Emergency Ilio-femoral Bypass during Kidney Transplantation due to External Iliac Artery Dissection: Case Report

Ivica Mokos[1], Luka Penezić[1,*], Josip Figl[1], Bojan Čikić[1], Marjan Marić[1], Nikolina Bašić Jukić[2], Željko Kaštelan[1]

ABSTRACT

Intraoperative iliac artery dissection during kidney transplantation is a rare but serious complication that requires prompt intervention. We present a case of right external iliac artery dissection during deceased donor kidney transplantation. A 57-year-old male patient underwent standard pretransplant evaluation and had no signs of either significant aortoiliac occlusive disease or peripheral arterial occlusive disease. Diabetic nephropathy, arterial hypertension and smoking were the underlying causes of the patient's end-stage renal disease. Transplantation was performed in the standard fashion. The kidney was positioned in the right iliac fossa and the venous end to-side anastomosis was performed first. A significant dissection of the right external iliac artery was found on arteriotomy. Immediate ilio-femoral bypass with a vascular prosthesis was performed. During two years of follow-up the kidney function is stable and there are no signs of lower limb vascular insufficiency.

KEYWORDS

kidney transplantation; peripheral arterial disease; vascular grafting

AUTHOR AFFILIATIONS

[1] Department of Urology, University Hospital Center Zagreb, Zagreb, Croatia
[2] Department of Nephrology, Arterial Hypertension and Dialysis, University hospital center Zagreb, Zagreb, Croatia
* Corresponding author: Kišpatićeva 12, 10000 Zagreb, Croatia; e-mail: penezic.luka@gmail.com

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INTRODUCTION

Kidney transplantation is the best method for treating end-stage renal disease (1), but graft rejection, infections and vascular complications remain major causes of kidney allograft loss. The frequency of vascular complications is relatively low, and arterial complications are more severe than venous. An increased incidence of peripheral arterial occlusive disease (PAOD) is found in patients with chronic renal failure (2), and additional risk factors include smoking, arterial hypertension, and diabetes. PAOD significantly reduces the quality of life since it can lead to acute or chronic lower limb ischemia and patients with PAOD have an increased risk of death due to myocardial infarction or stroke (2). Symptomatic and significant PAOD in a kidney transplantation setting is rare: it occurs in 1.8% of patients eligible for transplantation (3), and is not necessarily a contraindication for kidney transplantation. There are reports of successful kidney transplantations after vascular reconstruction with favorable outcomes (4–6). Dissection of the external iliac artery (EIA) is a rare but serious complication that can occur during kidney transplantation. Combination of atherosclerotic plaque, poor vessel wall quality, clamping injury and suturing of the anastomosis may lead to dissection, which can cause vessel occlusion and graft loss. Arterial dissection during kidney transplantation is an emergency that requires a well-organized interdisciplinary approach to save both the lower extremity and the transplanted kidney.

CASE REPORT

A 57-year-old male patient underwent deceased donor kidney transplantation for end-stage renal disease that was a result of diabetic nephropathy from type 2 diabetes mellitus and arterial hypertension, as well as a 30 pack-year smoking history. Hemodialysis was initiated eighteen months before transplantation, first via arteriovenous fistula (AVF) and later, due to AVF thrombosis, via a temporary intravascular catheter. The patient underwent standard pre-transplant recipient evaluation. This included a kidney, ureter and bladder (KUB) x-ray study that described moderate left side external iliac artery calcifications and lower extremities color Doppler ultrasound which showed hemodynamically insignificant minimal calcifications of the common and external iliac arteries bilaterally. CT angiography in our institution is not routinely performed for every candidate but is indicated only for patients with moderate and severe iliac artery calcifications diagnosed by KUB X-ray. Since the evaluation didn't reveal any contraindications for transplantation, the patient was placed on the Eurotransplant waiting list. The deceased donor allograft was a left kidney with one renal artery, one vein, and a normal ureter.

End-to-side venous anastomosis to the right external iliac vein was performed first. This was followed by the clamping of the right EIA at the best available sites because the artery was moderately atherosclerotic. During the arteriotomy an intimal dissection occurred, but it was immediately recognized, and cold dressings were applied to the kidney. The vascular surgeon was called in to assist with the vascular reconstruction. Further exploration of the AIE revealed a dissection, 5 cm in length, distal to the arteriotomy site, so a right ilio-femoral bypass using an eight-millimeter diameter silver knitted vascular prosthesis (Integard Silver Knitted Straight Graft®, Intervascular, La Ciotata Cedex, France) was done. A renal artery to vascular prosthesis arterial end-to-side anastomosis was then performed. After completion of arterial anastomoses, good pulsations of the vascular prosthesis and renal artery were noted, and femoral and dorsal pedal artery pulsations were palpable. Upon reperfusion, the transplanted kidney regained normal color. The total cold ischemia time was 12 hours and 30 minutes, the bypass anastomosis time 40 minutes and the vascular prosthesis-renal artery anastomosis time 15 minutes. The patient received a standard post-transplant prophylactic low-molecular weight heparin (LMWH) regime during the early postoperative course alongside prophylactic doses of acetylsalicylic acid, which were continued after discharge. Hospitalization was prolonged due to delayed graft function, most likely caused by acute tubular ischemia which was confirmed by renal scintigraphy, followed by fungal pneumonia and recurrent urinary tract infection caused by P. aeruginosa. The patient was discharged after three weeks with good diuresis, a serum creatinine value of 180 ng/µmoL, and normal circulatory status of the right leg.

