Salvage of External Iliac Artery Dissection Immediately After Renal Transplant

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Abstract
Renal transplant is the preferred treatment for patients with uremia. The renal transplant procedure is well established with a high success rate, but surgical complications are encountered occasionally. We report a case of sudden onset of anuria of the graft kidney owing to acute external iliac artery dissection diagnosed by Doppler sonography. Urgent endarterectomy with thrombus removal of false lumen prevented ischemia and occlusion of the right femoral artery. Without accurate diagnosis and management, this complication could have caused graft loss and death. We believe that renal transplant requires attentive teamwork to keep the graft functioning well.

Key words: Renal transplant, External iliac artery dissection

Introduction
Renal transplant (RTx) is the preferred treatment for patients with end-stage renal disease, offering better quality of life and conferring greater longevity than long-term dialysis. Though the RTx procedure is safe and is associated with a high success rate and a good prognosis, surgical complications may still occur including hemorrhage, vascular, and urologic complications.1 The dissection of the external iliac artery (DEIA) is rare, and to our knowledge, only 6 cases have been reported thus far. Most cases occurred during trauma handling2,5; only 1 case involved spontaneous dissection.6 Three cases were managed by percutaneous transluminal angioplasty with a stent and 1 case was given bypass surgery.2 Five cases were detected several days after the operation, and only 1 case simultaneously occurred during the operation.5 We report a case of DEIA diagnosed by Doppler sonography right after the RTx. The patient immediately received vascular repair to preserve the renal graft and the right lower limb. We also review the clinical presentations, risk factors, diagnosis, and treatment of all 7 reported cases of DEIA.

Case report
A 52-year-old man was admitted to our hospital for a second renal transplant, which was donated by his wife, in December 2009. Twenty years earlier, he was on continuous ambulatory peritoneal dialysis for end-stage renal disease and underwent a deceased-donor RTx in the left iliac fossa 1 year later. Unfortunately, progressive deterioration of graft function diagnosed as chronic transplant nephropathy occurred 2 years previous, and he was back on hemodialysis 1 year before this admission. He also had a history of hypertension and hyperlipidemia (total cholesterol: 7.87 mmol/L) with regular control in the past. The patient was given a phosphate binder for hyperphosphatemia (calcium: 2.43 mmol/L, phosphorus: 1.71 mmol/L), and he received 1α,25-dihydroxycholecalciferol to control secondary hyperparathyroidism (i-PTH: 452 pg/mL). Because of his lengthy history of chronic kidney disease, the Agatston score was only 2.1, but there was no significant stenosis over the coronary arteries on multidetector computed tomography of the heart.
His wife’s left kidney was resected by laparoscopy without complication and implanted in the patient’s right iliac fossa. Warm ischemic time was 2 minutes and cold ischemic time was 1 hour 52 minutes. The external iliac arterial end-to-side anastomosis was constructed with interrupted sutures of 6-0 polypropylene. After restoration of circulation, graft kidney perfusion was achieved. The urine was clear and came out immediately. Doppler sonography of the graft renal artery showed that the flow began well before wound closure. However, after the patient’s arrival in the postoperative room, there was no urine output for 30 minutes, and there was markedly high blood pressure with systolic blood pressure up to 170 mm Hg. Urgent Doppler sonography disclosed nearly complete loss of graft perfusion, and renal artery occlusion was suspected. Unfortunately, diminished pulsation of the right femoral artery also was detected by comparison to the left side, and pulsation of the right dorsalis pedis was not palpable either. Taking these factors into consideration, we suspected an occlusion of the external iliac artery (EIA) near the graft renal artery, and we performed surgical intervention immediately.

A small arteriotomy was done over the EIA below the anastomosis of the graft renal artery. The EIA dissection with thrombosis over the false lumen had compressed the blood flow of the true lumen. The dissection extended to the bifurcation of the external and internal iliac arteries and the common iliac artery was looped (Figure 1 left-hand illustration). The EIA was longitudinally incised after proximal control with Pot clump; then the endarterectomy was performed and the thrombus in the false lumen was removed. The torn intima was repaired with 7-0 Prolene to the adventitia over the previous arterial clumping area (right-hand illustration). The orifice of the graft renal artery was intact.

The external iliac artery dissection with thrombosis over the false lumen compressed the blood flow of the true lumen. The dissection extended to the bifurcation of the external and internal iliac arteries and the common iliac artery was looped (left-hand illustration). The external iliac artery was longitudinally incised after proximal control with Pot clump; the endarterectomy was performed, and the thrombus in the false lumen was removed. The torn intima was repaired with 7-0 Prolene to the adventitia over the previous arterial clumping area (right-hand illustration). The orifice of the graft renal artery was intact.

The following Doppler sonography of the graft kidney disclosed adequate perfusion without focal defect, and the serum creatinine concentration was 91.5 μmol/L 1 week after RTx. The pathology of the torn intima of the EIA showed only a mild intimal tear with mild atherosclerosis (Figure 2). The following computed tomography angiography of the abdomen after repair disclosed residual hematoma in anterior and medial parts of the graft kidney space without active bleeding, and no further dissection of the EIA (Figure 3), but it also revealed atherosclerosis of the aorta. For anticoagulation, heparinization with low molecular weight heparin was given for 3 days. Lifelong clopidogrel also was prescribed. The patient was discharged with a serum creatinine concentration level of 99.1 μmol/L without claudication 14 days postoperatively.
Discussion

Dissection of the external iliac artery is rare and is not well-established right after RTx. Unfortunately, it is a devastating complication, which causes graft loss owing to a lack of collateral circulation and may jeopardize survival of a lower limb if there is further dissection. To our knowledge, only 5 cases have been reported to date (Table 1).2-6 Of them, the former 4 cases occurred several days after operation, and the fifth case was noticed during the operation. Our case was the first one that was found right after operation.

