Endovascular Therapy for Renal Transplant Salvage

How to use an endovascular approach in the diagnosis and treatment of combined iliac and renal anastomotic stenoses.

BY GRACE J. WANG, MD, AND MATTHEW H. LEVINE, MD, PhD

Clamp injury to the iliac artery after renal transplantation is rare. The constellation of symptoms consists of ipsilateral claudication and early renal allograft dysfunction and should heighten one's suspicion of this complication. In this article, we report a case of successful endovascular therapy for iliac artery stenosis/dissection to salvage a renal transplant.

CASE REPORT

The patient was a 48-year-old woman with a significant medical history of a gunshot wound to the abdomen 6 years previously, with resultant liver injury and open abdomen management, as well as tracheostomy, who developed end-stage renal disease during her prolonged and complicated hospital course. She was subsequently listed for kidney transplant and underwent a right renal transplant to the right external iliac vessels. The donor kidney had significant aortic plaque and two renal arteries, which were reconstructed by syndactylization.

Postoperatively, the patient exhibited urine output but no improvement in creatinine, which is consistent with delayed graft function. At this time, renal ultrasound showed normal graft patency, and dialysis was initiated. During the next 2 weeks, the patient's urine output dropped. She underwent a renal biopsy, which showed acute tubular necrosis without evidence for rejection. Repeat renal duplex suggested parvus tardus flow into the transplant. In addition, the patient was having claudication symptoms in her right lower extremity. Time-of-flight (noncontrast enhanced) magnetic resonance angiography was performed, which showed a stenosis at the renal anastomosis and severely decreased flow within the right external iliac artery (Figure 1). The decision was made to perform angiography and evaluate the possibilities of an endovascular intervention.

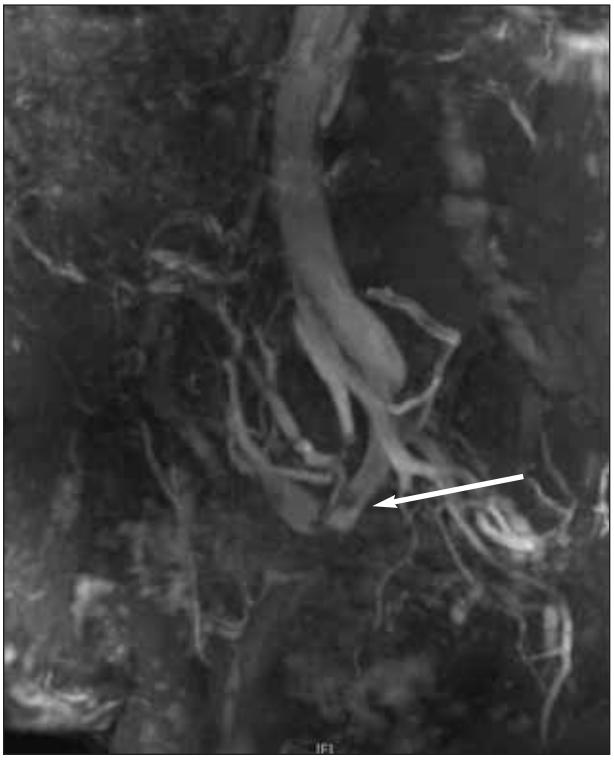

Figure 1. Magnetic resonance angiogram of the abdominal aorta and iliac arteries showing decreased flow in the right external iliac artery. Note the area of stenosis proximal to the anastomosis, likely related to clamp injury.

Figure 2. Arteriogram showing stenoses in the proximal and distal external iliac arteries with anastomotic narrowing.

After obtaining consent, the patient was brought to our hybrid endovascular suite, where aortoiliac angiography was performed through an Omniflush catheter (AngioDynamics, Inc., Queensbury, NY) via access from the contralateral groin. There was a stenosis of the external iliac artery proximal to the anastomosis, with a delayed nephrogram showing a patent anastomosis of the syndactylized renal arteries. The distal external iliac artery appeared to be occluded, as there was no contiguous antegrade flow.

A Bentson wire (Cook Medical, Bloomington, IN) was placed through the Omniflush catheter, and the 5-F sheath was switched out for a 6-F Destination sheath (Terumo Interventional Systems, Somerset, NJ) in the left groin. Using a combination of the Glidewire (Terumo Interventional Systems) and the Quick-Cross catheter (Spectranetics Corporation, Colorado Springs, CO), the proximal stenosis and the anastomotic region were able to be traversed. However, the occlusion in the distal external iliac artery was not able to be crossed. To prevent further propagation of the dissection plane past the inguinal ligament, a retrograde puncture of the right common femoral artery was performed.

