

# External Iliac Artery Dissection During Kidney Transplant for Polycystic Kidney Disease: A Caveat for Surgeons

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## Abstract

**Autosomal dominant polycystic kidney disease is a common cause of end-stage renal failure and an indication for transplant. The genetic mutation in autosomal dominant polycystic kidney disease also causes vascular abnormalities, mainly aneurysms but also medial dissection. Here, a case of dissection of the recipient artery during a kidney transplant procedure in a patient with autosomal dominant polycystic kidney disease is described. Dissection caused occlusion of both the external iliac artery and the donor renal artery. Occlusion was recognized intraoperatively, and the kidney was salvaged by in situ reperfusion of the kidney with cold preservation solution, excision of the affected recipient arterial segment, and reanastomosis of the donor artery to the internal iliac artery. The external iliac artery defect was replaced with a saphenous vein interposition graft. The transplanted kidney achieved good function. This is the first description of a case of recognition of recipient arterial dissection during a kidney transplant procedure for autosomal dominant polycystic kidney disease. Surgeons should be aware of the phenomenon of arterial dissection in autosomal dominant polycystic kidney disease and should be vigilant while anastomosing the artery during kidney transplant in these patients.**

**Key words:** *Arterial dissection, Autosomal dominant kidney disease, Renal transplantation*

## Introduction

Polycystic kidney disease is a common cause of end-stage renal failure and indication for transplant. The

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disease has extrarenal manifestations, including cyst formation in other organs and vascular abnormalities.<sup>1</sup> The patients have an increased incidence of intracranial aneurysms, and reports of aneurysms and dissection of extracranial arteries have been published.<sup>2</sup> The genetic abnormalities in autosomal dominant polycystic kidney disease (ADPKD) have been largely defined.<sup>3</sup> The proteins polycystins 1 and 2, which are encoded by the abnormal genes, are expressed in vascular smooth muscle, suggesting that abnormal vessel walls lead to vascular pathology. Segmental arterial mediolysis causing aortic dissection in a patient with ADPKD has been reported.<sup>4</sup> Here, a case of dissection of the wall of the external iliac artery during a kidney transplant procedure in a patient with ADPKD, which caused occlusion of the iliac artery and consequently the donor renal artery, is described.

The patient described in this report consented to publication. He was informed that the case description would be submitted without him being identifiable from the text or illustrations.

## Case Report

A 54-year-old man underwent a kidney transplant from a living unrelated donor. He had been on hemodialysis for 6 months because of end-stage renal failure due to ADPKD. He had been on treatment for hypertension for 20 years and for hypercholesterolemia for 15 years. He was initially obese, but his body mass index was reduced from 33 to 28 kg/m<sup>2</sup> by dietary management before the transplant procedure.

The kidney was transplanted onto the right external iliac vessels in an end-to-side fashion, the recipient artery having been routinely opened by a longitudinal incision. The arterial wall was found to be soft and supple, showing no signs of sclerosis or plaque formation. On release of the vascular clamps,

the perfusion of the kidney was good and the iliac artery was pulsating normally. After completion of the ureteric implantation into the bladder, it was noticed that the kidney was blue and flaccid and that the iliac artery was not pulsating from the anastomosis distally. The arterial anastomosis was taken down, and a clot was removed from the iliac artery. The kidney, with the venous anastomosis still intact, was reperfused with cold histidine-tryptophan-ketoglutarate solution ("Custodiol"; Dr. Franz Kohler Chemie GmbH, Bensheim, Germany), venting the effluent through a small puncture hole in the donor vein. The kidney was kept cold by packing in ice-cold swabs and regularly adding cold saline slush.

On inspection, it was apparent that the iliac artery had separated intramurally into 2 distinct tubes (tube within a tube) over a distance of 3.5 cm, as depicted in Figure 1. Thrombosis had occurred in the space between the tubes and occluded the iliac artery. A blood clot was removed from the external iliac artery. A 4-cm segment of artery was excised, and the vessel was reconstructed by means of a greater saphenous vein interposition panel graft harvested from the left

groin. The donor artery was anastomosed to the internal iliac artery in an end-to-end fashion. The opening in the donor vein was closed, and the vascular clamps were released. Perfusion of the kidney and flow through the iliac artery were good. After the operation, circulation in the leg was normal and the transplanted kidney functioned well. The patient is still doing well 2 years later.

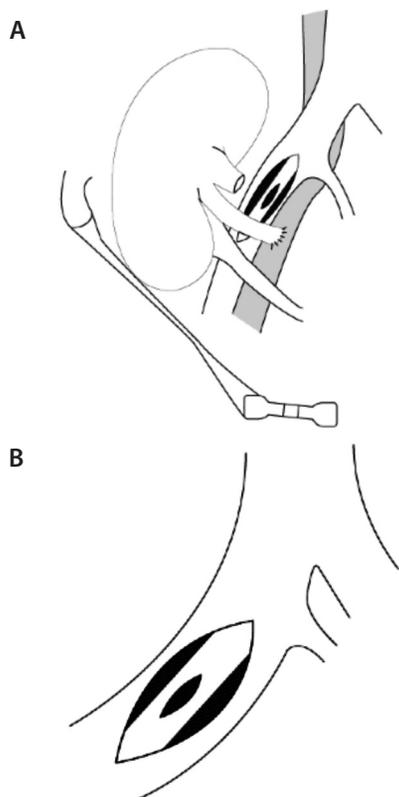
## Discussion

Technical complications remain common after renal transplant. Of these, the most dreaded are vascular complications because of possible irreversible damage to the donor kidney. Donor arterial complications include kinking, thrombosis, and stenosis. Uncommonly, recipient arterial abnormalities can cause complications, as in the case of dissection in the patient presented here. Dissection of the external iliac artery usually presents as transplant dysfunction after the transplant operation.<sup>5-7</sup> Occurrence during transplant surgery has been reported only once before. Kimura and associates described dissection on declamping of the external iliac artery on the side of a pancreas transplant during a simultaneous kidney-pancreas transplant procedure in a diabetic patient.<sup>8</sup> The dissection was due to an intimal flap distal to the arterial anastomosis. After only partially successful endarterectomy, the affected area was bridged intraoperatively with an endovascular stent.

