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*Case Report / Olgu Sunumu*

# Transplanted kidney, stenotic renal artery, and a giant pseudoaneurysm: How we tried to treat, Why we failed, and How we managed?

## *Transplante böbrek, renal arter darlığı ve dev psödoanevrizma: Nasıl tedavi etmeyi denedik, Neden başarısız olduk ve Nasıl yönettik?*

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***ABSTRACT***

Donor and recipient artery problems are challenging complications in renal transplant patients. In this report, we present our treatment strategy in a 42-year-old renal transplant case with renal artery stenosis and a giant pseudoaneurysm at the anastomotic site. Open repair failed due to extreme adhesions. However, the patient was managed successfully using the hybrid approach with iliofemoral bypass and stent graft implantation to the renal artery, providing retrograde renal artery perfusion.

***Keywords:*** Artery; hybrid treatment; kidney transplantation; pseudoaneurysm; stenosis.

***ÖZ***

Donör ve alıcı arter problemleri, böbrek nakli hastalarında zorlu komplikasyonlardır. Bu yazıda, anastomoz bölgesinde renal arter darlığı ve dev psödoanevrizması olan 42 yaşında bir renal transplant olgusunda tedavi stratejimiz sunuldu. Açık cerrahi ciddi adezyonlar nedeniyle başarısız oldu. Bunun üzerine, hasta iliofemoral baypas ve retrograd renal arter perfüzyonunu sağlayacak şekilde, renal arter stent greft implantasyonu ile hibrid yaklaşım kullanılarak başarılı bir şekilde tedavi edildi.

***Anahtar sözcükler:*** Arter; hibrid tedavi; böbrek nakli; psödoanevrizma; darlık.

Pseudoaneurysms following renal transplantation may occur in less than 1% of cases.[1] They usually originate from the anastomotic sites. Various etiologies have been proposed in the development of these pseudoaneurysms including poor anastomosis skills, arterial injury, infectious contamination or immunological factors.[2] Conventional surgical, endovascular and percutaneous techniques have been defined in the literature for the treatment of the pathology; however, there is no gold standard method.[1]

In this report, we present hybrid treatment of a transplant renal artery pseudoaneurysm, renal artery stenosis, and outflow artery stenosis in a female patient with a history of kidney transplantation.

## CASE REPORT

A 42-year-old woman had chronic renal failure for 12 years and received hemodialysis three times per week. She had a three-month history of uneventful renal transplantation from cadaver, resulting from fairly good kidney function with creatinine decrease to 1.7 mg/dL (0.8-1.2 mg/dL). The kidney was implanted to the right iliac fossa with end-to-side anastomosis of the renal artery to the right external iliac artery.

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She presented to the clinic with abdominal and back pain. Her creatinine level was found to be elevated (3.5 mg/dL) and she was hospitalized for further investigation. Renal biopsy did not indicate acute rejection. Doppler ultrasonography of the kidney and iliac system indicated renal artery stenosis, 4 cm in diameter pseudoaneurysm and stenosis at the external iliac artery. Her creatinine level gradually increased up to 9.6 mg/dL during her hospital stay and interventional therapy was planned. She underwent angiography (Figure 1a) and renal artery balloon dilatation which led to decreased creatinine to 5 mg/dL, immediately; however, the pseudoaneurysm persisted. In few days, she complained about increasing abdominal pain and claudication. Magnetic resonance angiography indicated enlarged pseudoaneurysm, re-stenosed renal artery, and stenosed external iliac artery (Figure 1b). We planned open surgery to reconstruct the renal artery, external iliac artery, and treat the pseudoaneurysm. The patient was informed about the risks and benefits of surgery and a written informed consent was obtained.

The operation was performed under general anesthesia. The transplantation procedure was performed using the right retroperitoneal approach. The renal artery was anastomosed to the right external iliac artery and the renal vein was anastomosed to the common iliac vein. We preferred median laparotomy to keep bleeding under control and make the procedure safer. The aorta, bilateral common iliac arteries, and right external and internal iliac arteries were dissected free and looped. The renal artery, distal part of the external iliac artery, and the pseudoaneurysm were unable to be dissected due to extreme adhesions, risk of bleeding, and kidney loss.

