

## CORRESPONDENCE

# Treatment options in fibromuscular dysplasia of the renal artery: when percutaneous transluminal angioplasty is at high risk?

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### CASE REPORT

A 26-year-old woman was seen in the emergency room for recent onset hypertension. She reported no relevant systemic symptoms, clinical evaluation was unremarkable and blood pressure was 250/150 mmHg. Blood tests revealed only mild hypokalemia ( $3.4 \text{ mEq l}^{-1}$ ). Target organ damage was documented (microalbuminuria, grade 2 hypertensive retinopathy and left ventricular hypertrophy with diastolic dysfunction on echocardiography). Basal and captopril stimulated plasma renin activity and aldosterone concentration were within the normal limits.

C-reactive protein, erythrocyte sedimentation rate, antinuclear antibodies, a-neutrophil cytoplasmic antibody and antiphospholipid antibodies panel were negative. On ultrasound examination, the right kidney size was decreased with a slight increase of Doppler flow velocity on the right renal artery. Sequential renal scintigraphy showed right kidney hypoperfusion: the right kidney glomerular filtration rate was  $37 \text{ ml min}^{-1}$  with patchy hypoperfusion of the upper pole, while the left kidney glomerular filtration rate was  $67 \text{ ml min}^{-1}$ . Abdominal CT and magnetic resonance angiography (MRA) showed reduced calibre of the right renal artery in

its medial and distal tract. The patient was treated with ACE inhibitor and calcium-channel blocker with a transient blood pressure reduction (down to 140/94 mmHg, mean of repeated office measurements).

Percutaneous transluminal balloon angioplasty (PTA) was planned. On selective renal angiography, 95% annular stenosis of the main right renal artery at kidney hilum was confirmed (Figure 1). As stenosis was close to the artery bifurcation, PTA-induced artery dissection may have further compromised renal perfusion requiring emergency revascularization or, more likely, nephrectomy. Therefore, the patient was referred to elective vascular surgery. A right renal artery bypass was done with right termino-lateral aorto-renal bypass with the great saphenous vein. The bypass was anastomosed with the right renal artery at the prehilum bifurcation (Figure 2). Revascularization was accompanied by immediate and medium-term significant blood pressure reduction without antihypertensive treatment: mean home blood pressure was 130/85 mmHg, ambulatory blood pressure was 117/80 mmHg at daytime, 111/75 mmHg at night-time 6 months after surgery. At 2 years after revascularization, the patient is well, under ramipril 2.5 mg once daily with good

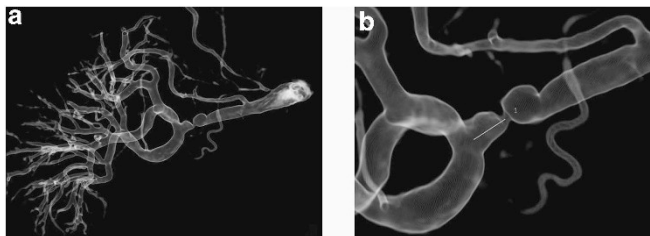
office blood pressure control (138/76 mmHg), normal urinalysis and renal function (serum creatinine  $0.83 \text{ mg dl}^{-1}$ , estimated Cockcroft-Gault glomerular filtration rate  $130 \text{ ml min}^{-1}$ ) and bypass patency (Figure 3).

### DISCUSSION

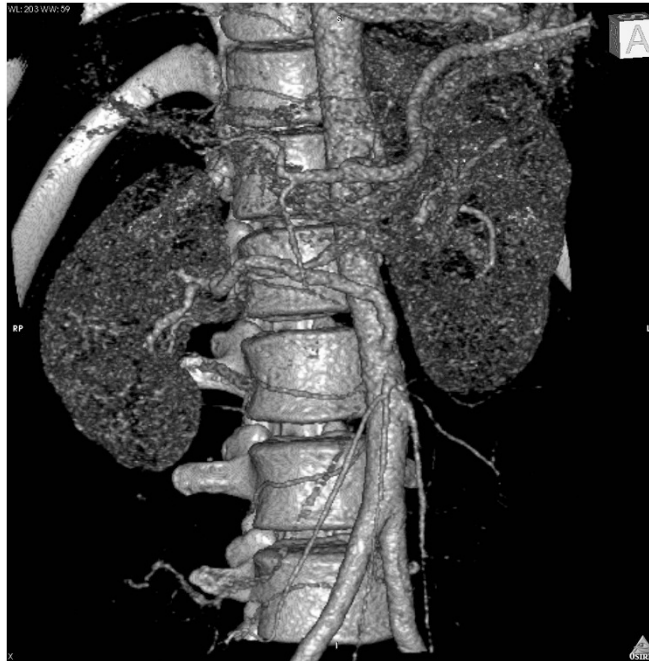
Fibromuscular dysplasia (FMD) is a non-atherosclerotic non-inflammatory vascular disease that affects young and middle-aged women. It may involve the renal and carotid arteries and it is often underdiagnosed because of the lack of specific symptoms and signs. FMD is classified into three categories according to the affected layer of the arterial wall—intima, media and adventitia (periarterial). Medial FMD is the most common and is further subdivided into medial and perimedial fibroplasia, and medial hyperplasia.

