Case Report

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Asymptomatic Common Iliac Artery Stenosis as a Cause of Renal Allograft Dysfunction and Uncontrolled Hypertension

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Occlusive disease of the iliac segment, proximal to the transplant artery (prox-TRAS), in kidney transplant recipients is a rare complication. Prox-TRAS, located in the common iliac artery, is extremely rare in these patients. Herein, we present an interesting case of a common iliac artery stenosis that manifested as decreased allograft function and uncontrolled blood pressure without other typical clinical symptoms. The patient was successfully treated with percutaneous luminal angioplasty and stent insertion.

Key Words: Common iliac artery, Pathologic constriction, Kidney transplantation, Allograft dysfunction, Hypertension
중심 단어: 온엉덩동맥, 협착, 신장이식, 동종이식 기능장애, 고혈압

INTRODUCTION

Transplant renal artery stenosis (TRAS) is a common arterial complication after kidney transplantation. The reported incidence varies widely from 1% to 23%(1). The most common location of TRAS is at or near the surgical anastomosis site. Iliac artery stenosis after kidney transplantation, known as stenosis of the iliac segment proximal to the TRAS (prox-TRAS), is a rare complication. The reported incidence of iliac artery stenosis in kidney recipients varies from 0.37% to 1.5%(2). Here, we report a case of common iliac artery stenosis in a kidney transplant recipient that manifested as decreased allograft function and uncontrolled hypertension and was successfully treated with percutaneous luminal angioplasty (PTA) and endovascular stent insertion.

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CASE REPORT

A 49-year-old man with end stage renal disease of unknown cause received a living related kidney transplantation in April 1999. His baseline serum creatinine level ranged from 1.0 to 1.2 mg/dL following kidney transplantation. He had stable renal function without rejection or other complications until 14 years after the transplantation. Fourteen years later, his serum creatinine levels increased to 1.6 mg/dL. At that time, a graft biopsy was performed to evaluate the cause of allograft dysfunction. Histopathology indicated acute T-cell mediated rejection IA and calcineurin inhibitor toxicity based on immunoglobulin A nephropathy. Immunosuppressive agents were cyclosporine 175 mg, mycofenolate mofetil 900 mg, and prednisolone 7.5 mg and serum cyclosporine level was 82 ng/mL. He received methylprednisolone pulse therapy and the primary calcineurin inhibitor was changed from cyclosporine to tacrolimus 6 mg. After calcineurin inhibitor was changed, tacrolimus trough level was maintained between 5.4 and 7.6 ng/mL. Serum creatinine level mildly decreased to 1.5 mg/dL but did not return to his baseline level.