Since the iliofemoral bypass graft patency is high,[3] the iliofemoral bypass graft procedure was planned. The right femoral artery was explored. There was decreased pulsation due to external iliac artery stenosis. We avoided clamping right common iliac artery or aorta to provide continuous blood flow to renal artery during procedure. Therefore, bypass was performed from the left common iliac artery to the right femoral artery with an 8-mm polytetrafluoroethylene graft (Fusion Vascular Graft, Maquet Getinge Group, MAQUET Cardiovascular LLC, Wayne, USA). The incisions were closed and the patient was taken to the angiography suit.

We aimed to implant a stent graft from the external iliac artery into the renal artery to treat the renal artery stenosis and to exclude the pseudoaneurysm providing antegrade flow; however, it was not possible due to at least 270° angle at the anastomotic site. A 6×12-mm stent graft (Maquet Getinge Group, MAQUET Holding B.V. & Co., Rastatt, Germany) was, then, deployed from the right femoral artery into the renal artery. Control angiography with right femoral injection indicated successful stent graft apposition without leak. A control angiogram from the right common iliac artery indicated antegrade pseudoaneurysm filling which was attributed to the size mismatch between the external iliac artery and stent graft. The aneurysm and proximal external iliac artery were coil-embolized

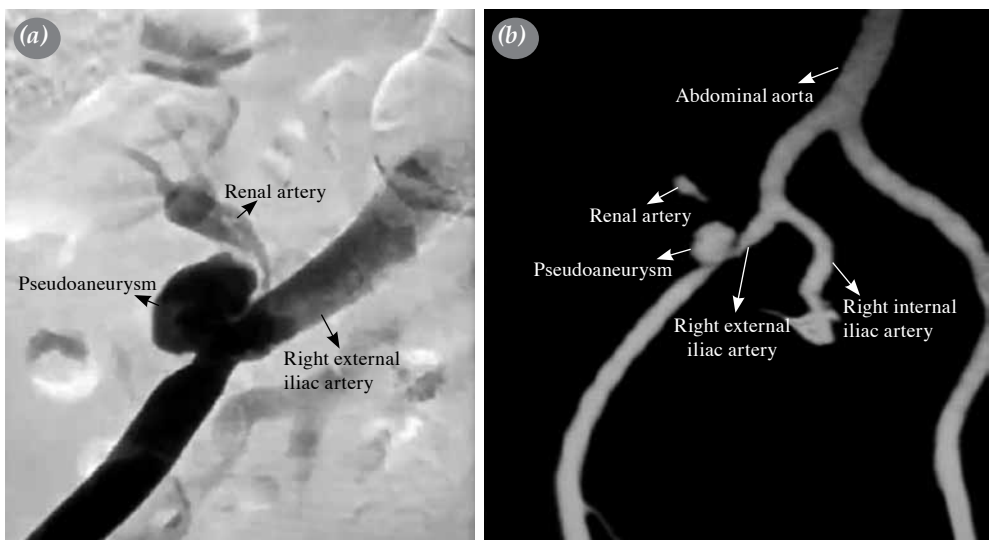


**Figure 1. (a)** Angiography before balloon dilatation of the renal artery showing renal artery stenosis, pseudoaneurysm, and the external iliac artery stenosis. **(b)** Magnetic resonance angiography after balloon dilatation showing renal artery stenosis, pseudoaneurysm, and external iliac artery stenosis.

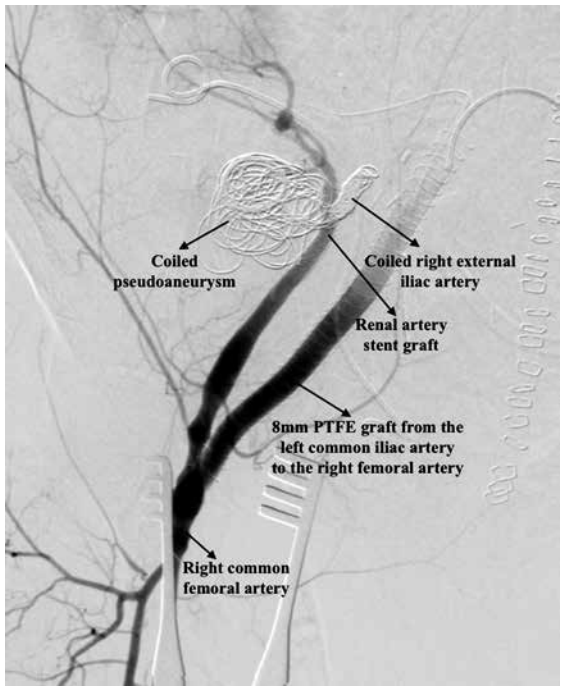


**Figure 2.** Hybrid-treated renal artery stenosis, pseudoaneurysm, and external iliac artery stenosis. Left common iliac artery to right common femoral artery bypass, endovascular stent graft implantation into the renal artery, and coil embolization of the pseudoaneurysm and external iliac artery.

and pathology was completely treated. A final control angiography was performed using contrast injection from the graft and showed sufficient retrograde renal artery and antegrade femoral artery filling (Figure 2).