The right common femoral artery was then punctured, and access was achieved via a 5-F sheath. The wire easily passed from the right common femoral artery up into the aortic bifurcation. The sheath was retracted, and retrograde injection showed the distal external iliac injury, renal anastomosis, and the area of proximal external iliac artery stenosis (Figure 2). The 5-F sheath in the right common femoral artery was then replaced with a 6-F sheath, and the distal external iliac artery lesion was addressed first.

The area was predilated with a 6- X 20-mm Ultra-thin SDS balloon (Boston Scientific Corporation, Natick, MA). Because of the location near the inguinal ligament, a nitinol stent was chosen. A 7- X 40-mm LifeStent (Bard Peripheral Vascular, Inc., Tempe, AZ) was placed.

At this time, angiography showed a residual stenosis more distally, and an 8- X 40-mm LifeStent was placed with a 2-cm overlap to address this lesion. Both stents were ballooned, and arteriography showed a good angiographic result. The proximal external iliac artery was then addressed.

It was first predilated using the 6- X 20-mm balloon, and then an 8- X 27-mm Express stent (Boston Scientific Corporation) was placed across the lesion. An arteriogram was obtained through the Destination sheath at this time and showed good flow down the external iliac artery into the right common femoral artery. However, there was a new filling defect noted within the renal graft anastomosis. This was likely attributable to dislodged plaque/material after ballooning/stenting of the proximal external iliac artery lesion. The Quick-Cross and Glidewire were used to select the renal artery anastomosis, and the wire was exchanged for the Grand Slam wire (Abbott Vascular, Santa Clara, CA). A 4- X 20-mm

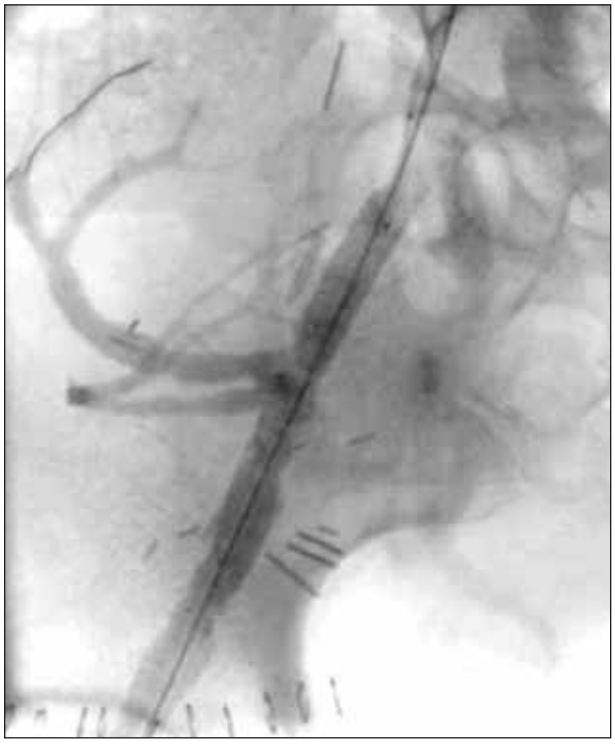

Figure 3. Completion arteriogram showing resolution of stenoses.

Viatrac device (Abbott Vascular) was used to balloon the renal anastomosis, which produced a good angiographic result. Arteriography through the Destination sheath showed good flow through the renal graft and down the external iliac artery into the right common femoral artery (Figure 3).

The patient did well after the procedure and was producing 1 to 1.5 liters of urine per day with progressive stabilization of her creatinine. She was discharged on postoperative day 3 on aspirin and clopidogrel.

DISCUSSION

The most common cause of vascular insufficiency as an etiology for renal allograft failure is at the renal anastomosis.[1] Renal allograft failure secondary to progressive atherosclerosis in the aortoiliac system has also been described and is associated with ipsilateral lower extremity claudication symptoms, which develop later.[2] Iatrogenic injury to the external iliac artery after renal transplantation is a rare cause of early allograft failure but has been previously described.[3,4]

The location of the lesions in this patient, as well as proximity to the timing of the transplant, suggested clamp injury as the etiology. However, flow to the kidney was initially normal on ultrasound, and urine output diminished more than 3 days postoperatively, indicating dissection propagation remote from the time of transplant surgery. The authors believe that the delayed nature of the patient's presentation is consistent with clamp-induced dissection, which was not initially flow-limiting but then propagated distally until complete occlusion occurred.

Endovascular management of iliac artery and anastomotic stenoses for renal allograft preservation has been accepted as the initial treatment of choice with excellent patency and clinical response rates.[5-7] Preoperative duplex studies may be useful to identify the parvus tardus waveforms and low pulsatility index associated with an anastomotic stenosis or inflow issue.[8] Ultimately, arteriography is often required to define the etiology(ies) for allograft failure. Both retrograde and antegrade approaches may be necessary for the diagnosis and treatment of combined iliac and renal anastomotic stenoses. ■

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