

Case Report

Renal Artery Dissection after Angiographic Evaluation of Lower Extremities

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We describe a case of renovascular hypertension that was caused by renal artery dissection after an angiographic evaluation of the lower extremities. Retention of contrast medium in the affected kidney even 1 day after the procedure caused us to suspect renal artery dissection. Magnetic resonance angiography revealed irregular streaks in the lumen of the affected artery, a sign of dissection. Treatment by a transluminal angioplasty with stent insertion improved renal function and reduced systemic blood pressure with normalization of plasma renin activity. In patients whose systemic blood pressure increases suddenly after any conceivable physical traction on the abdominal aorta, evaluation of the renal arteries should be considered. Appropriate endovascular treatment can preserve renal function and reduce systemic blood pressure. (*Hypertens Res* 2005; 28: 853–855)

Key Words: renal artery stenosis, contrast medium, renal perfusion, angiography

Introduction

Renal artery dissection, which is usually caused by physical traction of a renal artery, is a rare cause of renovascular hypertension (1). Although early detection and appropriate repair can preserve renal perfusion and reduce systemic blood pressure (BP), many cases of renal artery dissection are neither detected nor treated in their early stage (2, 3). The dissection usually takes place on one of multiple trunks or a branch artery, and is generally not associated with an increment in serum creatinine (Cr). This characteristic of the disease is thought to be a reason why many cases of renal artery dissection have not been detected in their early stage (3, 4).

In the present report, we describe a case of renal artery dissection that was thought to have occurred during an angiographic procedure for the lower extremities. The retention of contrast medium in the right kidney made us suspect renal

artery dissection as a cause of the abrupt increase in BP after the angiographic procedure. Magnetic resonance angiography (MRA) revealed a typical image of renal artery dissection on the upper main trunk of the right renal artery (5, 6). Successful treatment by transluminal angioplasty with stent insertion resulted in a reduction of BP and a recovery of renal function.

Case Report

An angiography of the lower extremities was performed at another hospital to evaluate intermittent claudication of a 73-year-old man. An obstruction of the right superficial femoral artery was detected, but no angioplastic procedure was performed because the co-lateral arteries supplied sufficient perfusion beyond the obstruction. The catheter and guide wire were handled beneath the level of the bifurcation of the iliac artery during the procedure, and the angiographic procedure was eventless. However, the BP of the patient was elevated to

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Fig. 1. CT detected patchy retention of contrast medium in the right kidney even 1 day after angiographic evaluation of the lower extremities. The retention was more prominent in the lower dorsal part.

180/100 mmHg on the morning after the procedure, vs. 120/70 mmHg before the procedure. This sudden elevation of BP after overnight bed rest raised a suspicion of renal vein thrombosis or renal infarction, and an abdominal evaluation by CT scan was performed. Neither swelling of the kidneys nor thrombosis in the vasculature was detected, but there was patchy retention of contrast medium in the right kidney (Fig. 1). Based on these findings, along with the high plasma renin activity (PRA) of more than 20 ng/ml/h (normal range: 0.2–2.7 ng/ml/h), renovascular hypertension due to renal infarction was suspected and the patient was referred to our hospital.

Prior to admission, the patient had been receiving candesartan (8 mg/day) and amlodipine (5 mg/day) orally, but no anti-thrombotic medications had been administered. On the day of admission to our hospital, the blood and urine analyses showed no apparent abnormalities. WBC was 5,000/ μ l with 4% of eosinophil. The C3, C4 and CH₅₀ values were 98, 28.2 and 43.3 mg/dl, respectively (normal range: 83–140, 14–37 and 30–45 mg/dl, respectively). Urinal protein was 100 mg/g Cr and urinal RBC was <4/HPF. The value of serum Cr was 1.0 mg/dl (88.4 μ mol/l) (normal range: 0.4–1.0 mg/dl [35.4–88.4 μ mol/l]). In the renoscintigram that was taken 1 h after administration of 50 mg captopril (captopril-renogram), T_{\max} was normal in both kidneys (<5 min). However, the right renal function was extremely reduced, with a calculated glomerular filtration ratio (GFR) of 7.3 ml/min. The left renal function was also mildly reduced with a GFR of 20.0 ml/min. MRA analysis of the renal arteries revealed two right main trunks, the upper one of which showed abnormal irregular streaks in the lumen (Fig. 2A). This image indicated a diagnosis of dissection of the upper trunk of the right renal artery, which was confirmed by selective renal arteriography (Fig. 2B).

