



Trauma and reconstruction

Unveiling a pseudoaneurysm at the anastomosis site in a transplanted kidney: An initial misclassification as hydro nephrosis - A case report and literature review

Niki Tadayon^a, Amir Reza Abedi^{b,*}^a Shohada Tajrish Hospital, Vascular Department, Shahid Beheshti University of Medical Science, Tehran, Iran^b Men's Health and Reproductive Health Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

ARTICLE INFO

Keywords:

Kidney transplantation
Endovascular stent
Pseudoaneurysm

ABSTRACT

A 31-year-old woman who developed large Pseudoaneurysm after kidney transplantation is discussed. The patient was presented with an 11 cm mass, which became larger gradually. Minimally invasive endovascular stent graft placement was successfully done.

1. Introduction

Vascular complications in renal transplantation encompass stenosis or thrombosis of the renal artery, thrombosis of the renal or iliac veins, arteriovenous fistulae, or pseudoaneurysm formation.^{1,2} Pseudoaneurysms that develop after renal transplantation are rare, with an incidence rate of less than 1%. These aneurysms can be located either at the anastomotic site or within the renal allograft.² Because of rarity, controversy exists regarding its etiology, occurrence, and indications for repair, treatment options, and prognosis of this potentially life-threatening complication.³

When faced with complication, comprehensive diagnostic evaluation and collaborative decision-making among different specialties are crucial for optimal patient outcomes. In this article we present a 31-year-old woman with a huge pseudoaneurysm at the anastomotic site of her second transplanted kidney; Initially a urologist suspected a lymphocele or huge hydro-nephrotic implanted kidney, according to a CT scan without contrast material. Attempt for percutaneous aspiration yielded fresh blood, leading to further investigation.

A subsequent Doppler ultrasound revealed the presence of a significant pseudoaneurysm in left lower quadrant of abdomen.

Through collaborative efforts between urologists and vascular surgeons, the patient underwent successful endovascular stent graft placement to address the pseudoaneurysm. This case highlights the importance of diagnostic collaboration for effective and on time management of this rare complication.

2. Case presentation

A 31-year-old female underwent her fist kidney transplantation for end-stage renal disease secondary to an unknown condition at age 16 in her right iliac fossa. This graft was functional for 6 years. Then she underwent 2 years of hemodialysis till she could get another transplant in her left iliac fossa from a living donor. Both artery and vein were anastomosed to internal iliac artery and vein respectively according to her urologist. This graft was functional until 3 years ago when she began again on hemodialysis. She presented with heaviness and a mass in the transplant region. The mass was present for at least 6 months and gradually became larger. Based on findings of a CT scan which did not include any contrast material; the urologist suspected a lymphocele or sever hydronephrosis of the transplanted kidney and attempted to aspirate the suspected mass. However, instead of lymph fluid or urine, fresh blood was obtained. This unexpected result prompted further evaluation.

Recognizing the need for a more comprehensive assessment, a Doppler ultrasound was performed. The results revealed the presence of a significant pseudoaneurysm at the anastomosis site of the transplanted kidney's vasculature. Vascular surgery team was involved for collaborative decision-making. A CT angiogram showed a pseudoaneurysm with 11cm diameter at the anastomotic site of the left internal iliac artery (Fig. 1).

We chose endovascular approach for management of this pseudoaneurysm. Vascular access from right and left femoral arteries with 6

* Corresponding author.