Eight months after transplantation the patient reported intermittent claudication of the right leg with a walking distance of 200 meters. A stenosis of the right superficial femoral artery was diagnosed on angiography, and successfully treated by percutaneous balloon angioplasty. The patient was discharged with a recommendation for long term LMWH therapy. During a two-year follow up period after kidney transplantation, the kidney function is normal with stable serum creatinine values. There are no signs of lower limb circulatory insufficiency.

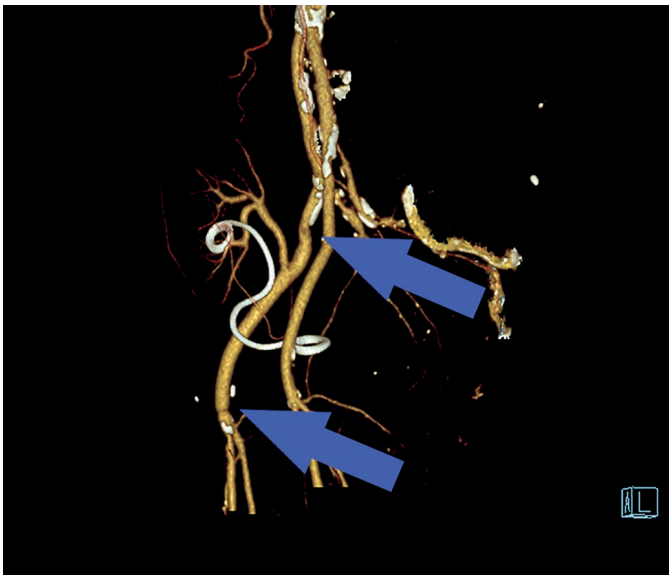

Fig. 1 CT arteriography showing ilio-femoral bypass (blue arrows) with normal allograft perfusion.

DISCUSSION

In general, kidney transplantation procedure involves arterial clamping which causes minor trauma to the vessel and in most cases does not lead to serious consequences. Rarely, combined with PAOD, it can result in iliac artery dissection, an emergency event that may lead to acute lower limb ischemia and, if the arterial anastomosis of the kidney has already been carried out, allograft hypoperfusion or acute thrombosis caused by arterial occlusion due to intimal flap. The most probable cause of the dissection in our case is the cascade facilitated by atherosclerosis: the clamping of the stiffened vessel initiates the separation of the intima that with arteriotomy progresses to splitting and dissection. The dissection of the EIA can occur during and after the procedure (7). In most reported cases it is diagnosed intraoperatively and is usually noticed because of the mottled and poorly perfused graft appearance after completion of the renal artery anastomosis and removal of vascular clamps, along with loss of distal arterial pulses (7). This situation requires resection of the arterial anastomosis, after which a vascular reconstruction can be performed. Uniquely in our case, the dissection developed at the beginning of the procedure, which allowed for immediate visualization of the extent of dissection and rapid intervention. Despite the relatively short dissection, we selected the bypass over endarterectomy because the allograft artery anastomosis needs to have a minimal risk of further vascular complications, such as thrombosis, which is greater with endarterectomy than bypass. After the bypass was in place, an end-to-side renal artery to prosthetic graft anastomosis was performed resulting with adequate perfusion for both the lower limb and the allograft. There are only 14 literature reports of intraoperative iliac artery dissection during kidney and/or pancreas transplantation procedure (7–14). The most used reconstruction technique is synthetic vascular graft (seven cases) (9, 11, 12), while other methods are implemented less frequently: donor iliac artery graft (four cases) (13), endarterectomy (one case) (7), endarterectomy followed by subsequent endovascular stenting (one case) (14) and recipient saphenous vein graft (one case) (10). The choice of vascular reconstruction depends on the extent of the dissection, time of diagnosis, the possibility of renal artery anastomosis, surgeon preference and experience, and technology/material availability. In our case, the dissection occurred, and was noted, intraoperatively, but it can also develop later in the postoperative period and present a diagnostic challenge. Once diagnosed, usually with CT angiography, immediate intervention/reconstruction is mandatory. In this setting an alternative intervention to surgery is minimally invasive endovascular stenting (15), if feasible without jeopardizing the renal artery anastomosis. As in most reported cases, the bypass in our case was performed with a synthetic vascular prosthesis, and this has proven to be a good choice because synthetic grafts in this location have satisfactory long-term patency. Reported short term transplant and limb revascularization outcomes are excellent with reports of 100% 1-year kidney survival rate without major vascular issues (7–14). The longest follow-up of a patients with simultaneous pancreas and kidney transplant is 45 months, reported by Moon et al. (13).

CONCLUSION

Acute EIA dissection, a rare, but serious intraoperative vascular complication, can be successfully managed with prosthetic vascular bypass grafting and renal artery to bypass-graft anastomosis with favorable short- and mid-term allograft and lower limb survival outcomes.

AUTHOR'S NOTE

The Institutional Ethical Committee approval for this case report was obtained and the patient provided signed informed consent for publication of the case report and accompanying images.

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