European Review for Medical and Pharmacological Sciences 2009; 13: 317-319

Primary stenting for renal fibromuscular-dysplastic stenosis: a case report

R. CIANCI, G. STIVALI, A. GIGANTE, D. DI DONATO, L. POLIDORI, G. CLEMENZIA, F. BORGHESI, R. RENZULLI, P. MARTINA, M.L. GASPERINI, B. BARBANO

Department of Nephrology, University "La Sapienza", Rome (Italy)

Abstract. – Fibromuscular dysplasia (FMD) is a non-inflammatory, non-atherosclerotic vascular disease that has been reported in renal and internal carotid arteries and in almost every arterial bed, primarily affecting young to middle-aged people, mainly female individuals. These patients may be asymptomatic or may present with hypertension.

A 29 year-old hypertensive woman was referred for a renal color Doppler ultrasound (CDU) scan because of a suspicion of renovascular hypertension and we revealed the presence of three separate stenosis on the right renal artery. Digital selective angiography (DSA) and percutaneous transluminal angioplasty (PTA) were performed but an incomplete dilation of the vessel was obtained. Because of the suboptimal result, it was decided to stent the lesions during two different procedures.

Percutaneous transluminal renal angioplasty is the primary treatment of renal FMD, but should not be excluded primary stent implantation as an alternative technique to surgical revascularization.

Key Words:

Fibromuscular dysplasia, Renal artery, Percutaneous transluminal angioplasty stenting, Renovascular hypertension, Color Doppler ultrasound.

Introduction

The pathological classification scheme for fibromuscular dysplasia (FMD) lesions of the renal arteries is based on the arterial layer – intima, media, or adventitia – in which the lesion predominates[1]. Diagnosis of renal artery stenosis (RAS) is made by color Doppler ultrasound (CDU) and confirmed by magnetic resonance angiography (MRA). However, renal arteriography remains the gold standard[2] although the recent literature reported a pitfall in the diagnosis of FMD renal stenosis[3].

Medical management is indicated for the treatment of hypertension and endovascular therapy or surgery is recommended when hypertension is poorly controlled with three or more antihypertensive drugs. Percutaneous Transluminal Angioplasty (PTA) is the mainstay of treatment for the renal artery stenosis in FMD. There is no indication to stent fibrous lesions, because the recurrence rate after PTA is low, especially for the medial FMD[4].

The occurrence of a new focal lesion, worsening arterial stenosis, or the enlargement of a mural aneurysm, occurs in up to 37 percent of patients with renal FMD[2]. Blood pressure (BP) and renal function controls with periodical CDU examination during the follow-up is always recommended for monitoring the disease's progression, restenosis, or loss of kidney volume.

Case Report

A 29 year-old hypertensive woman was referred for a renal CDU scan because of a suspicion of renovascular hypertension. She was on medical treatment with calcium channel antagonists (manidipine 10 mg, daily) and angiotensin II type 1 receptor blockers (losartan 50 mg, daily) with poor blood pressure (BP) control (mean day time BP value of 160/105 mmHg at 24-hours BP monitoring) and a slower decline of renal function with serum creatinine level of 1.54 mg/dl (normal values 0.60-1.20 mg/dl) and blood urea nitrogen (BUN) of 64 mg/dl (normal values 20-50 mg/dl).

When she arrived to our observation, three separate renal artery stenosis were diagnosed by CDU scan (Aplio SSA-77A with a 3.5 MHz Doppler convex transducer, Toshiba, Tochigi-Ken, Japan) and confirmed by MRA. Stenosis were located at the ostial, middle and distal portion of the right re-

Corresponding Author: Biagio Barbano, MD; e-mail: biagionet@hotmail.com

nal artery and the last two showed elevated blood-flow velocities with the peak systolic velocity (PSV) of 200 cm/sec and 230 cm/sec respectively as for haemodynamic stenosis. The ostial stenosis had a PSV of 160 cm/sec.

Digital Selective Angiography (DSA) and PTA were performed but an incomplete dilation of the vessel was obtained. Because of the suboptimal result, it was decided to stent the middle and distal stenosis during the same procedure. The ostial stenosis was not treated because it did not appear as an haemodynamic lesion.

For percutaneous transluminal selective renal angioplasty, the renal artery was approached through a skin incision in the femoral artery. We used 5-French catheters for selective renal-artery angiography and 6 French guiding pigtail catheters (Choice 0.14) for positioning the stents. All lesions were repaired with stainless steel Express LD 6x14 stent (Boston Scientific Corporate, Natick, MA, USA) premounted on a balloon catheter. For PTAS, patients received an injection containing 25-30 mL of a 50-50 mixture of isotonic contrast and saline.

The patient was discharged with antiaggregant therapy (ticlopidine hydrochloride 250 mg, daily). After revascularization, no antihypertensive therapy was required and renal function improved with serum creatinine level of 0,9 mg/dl and BUN 28 mg/dl.

During six months follow-up, CDU showed patency of the two distal stents while the ostial lesion showed a slow increase in velocity blood-flow with PSV of 190 cm/sec as for increased stenosis degree. Six months later, because of the CDU findings and high blood pressure values (170/90 mmHg), DSA and PTA-stenting procedures were performed at the ostial lesions and optimal outcome was confirmed by angiographic control (Figure 1).

The patient was discharged with clopidogrel (75 mg, daily) and acetylsalicylic acid (75 mg, daily) therapy. Complete patency of three stents with CDU scan (Figure 2), good blood pressure control and normal renal function blood tests were observed throughout 36 months of the follow-up.