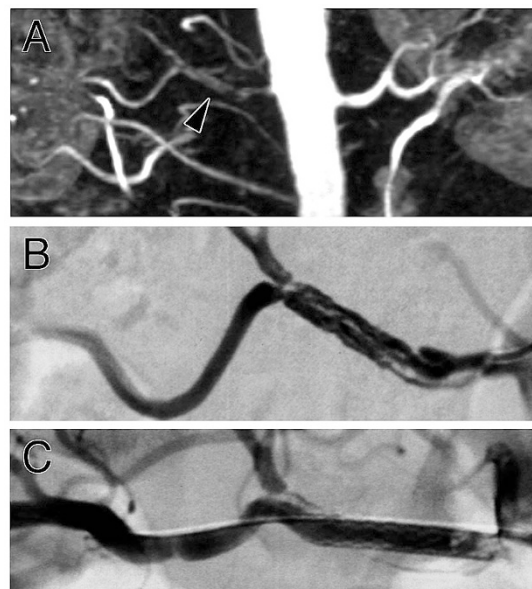


Fig. 2. A: MRA detected two main trunks in the right renal artery, and abnormal irregular streaks (arrowhead) in the lumen of the upper one. B: Selective renal arteriography revealed a dissected right upper trunk. The dissection extended into the upper branch. C: Angioplasty with stent insertion repaired the dissection in the main trunk and improved renal perfusion to the lower branch. However, the dissection in the upper branch remained.

Renovascular hypertension arising from the renal artery dissection was suspected as the cause of the sudden elevation in BP. The dissected renal artery was treated by a transluminal angioplasty with stent insertion (Fig. 2C), and oral administration of aspirin (100 mg/day) was started after the angioplasty. Although the PRAs of the samples taken from the right and left main renal veins during the angiography were not increased (right: 1.5 ng/ml/h; left: 2.0 ng/ml/h), the angioplasty reduced the BP to 135/75 mmHg without administration of anti-hypertensive agents. The BP was further diminished to 120/70 mmHg by administration of candesartan (4 mg/day). In the captopril-renogram, the calculated GFR of the right kidney was increased to 21.4 ml/min at 6 months after the angioplasty (the GFR of the left kidney was 25.1 ml/min). T_{\max} continued to show a normal value in both kidneys, and there was no apparent change in the value of the serum Cr concentration after the angioplasty.

Discussion

Renal artery dissection usually occurs as a result of physical traction of the renal arteries, and its incidence is reported to be high among patients who have multi-trunk renal artery (3). Because atherosclerosis is a systemic disease and affects multiple vessels, angiographic evaluation of atherosclerotic vas-

cular diseases with femoral puncture, which could induce physical traction at the aorto-renal junction, can potentially cause renal artery dissection (1, 7).

Renal artery dissection usually disturbs renal perfusion. As a consequence of a reduction in renal perfusion, the renin-angiotensin aldosterone cascade is activated and BP is increased, a condition of renovascular hypertension (8). Without appropriate treatment, the increase in BP will persist and the impairment of renal function will progress (9, 10). Because an appropriate interventional treatment can reduce BP and improve the renal perfusion, early detection and appropriate treatment are of great importance (3, 4, 11–13).

Selective renal arteriography is the gold standard to assess disorders of the renal arteries, but the procedure itself is invasive and can potentially cause renal artery dissection. CT arteriography (CTA) and MRA are less invasive anatomical methods to evaluate the renal arteries (14). Owing to the recent improvement in resolution, both CTA and MRA can detect most of the lesions in the main renal artery (15). In the present case, evaluation of the renal arteries by MRA revealed arterial dissection in one of the trunks of the right renal artery.

Retention of contrast medium is thought to be a consequence of sudden reduction of the perfusion just after the entry of contrast medium (6). Although an image of the contrast medium retention in the kidney was captured in the present case, the duration of the retention depends on the residual perfusion, and thus images of contrast medium retention are rarely captured in any type of tissue. However, the image itself apparently indicates a sudden reduction of the perfusion to the affected tissue. If an image of contrast medium retention is captured, a disorder of the feeding artery should be suspected and an evaluation of the artery should be performed.

In conclusion, if BP increases suddenly, evaluation of the renal arteries should be considered. In particular, when a patient has undergone a procedure with the potential to cause physical traction on the abdominal aorta, renal artery dissection should be considered. MRA and CTA, which can detect most of the lesions in the main renal artery, are useful tools to detect disorders of the renal arteries. Appropriate endovascular treatment can reduce BP and preserve renal function.

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