Case Report

Autotransplantation and Stent Implantation for Bilateral Renal Artery Fibromuscular Dysplasia


A 36-yr-old male was found to have renovascular hypertension due to an occluded right renal artery and 70% stenosis in the left renal artery, caused by fibromuscular dysplasia. The right kidney was supplied by collateral blood flow, and secreted more renin than the left kidney. Two differential therapeutic approaches were taken: autotransplantation for the right kidney and percutaneous transluminal renal angioplasty followed by stent implantation for the left. The renovascular hypertension was treated with these therapies, preserving renal function in this patient. (Hypertens Res 1999; 22: 141-143)

Key Words: renovascular hypertension, fibromuscular dysplasia, autotransplantation, angioplasty, stent

Three therapeutic options are currently available for patients with renovascular hypertension; medical antihypertensive therapy, surgical revascularization, and transluminal angioplasty including stent implantation. Percutaneous transluminal renal angioplasty (PTRA) has been widely used for renovascular hypertensive patients (1, 2), and more recently, intravascular stenting is reported to be potentially beneficial in improving the patency of dilated renal arteries (3, 4). In the meantime, surgical revascularization should be considered when these interventions cannot be used. We report here on a patient with bilateral renal arterial stenoses due to fibromuscular dysplasia (FMD), whose renovascular hypertension was treated with autotransplantation for the right kidney and PTRA followed by stent implantation for the left.

Case Report

A 36-yr-old male was referred to our hospital for elevated blood pressure accompanied by increased plasma renin activity (PRA) to 56 ng/h/ml. High blood pressure ranging from 160 to 170 mmHg at systole had been documented since the age of 20, but antihypertensive medicine was not administered until recently. Neither first- nor second-degree relatives had any similar diseases. On physical examination, his blood pressure was 164/110 mmHg at systole and 170 mmHg at diastole. He was found to have hypertension accompanied by increased renin activity and left ventricular hypertrophy. A renogram showed a delayed peak of radioisotope uptake by the right kidney, whereas the pattern of the left was within normal limits. As shown in Fig. 1, abdominal aortography revealed total occlusion of the right renal artery and 70% stenosis of the left, and the right kidney was supplied by collateral arteries. The PRAs in the inferior vena cava (IVC) and renal veins were as follows: suprarenal IVC, 32.8; infrarenal IVC, 34.4; right IVC, 268; left IVC, 72.8 ng/h/ml. Thus, this patient was diagnosed as having renovascular hypertension, probably due to fibromuscular dysplasia (FMD) based on his age and angiographic features of the stenosis.

Two differential therapeutic steps were taken for the renovascular hypertension. The first was autotransplantation of the right kidney in the pelvis, with the renal artery anastomosed end-to-end to the right internal iliac artery, and the renal vein end-to-side to the external iliac vein (Fig. 3-A). Histologic examination of the right renal artery revealed a proliferation of fibrous tissue and smooth muscle cells, and the lumen was occluded by a thrombus. His blood pressure decreased from 160/100 to 130/90 mmHg soon after the surgery. The second therapeutic step was percutaneous transluminal renal angioplasty followed by stent implantation for the left renal artery. The left renal artery was dilated, and a stent was implanted to prevent restenosis. The blood pressure decreased further to 140/90 mmHg, and the patient was discharged on long-term antihypertensive medication.
after the surgery, under antihypertensive treatment with 40 mg nifedipine and 5 mg amlodipine, and the PRA decreased to 4.3 ng/h/ml on the fifth day after operation. As shown in Fig. 1-B, a renogram revealed an improvement in the pattern of the autotransplanted right kidney, but the peak of the left was delayed relative to the preoperative record (Fig. 1-A), without a difference in the PRAs between the left renal vein and infrarenal IVC (6.4 vs. 7.1 ng/h/ml). PTRA was subsequently performed for the left renal artery 2 mo after the surgery. In addition, a Wallstent was implanted to increase the diameter since intimal dissection occurred following the angioplasty (Fig. 3-B). Although the PRA and blood pressure remained unchanged during 2 wk in hospital following the angioplasty, the renogram pattern of the left kidney improved (Fig. 1-C). Forty mg nifedipine and 5 mg bisoprolol were necessary to maintain the blood pressure at 130/90 mmHg, but the serum creatinine level was 0.8 mg/dl after the PTRA and stenting, and remained within the normal range during all of the procedures.

Discussion

Surgical and nonsurgical methods are available for the treatment of renal artery stenosis. Recently, intravascular interventions such as PTRA or stenting have been widely used to treat renovascular hypertension (1-4). However, autotransplantation was performed on the right kidney of this patient since a nonsurgical approach was impossible due to complete occlusion of the right renal artery. Judging from the findings of the renogram as well as reductions in the blood pressure and PRA, blood supply to the right kidney improved following the operation. In the meantime, as observed in the renogram, the peak of radioisotope uptake by the left kidney was delayed compared to that before the operation, probably due to reduced renal perfusion

Fig. 1. Renograms before (A) and after (B) autotransplantation for the right kidney, and that after PTRA with stenting for the left (C). The peak levels in the left kidney are lower than those in the right after autotransplantation, measured by radioactivity detection from the front side of the patient (B and C).

Fig. 2. Aortography shows total occlusion of the right renal artery and 70% stenosis of the left.
pressure. PTRA followed by stent implantation was then performed to alleviate left renal artery stenosis. The renogram pattern of the left kidney improved, but the PRA and blood pressure remained unchanged following angioplasty. Based also on the absence of PRA step-up in the left renal vein, the stenosis may not have been severe enough to raise the blood pressure. Thus, by means of two differential therapeutic approaches, the bilateral renal artery FMD was treated preserving renal function in this patient.

In the comparison of surgical revascularization and PTRA, Weibull et al. reported that restenosis occurred at a higher rate in PTRA than in surgery (5), although restenosis can be cured by repeating PTRA. Long-term outcomes following surgical revascularization. PTRA and stenting for renal artery stenosis may also depend on the underlying arterial diseases (2, 6, 7). FMD is classified into 5 subtypes based on the sites of the vascular wall involved, and the histopathologic diagnosis of this patient was periarterial fibroplasia, a rare type of FMD (8). Goncharenko et al. showed a substantial progression rate for renal artery FMD (9), but few studies have compared the prognoses among these subtypes. Although the FMD of bilateral renal arteries was successfully treated in this patient, careful follow-up appears to be necessary for early detection of restenosis or progression of the disease.

References