Figure 1. Arteriography control after the third stent positioning on right renal artery.

Discussion

Nowadays conventional balloon angioplasty is the therapy of choice for renal artery stenosis caused by FMD with cured or improved hypertension in 60-92% of the cases[5-7]. Although complications of renal artery PTA are rare, adverse events such as ruptured balloon followed by embolism and acute limb ischaemia requiring emergency surgery are reported[7-8]. Before the advent of PTA, surgical revascularization was the primary therapeutic alternative for patients with refractory hypertension due to FMD stenosis of the renal artery. However, PTA is less costly than the surgical revascularization and less invasive, can be performed on an outpatient basis,

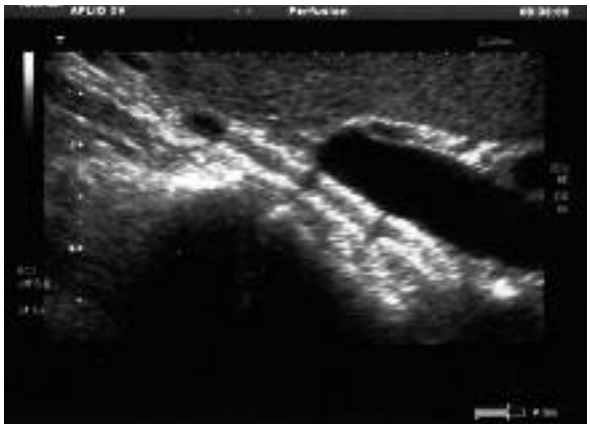

Figure 2. Color Doppler ultrasound scan showing the presence of three stents on the right renal artery.

and is associated with a lower morbidity. Moreover, if it is unsuccessful, surgical therapy may still be used[10-13].

Although stents have been used extensively for the treatment of the atherosclerotic renal artery stenosis, the use of stents for FMD has been reserved as a "bailout" procedure in cases in which there are suboptimal results with balloon angioplasty or in which a renal artery dissection occurs[4].

In our case, we decided to implant two stents soon after the first PTA because the result was suboptimal. A primary PTA-stenting was implanted in the ostial stenosis after the absence of restenosis of the first two stents was confirmed, and normalization of renal function and good blood pressure control without antihypertensive medical therapy were ascertained after the first procedure. Of note, the patient has always refused surgical treatment with renal-aortic by-pass.

In conclusion, conventional balloon angioplasty remains the therapy of choice for renal artery stenosis caused by FMD, but the use of primary stenting should not be excluded as first approach in the treatment of symptomatic FMD renal artery stenosis.

References

1) Harrison EG Jr, McCormack LJ. Pathologic classification of renal arterial disease in renovascular hypertension. Mayo Clin Proc 1971; 46: 161-167.
2) Begelman SM, Olin JW. Fibromuscular dysplasia. Curr Opin Rheumatol 2000; 12: 41-47.
3) Pratap T, Sloand J, Narins CR. Potential pitfalls of renal angiography: a case of atypical fibromuscular dysplasia. Angiology 2009; 59: 753-756.
4) Slovut DP, Olin JW. Fibromuscular dysplasia. N Engl J Med 2004; 350: 1862-1871.
5) Zeller T. Renal artery stenosis: epidemiology, clinical manifestation, and percutaneous endovascular therapy. J Interv Cardiol 2005; 18: 497-506.
6) Van Bockel JH, Weibull H. Fibrodysplastic disease of the renal arteries. Eur J Vasc Surg 1994; 8: 655-657.
7) Cluzel P, Raynaud A, Beyssen B, Pagny JY, Gaux JC. Stenoses of renal branch arteries in fibromuscular dysplasia: results of percutaneous transluminal angioplasty. Radiology 1994; 193: 227-232.
8) Vanmaele RG, D'Archambeau OC, Van Schil PE, Van Landuyt KA, De Schepper AM. Ruptured balloon separation during percutaneous transluminal renal artery angioplasty. Eur J Vasc Surg 1993; 7: 104-106.
9) Gahlen J, Koeppel T, Prosst RL. Vascular occlusion by ruptured balloon after percutaneous transluminal angioplasty. J Endovasc Ther 2003; 10: 1117-1119.
10) Lüscher TF, Keller HM, Imhof HG, Greminger P, Kuhlmann U, Largiadèr F, Schneider E, Schneider J, Vetter W. Fibromuscular hyperplasia: extension of the disease and therapeutic outcome: results of the University Hospital Zurich Cooperative Study on Fibromuscular Hyperplasia. Nephron 1986; 44: 109-114.
11) Hägg A, Aberg H, Eriksson I, Lörelius LE, Mörlin C. Fibromuscular dysplasia of the renal artery–management and outcome. Acta Chir Scand 1987; 153: 15-20.
12) Sos TA, Pickering TG, Sniderman K, Saddekni S, Case DB, Silane MF, Vaughan ED Jr, Laragh JH. Percutaneous transluminal renal angioplasty in renovascular hypertension due to atheroma or fibromuscular dysplasia. N Engl J Med 1983; 309: 274-279.
13) Towbin RB, Pelchovitz DJ, Cahill AM, Baskin KM, Meyers KE, Kaplan BS, McClaren CA, Roebuck DJ. Cutting balloon angioplasty in children with resistant renal artery stenosis. J Vasc Interv Radiol 2007; 18: 663-669.