E-mail address: amirezabedi@gmail.com (A.R. Abedi).<https://doi.org/10.1016/j.eucr.2023.102526>

Received 4 July 2023; Received in revised form 3 August 2023; Accepted 13 August 2023

Available online 14 August 2023

2214-4420/© 2023 Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

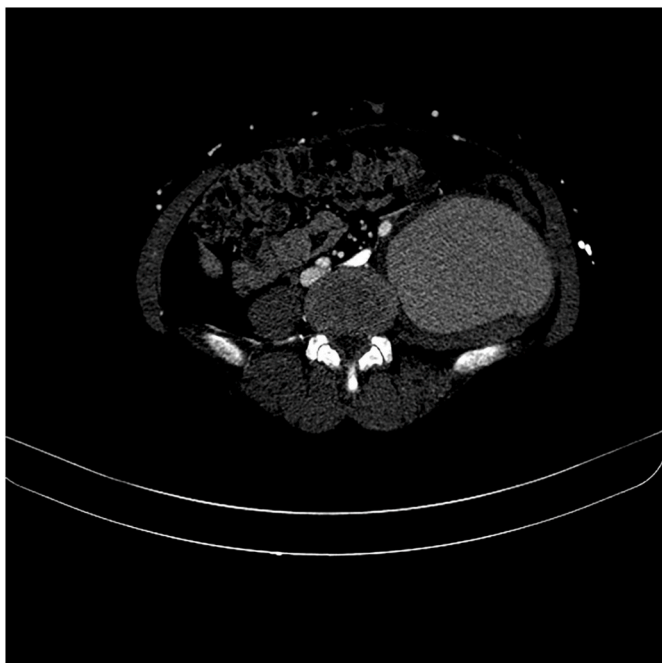


Fig. 1. Axial cut of CTA showing a huge enhancement (pseudoaneurysm) in left iliac fossa.

French and 9 French sheaths obtained. Internal left internal iliac artery was cannulated with a 6 French cobra catheter from the right groin after cross over. Coil embolization of distal internal iliac artery performed (Fig. 2). A stent graft (Covera™ Vascular Covered Stent - Flared - 9mm × 60mm x 80cm) was placed from left common iliac to left external iliac which effectively excluded the pseudoaneurysm and normal blood flow to the lower extremity was preserved (Fig. 3).

The patient experienced a smooth recovery without perioperative complications. Follow-up examinations revealed a significant improvement in the patient's symptoms, with the resolution of pain and



Fig. 2. Angiography showing access from both groins. Coil embolization of distal internal iliac artery.



Fig. 3. Angiography showing A stent graft (Covera™ Vascular Covered Stent - Flared - 9mm × 60mm x 80cm) placement from left common iliac to left external iliac.



Fig. 4. Axial cut of CTA 1-month post intervention shows patent iliac artery with stent graft in place, non-enhanced and markedly smaller hematoma in site of previous pseudoaneurysm can be seen.

heaviness. Ultrasonographic and CTA follow-up examinations confirmed successful pseudoaneurysm exclusion and resolution during the first post-operative year (Fig. 4).

3. Discussion

Vascular complications, while infrequent, remain a significant cause of morbidity and even mortality.³ Renal transplantations is associated

with a range of 3–15% occurrence of vascular complications, including transplant renal artery stenosis, transplant renal artery thrombosis, transplant renal vein thrombosis, hematomas, extra-renal pseudoaneurysms, and biopsy-induced arteriovenous fistulas and intra-renal pseudoaneurysms. Early detection and prompt surgical or interventional management can effectively salvage most renal allografts.²

The incidence of vascular complications is higher in cadaveric donor renal transplant recipients compared to living donor renal transplant recipients, and more common with allografts possessing multiple renal blood vessels. Although rare, extra-renal pseudoaneurysms can be devastating and lead to allograft loss due to the risk of rupture. These pseudoaneurysms are usually located at the anastomotic site and are commonly caused by poor surgical technique or perivascular infection. Intra-renal pseudoaneurysms can occur following needle biopsy or as a result of mycotic infection.²

Patients with pseudoaneurysms are typically asymptomatic and diagnosed incidentally, although some may present with fever, anemia, hypertension, functional impairment, graft loss, and life-threatening hemorrhage due to acute rupture.^{3,4} Physical examinations may detect tenderness, pulsatile masses, thrill, or bruit, although there are no specific physical findings for these pseudoaneurysms. The size of the pseudoaneurysm is a direct factor in predicting the risk of rupture, as well as other factors such as the rate of expansion or growth, the presence of active blood flow, weakness of the wall, and existence of trauma or radial force on the lesion.⁴

Additionally, investigation showed that patients who suffer from end-stage renal may potentially experience platelet dysfunction. Furthermore, the utilization of extended anticoagulants during hemodialysis presents a risk factor for pseudoaneurysms formation after an arterial injury.⁵

We hypothesize that these two factors may have contributed to the development of the pseudoaneurysm in this patient.