Several diagnostic options can be chosen to detect FMD. MRA can be successfully used for diagnosis, but CT angiography holds the greatest accuracy with sensitivity and specificity reported as 64–99% and 89–98%, respectively. Catheter-based angiography remains the most accurate imaging technique, but it is performed only when interventional revascularization is planned, as was the case in our patient.<sup>1</sup>

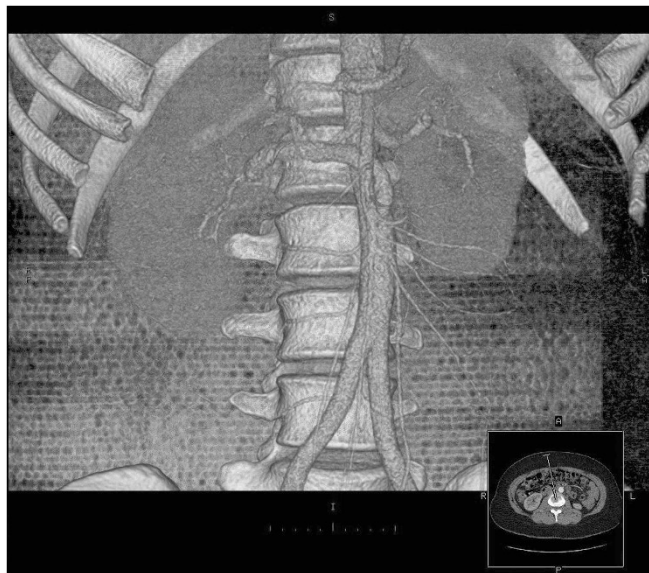
The primary goal in the treatment of patients with renal artery FMD is hypertension control to prevent target organ damage. In patients with non-atherosclerotic renal artery disease associated with severe hypertension, endovascular or open renal revascularization is superior to medical management alone. However, PTA, with or without stenting, and surgical intervention are offered only in case of poor blood pressure control, intolerable side effects of the



**Figure 1** Rotational angiography volume-rendering technique reconstruction showing right renal vasculature (a) and reduced calibre of the right renal artery in its medial and distal tract (b).



**Figure 2** Postoperative angioCT showing venous bypass anastomosed with the right renal artery at the prehilal bifurcation. A full color version of this figure is available at the *Hypertension Research* journal online.



**Figure 3** Abdominal CT scan 2 years after surgical revascularization showing the venous bypass. A full color version of this figure is available at the *Hypertension Research* journal online.

medications, reduction of renal size or reduction of renal function.

PTA is the recommended first-step therapy, as it is very effective with no need for stent implantation in most circumstances. Stenting is considered for treating dissection and if the gradient cannot be obliterated with angioplasty alone.<sup>2</sup> According to current guidelines,<sup>3</sup> surgical revascularization should

be performed to treat aneurysms in patients in whom endovascular therapy is not an option or after PTA failure, despite the observations that it controls hypertension better than endovascular therapy,<sup>4</sup> and it provides the most durable long-term results.<sup>5</sup> Furthermore, vascular surgical reconstruction is indicated for patients with FMD renal artery stenosis exhibiting complex

disease that extends into the segmental arteries and those having macro aneurysms.<sup>3</sup>

In this patient, we offered surgical revascularization at the first attempt because to our judgment the stenosis was close to artery bifurcation and any artery dissection may have jeopardised renal perfusion, thus requiring stent implantation in a young patient or, in the case of failure, emergency surgical treatment. As there is no consideration of the site of stenosis in the current guidelines, we suggest that the site of stenosis is included among the vascular characteristics that guide treatment choices for FMD.

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