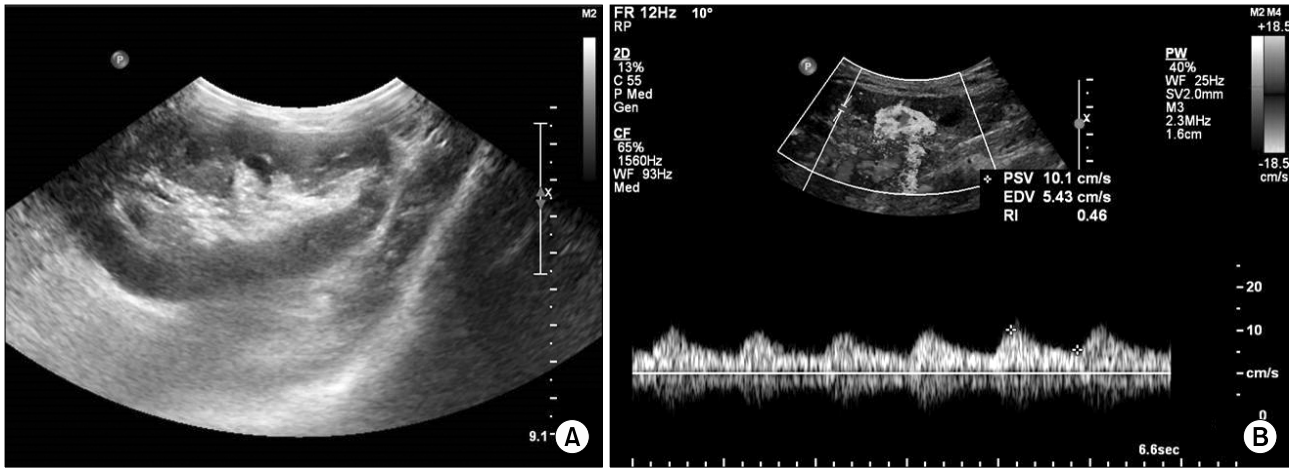

Fig. 1. Color Doppler ultrasonography showing (A) normal size and echogenicity of the transplant kidney and (B) low resistive index and pulsus parvus et tardus of flow pattern in the intrarenal artery: stenosis proximal to the transplant renal artery.

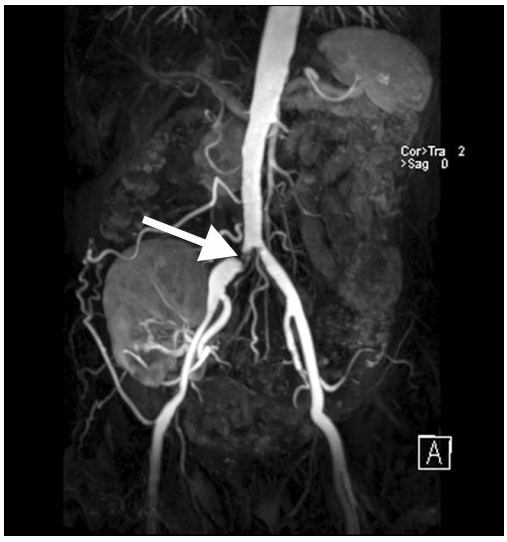

Fig. 2. Magnetic resonance angiography showing segmental occlusion of right common iliac artery (white arrow).

Two years later, the patient presented with progressive renal dysfunction, and his serum creatinine level was increased to 1.79 mg/dL. His systolic blood pressure gradually increased to 150 mmHg and four antihypertensive medications were required. A kidney color Doppler ultrasonography was performed because of persistent allograft dysfunction and uncontrolled blood pressure. Sonographic findings showed normal size and echogenicity of renal parenchyma in graft kidney and no hydronephrosis. Intrarenal arterial flow pattern in transplant renal and intrarenal arteries was recognized as poststenotic due to the presence of pulsus parvus et tardus and decreased resistive index (RI) 0.46: RI=(peak systolic velocity–end diastolic velocity)/peak systolic velocity (Fig. 1). The Doppler sonography findings suggested stenosis proximal to the transplant renal artery. He had no symptoms of peripheral arterial occlusive disease (PAOD), such as claudication or lower extremity pain. There was no bruit above the kidney transplant site and diffuse abdomen. Distal pulses from the lower extremities were intact.

Abdominal magnetic resonance angiography (MRA) was performed to evaluate the location of stenosis. Radiological findings of MRA showed a 1.6 cm-sized segmental occlusion of the right common iliac artery (Fig. 2). Pelvic angiography detected short segmental total occlusion of the right common iliac artery. Percutaneous transluminal angioplasty with balloon expandable metallic stent (10 mm～4 cm, PALMAZ® GENESIS™, Cordis Corporation, Miami, FL, USA) was performed in the right common iliac artery (Fig. 3). The patient was discharged 2 days after this procedure without any complications. He was prescribed an antiplatelet agent and lipid-lowering agent to prevent additional ischemic events. After 8 months of stent insertion, his serum creatinine level was decreased to 1.28 mg/dL. On follow-up color Doppler sonography, the intrarenal arterial flow pattern was normalized and RI was increased to normal (Fig. 4). The patient's blood pressure was well controlled at 110 mmHg and he took a single antihypertensive medication.