Various diagnostic tools have been utilized to detect pseudoaneurysms of transplanted renal artery. Color flow Doppler and duplex Doppler scanning are capable of readily identifying them. Pseudoaneurysms manifest as either a simple or complex cyst on B mode ultrasound. Intracystic blood flow can be visualized via color Doppler, while spectral analysis can reveal any co-existing arteriovenous fistula with elevated arterial and venous flow, high velocity, and low resistance.^{2,3} Prior to commencing treatment to verify the findings of ultrasound a CT angiography, MR angiography, or catheter directed conventional angiography is used. Superselective transcatheter embolization may be employed to address any identified arteriovenous fistulae or small favorable pseudoaneurysms.⁴ Intravascular stent graft placement may be performed for extra-renal pseudoaneurysms with suitable anatomy.^{2,4}

The indications for repair of pseudoaneurysm and management options are currently subject to debate. Urgent intervention will be required to save the lives of patients in the presence of life-threatening hemorrhage due to acute rupture, with the allograft being undoubtedly jeopardized and transplant nephrectomy possibly required.³ Some reports suggest that symptomatic pseudoaneurysms, large size (greater than 2.5 cm), presence of infection, progressive enlargement, and impending rupture are indications for repair. Asymptomatic small pseudoaneurysms may be managed conservatively with regular monitoring.⁴

Open surgical repair, endovascular repair, and ultrasound-guided percutaneous thrombin injection are the presently reported treatment options for managing extra-renal pseudoaneurysms complicating renal transplantation. Surgical resection of the pseudoaneurysm and subsequent arterial reconstruction with patch angioplasty, reanastomosis, or an allograft autotransplantation are included in open surgical repair. Reports have been made of an interposition graft or extra-anatomic reconstruction following pseudoaneurysm resection leading to graft loss.³

Endovascular repair has become a more appealing treatment option

for extra-renal anastomotic pseudoaneurysms and has gained popularity recently.⁴ It eliminates blood flow into the pseudoaneurysm by endoluminal stent deployment, thus reducing the risk of rupture. Anatomic criteria for proximal and distal landing zones are required. Endovascular stenting of the external iliac artery with renal transplant artery exclusion may be considered in emergency situations of acute rupture or situation of failure of kidney transplant. Adjunctive percutaneous drainage of the retroperitoneal hematoma or subsequent open surgical drainage and transplant nephrectomy may be necessary and is left for once the patient's condition stabilizes.^{3,4}

Ultrasound-guided percutaneous thrombin injection has been identified as an efficient and secure treatment option, provided that the pseudoaneurysm is accessible and not associated with infection. This method has also been utilized for the treatment of a large anastomotic pseudoaneurysm after the failure of kidney transplant.^{3,4}

In the case of the studied patient, prompt intervention was necessary, as the pseudoaneurysm was 11 cm in diameter. Kidney transplant had already failed. Besides the prior attempt for aspiration of the pseudoaneurysm raised the concern for prompted rupture. We considered a sufficient proximal and distal landing zone in common and external iliac arteries respectively and stent graft was deployed. Subsequent clinical and ultrasonographic follow-up evaluations verified that the treatment was successful.

4. Conclusion

Minimally invasive endovascular stent graft placement offers a good therapeutic approach in this challenging scenarios.

The case underscores the need for effective communication and teamwork among disciplines involved in transplant care. