

Anastomotic pseudoaneurysm after renal transplantation; a new hybrid approach with graft salvage

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Dear Editors,

Under modern immunosuppressive regimens, the most important prognostic factors for short-term graft survival are delayed graft function and surgical complications. Most urologic problems such as ureteral obstruction and urinoma can be mastered, whereas vascular problems (renal artery/vein thrombosis, arteriovenous fistula, and pseudoaneurysms) represent significant nonimmunological causes of renal allograft loss [1]. Pseudoaneurysms of the transplant renal artery are extremely rare and treatment often involves sacrifice of the renal allograft, despite different techniques of repair. In this letter we report on a patient with a renal artery pseudoaneurysm 14 months after renal transplantation.

The patient, a 62-year-old woman with end-stage renal failure because of chronic pyelonephritis, received a deceased-donor renal transplant. The right donor kidney was placed in the left iliac fossa. The allograft artery was anastomosed end-to-side to the left external iliac artery. The postoperative course was complicated by a urinary tract infection and tubular necrosis. The patient was discharged with excellent renal transplant function during triple immunosuppression with tacrolimus, mycophenolate mofetil, and prednisolone. In the following months, immunosuppression was gradually reduced to low-dose tacrolimus (6 mg daily) and prednisolone (7.5 mg daily).

Fourteen months after transplantation, she presented with swelling of the left leg. The kidney graft function was excellent with a serum creatinine level of 76 $\mu\text{mol/l}$. Duplex ultrasound of the left leg and transplanted kidney demonstrated venous thrombosis of the femoral vein, extending to the external iliac vein, a normal arterial transplant inflow, and a mass close to the renal transplant artery. The CT-angiography showed a pseudoaneurysm of the renal transplant artery at the anastomosis, compressing the external iliac vein.

To evaluate the possibility of a therapeutic interventional endovascular procedure, an additional angiography was performed, which outlined the pseudoaneurysm and excluded simple endovascular correction (Fig. 1). Because of a low suspicion of infection in the absence of clinical signs, a choice between a complex autologous venous reconstruction and an expeditious hybrid stenting procedure was

made in favor of the latter. Surgical dissection revealed the large pseudoaneurysm at the site of the anastomosis of the renal transplant artery to the left external iliac artery. After heparinization, the left common iliac artery was clamped just below the aortic bifurcation and just above the branching of the internal iliac artery. A 6-mm Dacron prosthesis (Vascutek, Inchinnan, Renfrewshire, Scotland) was anastomosed in an end-to-side fashion to the common iliac artery. This resulted in a first renal ischemia time of 14 min, although there was some perfusion of the kidney because of backflow through the left internal iliac artery. Subsequently, the right common femoral artery was accessed percutaneously and a covered 9 \times 40 mm stent (Fluency, Angiomed GmbH, Karlsruhe, Germany) was placed in the left external iliac artery, occluding the orifice of the renal transplant artery and excluding the inflow to the pseudoaneurysm.

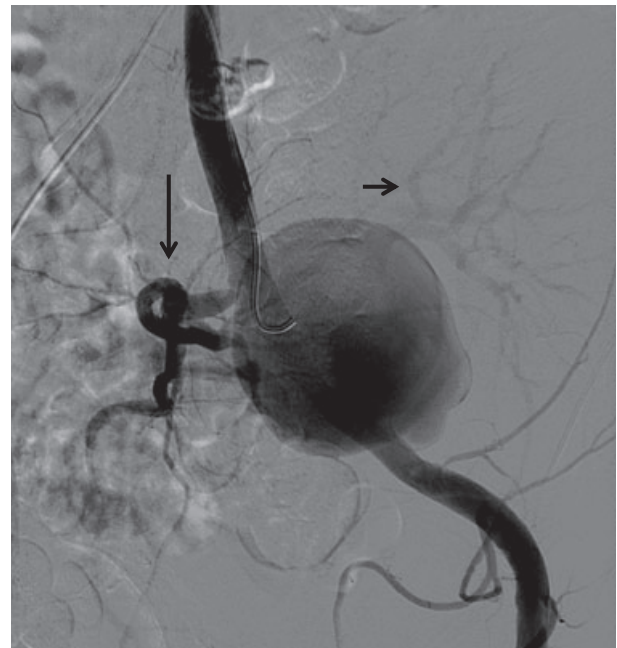


Figure 1 The angiography catheter is placed in the left common iliac artery. A large pseudoaneurysm projecting over the common and external iliac artery is depicted. The internal iliac artery projects on the right (large arrow) and the renal transplant on the left side of the pseudoaneurysm (small arrow).

Thereafter, the pseudoaneurysm was opened and an end-to-end anastomosis was created between the Dacron bypass and the orifice of the renal transplant artery. The clamps were removed and the graft was recirculated after a second warm ischemia time of 19 min. The diuresis was >20 ml/h at the end of the operation.

Duplex ultrasound of the kidney transplant showed normal perfusion and serum creatinine level returned to the preoperative level within several days. Perioperative tissue cultures yielded no growth. After the operation, the patient developed an *Escheria coli* sepsis with positive drain and urine cultures and was treated for 3 months with high-dose ciprofloxacin. After 2 years, the patient remains in good condition without signs of infection, good renal allograft function, and absence of vascular complications.

Pseudoaneurysm of the arterial anastomosis is a rare complication seen in less than 1% of recipients [2]. Deterioration of renal graft function, signs of ischemia or thrombosis in the ipsilateral limb, abdominal pain, prolonged fever, and anemia of unknown origin can be symptoms of an extrarenal pseudoaneurysm [3,4]. Diagnosis is made by duplex, computed tomography or angiography. Extrarenal pseudoaneurysms mostly occur in the early weeks after transplantation and are rarely observed as a late complication, as in our patient [4–6]. Most late pseudoaneurysms are the consequence of mycotic infection; other causes are suture rupture, anastomotic leakage, or vessel-wall ischemia [2,7]. In our patient, tissue cultures of the aneurysm showed no bacterial or fungal growth, making an infectious origin less likely. The perioperative picture suggested primary failure of the arterial anastomosis as cause of the pseudoaneurysm.

Treatment of a pseudoaneurysm is advised because of the risk of rupture, compression of related vascular or neurological structures or even loss of graft function [2–4,6,8]. Repair indications include local symptoms, progressive enlargement or a size over 2.5 cm. Especially, in case of infection, there is a significant risk of rupture. Therefore, some authors recommend immediate resection of the pseudoaneurysm with transplantectomy. Several other techniques for repair have previously been reported, including percutaneous administration of thrombotic agents, conventional open repair or endovascular repair [2,8–10]. Bracale *et al.* described their experience in the treatment of six patients with anastomotic pseudoaneurysms [9]. Five of six patients needed a transplant nephrectomy, as a result of irreversible rejection (three patients) or local infection (two patients). Endovascular treatment with the use of covered stents is another valuable therapeutic option, but with a substantial risk of allograft sacrifice. Poels *et al.* reported combined use of a thrombotic agent and covered stent in an end-to-end anastomosis while preserving the transplant kidney [10].

In case of a more common end-to-side anastomosis, placement of a covered stent will occlude the blood flow to the kidney, and therefore, it should be combined with a bypass as performed in our case. This hybrid approach, surgery with an endovascular stent, has not been published before and offers a useful alternative in the treatment of a pseudoaneurysm after renal transplantation.

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Conflicts of interest

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