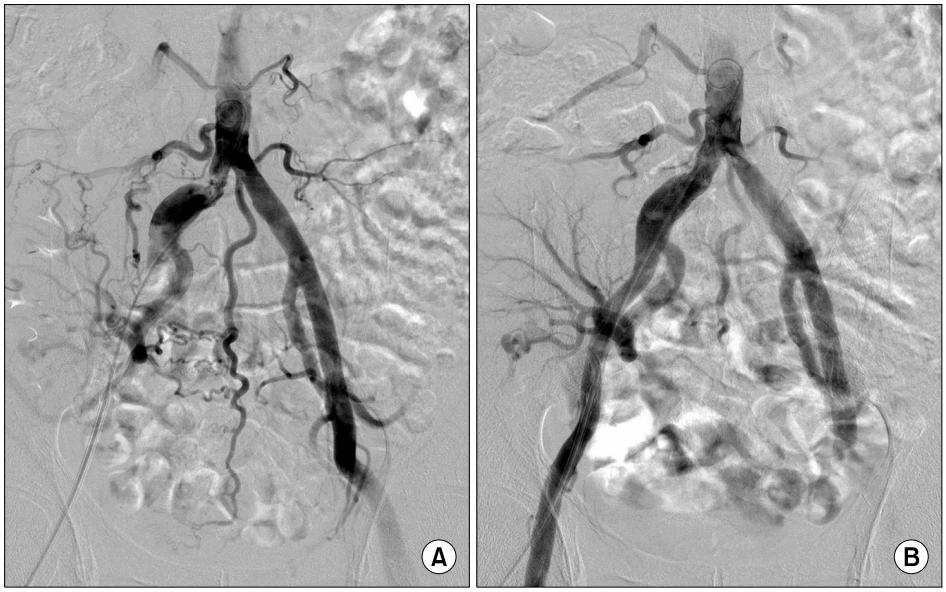

Fig. 3. (A) Angiography showing total occlusion of right common iliac artery. (B) After percutaneous luminal angioplasty and endovascular stent insertion, angiography showing fully dilated right common iliac artery.

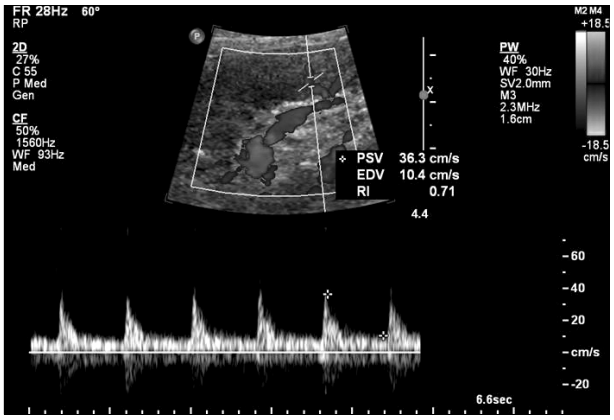

Fig. 4. Follow-up color Doppler ultrasonography showing normal resistive index and flow pattern in the intrarenal artery.

DISCUSSION

Renal ischemia in transplanted kidney is an important diagnostic consideration in kidney transplant recipients with decreasing allograft function and increased requirement for antihypertensive medications. Although the natural history of TRAS is widely known, information on prox-TRAS causing a similar syndrome is insufficient. The common site of prox-TRAS is the external iliac artery proximal to the graft anastomosis site. Prox-TRAS located in the common iliac artery is extremely rare in kidney transplant recipients(3,4). Our patient was diagnosed with prox-TRAS in the common iliac artery presenting as allograft dysfunction and hypertension.

The pathophysiology of prox-TRAS is renal hypoperfusion resulting in activation of the renin–angiotensin–aldosterone system. Because stenotic lesions proximal to the anastomosis limit flow to the transplanted kidney, signs and symptoms of prox-TRAS resemble those of TRAS, including refractory hypertension and allograft dysfunction(5). In addition, prox-TRAS are presumed to be caused by recipient atherosclerotic risk factors including older age, diabetes mellitus, hypertension, dyslipidemia, smoking, and preexisting atherosclerotic disorder(3). Because transplanted kidney was exposed ischemia chronically, both TRAS and prox-TRAS are associated with significantly worsening allograft survival(6).