The operation was performed again with intimal repair immediately, thereby restoring blood flow to the allograft and the right lower limb. Percutaneous transluminal angioplasty with stent was successful in 3 cases and 1 case was given bypass surgery. Though open-end arterectomy was unsuccessful in the fifth case, implantation of an endovascular metallic stent avoided occlusion of the ostium of the renal graft artery and preserved blood flow. Our case is the only one in which endarterectomy with thrombus removal in the false lumen and intimal repair were performed.

The most common cause of DEIA is traumatic handling7 in RTx, and only 1 case has resulted in spontaneous dissection.6 The mechanism and technique play major roles in DEIA, but the risk factors for cardiovascular disease should be considered as the essential causes. Chronic kidney disease predisposes individuals to atherosclerotic and cardiomyopathic diseases.8 Besides traditional risk factors (old age, male sex, hypertension, dyslipidemia, smoking, and diabetes mellitus), there are several nontraditional risk factors for cardiovascular disease in chronic kidney disease including anemia, microalbuminuria, increased inflammation and oxidative stress, and abnormalities in bone and mineral metabolism.8-10 In these 6 cases, all were men with chronic kidney

Table 1. Summary of 7 Cases of External Iliac Artery Dissection After Renal Transplant

<table>
<thead>
<tr>
<th>Case</th>
<th>Presentation</th>
<th>Risk Factors</th>
<th>Confirmed Diagnosis</th>
<th>Time to Dx/Tx (Postop)</th>
<th>Cause</th>
<th>Treatment</th>
<th>Outcome (SCr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>33-year-old man</td>
<td>SCR = 129.6 → 221.1, HTN, bruit</td>
<td>HD 5 y</td>
<td>Arteriography</td>
<td>6 mo</td>
<td>Intra-arterial catheter related</td>
<td>Bypass surgery</td>
<td>Stable &gt; 16 y; claudication</td>
</tr>
<tr>
<td>50-year-old man</td>
<td>Bruit, cold and pale left leg</td>
<td>PCKD, HD 2 y</td>
<td>Arteriography</td>
<td>Within 2 d</td>
<td>Traumatic handling, sclerotic artery</td>
<td>Expectant policy</td>
<td>Stable &gt; 9 mo; claudication</td>
</tr>
<tr>
<td>59-year-old man</td>
<td>Anuria, loss of perfusion, bruit</td>
<td>NIDDM, CAD, PAOD, HTN</td>
<td>Contrast-enhanced CT</td>
<td>5 d</td>
<td>Traumatic handling</td>
<td>Stent</td>
<td>2.0; Stable &gt; 3 mo</td>
</tr>
<tr>
<td>32-year-old man</td>
<td>Decreased blood pressure of dorsalis pedis</td>
<td>IDDM, HTN, HD 5 y</td>
<td>Sonography during operation</td>
<td></td>
<td>Traumatic handling</td>
<td>Failed arterectomy + stent</td>
<td>Patent EIA and good graft function</td>
</tr>
<tr>
<td>58-year-old man</td>
<td>Acute renal failure (SCR = 175.4), bruit</td>
<td>TC = 270 mg/dL, HTN</td>
<td>Arteriography</td>
<td>2 y</td>
<td>Spontaneous</td>
<td>Stent</td>
<td>1.1</td>
</tr>
<tr>
<td>52-year-old man (this case)</td>
<td>Anuria, complete loss of perfusion, no pulsation of leg</td>
<td>End-stage renal disease, 20 y between 1st and 2nd RTx, HTN, TC = 7.87 mmol/L</td>
<td>Direct operation</td>
<td>Within 30 min</td>
<td>Traumatic handling</td>
<td>Vascular repair</td>
<td>1.3; No claudication</td>
</tr>
</tbody>
</table>

Abbreviations: CAD, coronary artery disease; CT, computed tomography; Dx/Tx, diagnosis/transplant; EIA, external iliac artery; HD, hemodialysis; HTN, hypertension; IDDM, insulin-dependent diabetes mellitus; NIDDM, non-insulin-dependent diabetes mellitus; PAOD, peripheral arterial occlusive disease; PCKD, polycystic kidney disease; postop, postoperatively; Ref, reference; RTx, renal transplant; SCR, serum creatinine (µmol/L); TC, total cholesterol
When does DEIA occur? We believe it occurs after vascular injury, such as with angiography, and traumatic handling immediately or delayed after RTx, but congenital defects such as anomalies of the external iliac artery also may lead to spontaneous occurrence at various times after surgery. Therefore, clinicians should be suspect to any suspicious clinical manifestations. In our case, diagnosis was achieved rapidly, and endarterectomy with thrombus removal and repair of torn intima of DEIA after RTx were performed to obtain a good prognosis.

In conclusion, we should observe clinical manifestations and perform meticulous physical examinations in high-risk patients to prevent the devastating complications of DEIA in RTx recipients. Gentle and careful handling of vessels may decrease the possibility of external iliac artery dissection. Prompt Doppler sonography to evaluate perfusion of the graft kidney and surrounding vessels is necessary and effective right after RTx and daily in all recipients. Only during early accurate diagnosis and timely management will salvage the graft function. We believe that RTx requires attentive teamwork to keep the graft functioning well.

References