Dissection of arterial walls is a well-recognized phenomenon in patients with ADPKD. Dissection of the transplant recipient artery in a patient with ADPKD has been described once before, with Courtois and associates reporting previously on dissection of the external iliac artery after a kidney transplant.<sup>6</sup> The patient presented 16 hours after surgery with ischemia of the ipsilateral leg. Thrombosis due to dissection had occurred at the level of the arterial anastomosis. The affected artery was resected and replaced with an arterial prosthesis to which the donor artery was anastomosed. The fate of the transplanted kidney was not reported.

Autosomal dominant polycystic kidney disease is a systemic disease in which cysts occur in several organs and arterial walls can be abnormal.<sup>9</sup> The genetic mutations *PKD1* on chromosome 16 and *PKD2* on chromosome 4 give rise to 2 similar syndromes. The differences in severity and age of

**Figure 1.** Illustration of Kidney Transplant After Take Down of the Arterial Anastomosis (A), With Dissection in the Wall of the External Iliac Artery Enlarged (B)



The dark shaded area indicates blood clot.

onset are also influenced by modifier loci and environmental factors.<sup>9</sup> The protein products of the mutations, polycystin 1 and polycystin 2, are incorporated in vessel walls, particularly in the smooth muscle cells of the media and in myofibroblasts. It is believed that reduced levels of these proteins play a role in vascular disease.

Intracranial aneurysms are well-recognized in ADPKD, and aneurysms of other arteries have been described. Dissection of the arterial wall has been described in the aorta as well as its branches, including the iliac arteries.<sup>10</sup> Dissection of arterial walls in patients without ADPKD is commonly subintimal and is due to atherosclerotic disease or trauma. However, the wall of the external iliac artery in the present case was macroscopically normal. Strikingly, there was circumferential smooth separation of the wall of the artery into 2 tubes. Presumably because of this separation, the full thickness of the wall had not been incorporated throughout into the anastomotic suture line, and this allowed dissection to occur. Attesting to the ease of separation was the rapidity of occlusion of the external iliac artery. This occurred within about 20 minutes.

The microscopic appearance of dissection of the wall of the aorta in a patient with ADPKD was described by Keuleers and associates.<sup>4</sup> They observed segmental necrosis of the middle part of the media (mediolysis) of recent onset. The case of Courtois and associates described above displayed rarefaction and disruption of the elastic lamellae in the media of the dissected artery.<sup>6</sup> These descriptions of separation in the media of arteries in patients with ADPKD seem to correspond to the macroscopic appearance in the present case, in which the artery wall had separated into 2 parts of substantial thickness. It would appear that intramural dissection within the media in this case was due to the arterial wall abnormality that occurs in ADPKD.

## Conclusions

Kidney transplant procedures are commonly performed in patients with ADPKD. In some cases, arterial wall abnormalities as described here may be present. Surgeons should be vigilant during transplant for ADPKD, and they should include the intima of the recipient artery during the placement of every suture of the anastomosis to avoid possible intramural dissection.

## References

1. Luciano RL, Dahl NK. Extra-renal manifestations of autosomal polycystic kidney disease (ADPKD): Considerations for routine screening and management. *Nephrol Dial Transplant*. 2014;29(2): 247-254.
2. Bobrie G, Brunet-Bourgin F, Alamowitch S, et al. Spontaneous artery dissection: Is it part of the spectrum of autosomal dominant polycystic kidney disease? *Nephrol Dial Transplant*. 1998;13(8):2138-2141.
3. Rossetti S, Harris PC. The genetics of vascular complications in autosomal dominant polycystic kidney disease (ADPKD). *Curr Hypertens Rev*. 2013;9(1):37-43.
4. Keuleers S, Verbeken E, Sinnaeve P. Aortic dissection associated with segmental arterial mediolysis in polycystic kidney disease. *Eur J Intern Med*. 2009;20(1):e9-e11.
5. Merkus JW, Dun GC, Reinaerts HH, Huysmans FT. Iliac artery dissection after renal transplantation. *Nephrol Dial Transplant*. 1992;7(12):1242-1245.
6. Courtois A, Nusgens BV, Delvenne P, et al. Dissection of iliac artery in a patient with autosomal dominant polycystic kidney disease: A case report. *Aorta (Stamford)*. 2013;1(2):123-125.
7. Lee G, Barlow A, Doughman T, Nicholson ML. External iliac artery dissection causing early renal transplant dysfunction. *BMJ Case Rep*. 2014. doi: 10.1136/bcr-2014-204160.
8. Kimura T, Saito T, Tsuchiya T, et al. Treatment of external iliac artery dissection with endovascular stent placement in a patient with simultaneous pancreas and kidney transplantation. *Transplant Proc*. 2005;37(8):3572-3573.
9. Chang MY, Ong AC. Autosomal dominant polycystic kidney disease: Recent advances in pathogenesis and treatment. *Nephron Physiol*. 2008;108(1):p1-p7.
10. Stiasny B, Schulze BD, Graf S, Weber M. Vessel malformation in a patient with ADPKD: megadolichobasilar artery, abdominal aortic and iliac aneurysms. *Contrib Nephrol*. 1995;115:182-184.