirmed by peri-interventional arteriography. One of the reasons is that ultrasound is dependent operator but also according to Williams *et al.*, [9] its accuracy is moderate because it is based on measuring the velocity peak of the renal artery, which is sensitive in 85% of cases. CT angiography and MRI angiography, although difficult to reproduce, remain very effective for the diagnosis of RAS, but renal arteriography remains the confirmatory examination that allows measurement of

the pressure gradient on both sides of the stenosis and to associate a therapeutic gesture [10, 2].

The treatment of the RAS aims at 3 objectives: to control the arterial pressure, to preserve the renal function and to avoid the decompensations like pulmonary oedema. As with all our patients, antihypertensive therapy should be prescribed in all cases; blockers of the renin-angiotensin system and aggressive treatment of cardiovascular risk factors is advocated by some authors [3].

The Seldinger technique by retrograde puncture of the common femoral artery was used for all cases. The procedure consisted of balloon angioplasty for the first patient and angioplasty plus a bare stent for the other two. The classical technique was open surgery for renal artery bypass surgery. Since the 1990s, endovascular techniques have flourished; they are as effective as open surgery and would be less morbid [2]. Angioplasty alone is very effective in removing the obstacle in the short term but the recurrence of restenoses is very frequent. This is why the associated stenting ensures arterial permeability for the long term and is highly recommended [2]. The dimensions of the stent are relative to the diameter of the renal artery as well as the extent of the stenosis. Our first patient was only six years old and we did not have a suitable stent.

The immediate operative follow-ups were simple. However, complications related to the endoluminal revascularization procedure have been reported in the literature such as arterial dissection, nephropathy induced by contrast, cholesterol embolism and restenosis of the artery.

Renal function and blood pressure were monitored in all cases. According to Phan *et al.*, [3] Revascularization does not control all renovascular HTAs because nephroangiosclerosis lesions once established are irreversible even after revascularization.

Moreover, the treatment of the etiology of the ARS is crucial. In one of our patients the diagnosis of Takayashu's disease is formal. For the latter, the diagnosis is based on a bundle of radioclinical arguments, the topography of the arterial disease, its appearance (stenosis or ectasia) and the association of tegumentary and visceral lesions [11]. Before an evocative table of vasculitis, the criteria proposed by the American College of Rheumatology [12] and the modified criteria of Sharma [13] can be used. There are 3 major criteria such as stenosis or occlusion of the middle part of the left or right subclavian artery at angiography and characteristic symptoms lasting at least one month (claudication, abolition). Pulse or blood pressure asymmetry, fever, neck pain, amaurosis, visual disturbances, syncope, dyspnea and palpitations). The minor criteria are 10; these are SV > 20 mm / h, carotid tenderness on palpation, brachial artery pressure >

140/90 mmHg, stenosis or occlusion of the middle portion of the left carotid or distal third of the brachiocephalic trunk at the angiography and many others. Thus a rating based on clinical, radiological and histological criteria appears in practice more useful [11]. Thus, the presence of 2 major criteria or 1 major criterion + 2 minor or 4 minor criteria suggests a high probability of Takayashu's disease [13].

The treatment of this disease is primarily medical consisting of corticosteroid or even immunosuppressive therapy based on methotrexate, azathioprine, mycophenolate mofetil, cyclophosphamide or more recent treatments such as anti-TNF and anti-TNF receptors, Interleukin 6. Regarding the stenosis of the renal artery often associated with this disease, endovascular revascularization surgery is indiscutable.

CONCLUSION

High blood pressure resistant to medical treatment should prompt to look for a secondary cause. Although rare, renal artery stenosis can then be revealed. Once the stenosis is confirmed, the reference treatment is a balloon angioplasty followed by a stent.

This work is for the promotion of this technique in our countries, in which there is a resurgence of arterial hypertension; whose renocascular causes which are amenable to endovascular revascularization are not negligible.

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