The patient was taken to the intensive care unit and extubated for six hours. Creatinine level decreased to 2.5 mg/dL. She was discharged with sufficient urine output and decreased creatinine level to 1.5 mg/dL on the postoperative fifth day in good condition. Anticoagulation was maintained with aspirin and clopidogrel for three months, followed by aspirin alone. At three months after surgery, computed tomography (CT) angiography revealed the graft patency.

## DISCUSSION

Vascular complications following renal transplantation are rare in the current era with the advances in medical equipment technology, immunosuppressive agents, and surgical skills.[4] These complications may include anastomotic problems, dissections, and stenosis at the inflow and run-off arteries due to various technical problems during implantation of the graft.[4] Pseudoaneurysms are among one of the anastomotic problems with an incidence less than 1% which may result from secondary to vascular injury, suture defects, infection, or immunological factors.[1]

Since the kidney is transplanted into the iliac fossa, patients with pseudoaneurysms are usually asymptomatic and incidentally diagnosed during imaging studies in case of suspicion for various transplant problems.[5] Other symptoms include abdominal pain, transplant kidney dysfunction, anemia, fever, signs of infection, claudication and/or limb swelling.[1] Doppler ultrasonography is usually the initial tool for the diagnosis and CT angiography or magnetic resonance angiography are used for the confirmation of the pathology as well as the interference with the structures at the vicinity.[2] Conventional angiography is useful for the diagnosis of the exact location of the defect as well as certain percutaneous treatment modalities.[5] Our patient had a pseudoaneurysm and stenosis at the renal artery and the external iliac artery, which were attributed to a giant pseudoaneurysm compressing these vascular structures.

Although pseudoaneurysms deserve treatment in most instances, the literature includes controversial indications for treatment of transplant renal artery pseudoaneurysms, most probably due to their rare and complex nature, which may end up with renal failure or loss.[6] Although several researchers have proposed regular follow-up for small, asymptomatic pseudoaneurysms, symptomatic pseudoaneurysms or pseudoaneurysms with a size greater than 2.5 cm in diameter, showing rapid growth, occurring secondary to infection require treatment.[1] Open surgical repair, angiography-based methods or ultrasound-guided percutaneous pseudoaneurysm embolization with thrombotic agents are among the treatment options.[7]

Surgical treatment of transplant renal artery pseudoaneurysms is not easy and even challenging, particularly in the early postoperative months due to extensive adhesions. There are reports of kidney loss in the literature during the surgical repair of these pseudoaneurysms.[4] In the current era, endovascular techniques are considered as convenient and safe methods.[8] Percutaneous pseudoaneurysm sack embolization, angiographic coil embolization, stent-supported coiling or endovascular stent graft implantation are other less invasive and more preferred methods; however, all they require expertise.[7]

The first endovascular stent graft treatment of auto-transplanted renal artery was presented by

Smeds et al.[9] in 2013. Che et al.[1] presented their snorkel technique in their heterotopic renal transplant case with unfavorable arterial anatomy. In our patient, we preferred hybrid therapy. With an extra-anatomic bypass from the left common iliac artery to the right femoral artery, not only ischemia to the transplanted kidney was omitted, but also the stenosis of the right external iliac artery was also bypassed. Since an antegrade stent graft from the right common iliac artery to the renal artery could not be possible due to high-grade angulation, we deployed a retrograde stent graft from the right femoral artery overcoming both renal artery and external iliac artery stenosis. We further secured the pseudoaneurysm with coil embolization of the aneurysm sack, following occluding the proximal external iliac artery.

In conclusion, despite with our single case report and limited number of the literature series, transplant renal artery pseudoaneurysms are complex and challenging. Individual treatment strategies, therefore, should be planned for each case. In our technique, we used hybrid treatment for the treatment of our particular cases.

**Declaration of conflicting interests**

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