The clinical manifestation of prox-TRAS is variable according to its location and the mean duration between kidney transplantation and development of stenotic lesion. In patients with stenosis presenting soon after kidney transplantation, allograft dysfunction might be the only main finding of prox-TRAS. In patients with established stable allograft function, clinical symptoms of prox-TRAS are similar to those of TRAS in addition to signs of PAOD, such as claudication or lower extremity pain(7,8). These clinical symptoms of PAOD present in some but not all patients with prox-TRAS. A prior report revealed symptoms of PAOD as

the leading finding in only 50% of prox-TRAS patients(9). The symptoms and signs in our patient had slowly progressive allograft dysfunction and hypertension, not PAOD. This finding indicates the suspicion of prox-TRAS should not be excluded in despite of a lack of typical clinical symptoms and signs of PAOD.

Color Doppler sonography is commonly utilized as an initial tool to evaluate allograft dysfunction because it is a simple, noninvasive, and inexpensive test that can be used regardless of renal function. Voiculescu et al.(7) suggested that intrarenal color Doppler sonography findings in kidney transplant recipients with early manifestations of prox-TRAS are decisive for the diagnosis of arterial stenotic lesions although clinical criteria were not typical for renovascular hypertension and PAOD. They suggested a low pulsatility index (PI <1.0) and pulsus parvus et tardus in the interlobar artery as markers of prox-TRAS. The PI was calculated according to the formula: PI=(peak systolic velocity–end diastolic velocity)/mean velocity. We measured RI instead of PI in the interlobar artery, and the RI level was significantly decreased from the normal range. Intrarenal arterial flow pattern also showed pulsus parvus et tardus. RI has been significantly positive correlated with PI in kidney transplant recipients(10). After treatment, low RI and pulsus parvus et tardus pattern in color Doppler sonography were resolved. Therefore, color Doppler sonography is a cost-effective and sensitive tool for detection of prox-TRAS and for follow-up after treatment.

Computed tomography (CT) angiography and MRA are also diagnostic options for TRAS and prox-TRAS. Similar to CT angiography, MRA can also precisely describe arterial anatomy. In addition, MRA can detect and grade the stenosis of transplant artery with the advantage of avoiding radiocontrast exposure as a use of relatively non-nephrotoxic gadolinium-based contrast media. The sensitivity and specificity for the detection of TRAS and prox-TRAS in MRA range from 67% to 100% and from 75% to 100%, respectively(8). MRA has a reasonable concordance with angiography(11).

Non-invasive study, such as color Doppler ultrasonography, CT angiography and MRA, may arouse the suspicion of prox-TRAS even in less symptomatic cases. However, the definitive diagnosis of prox-TRAS requires the use of invasive angiography. Although angiography is a definite diagnostic procedure, it is invasive and may cause complications by procedure including contrast induced nephrotoxicity, thromboembolism, pseudoaneurysms, traumatic arteriovenous fistulas, and hematomas(12). Therefore, angiographic technique is not used as a screening tool, but is reserved for either patients with inconclusive results on the non-invasive screening tests or patients with TRAS and prox-TRAS requiring treatment.

PTA with placement of an endovascular stent at the time of angiography is the appropriate initial treatment of prox-TRAS, and has low morbidity and mortality rates. A previous study reported that the technical success rate of PTA in prox-TRAS reach 95% and its 3- to 5-year patency rates range from 75% to 90%(13). The efficacy of PTA is indicated from resolved uncontrolled hypertension and improved renal functions. In our patients, the improvement of allograft function and amelioration of hypertension was successfully maintained after PTA with stent insertion.

In conclusion, we present a rare, interesting case of a kidney transplant patient with common iliac artery stenosis who manifested allograft dysfunction and uncontrolled hypertension without other clinical symptoms of PAOD. Color Doppler sonography is sensitive methods for detection of prox-TRAS in the common iliac artery. PTA with stent insertion was a definitive diagnostic method and first-line treatment returned allograft function to baseline with significant improvement in blood pressure control.

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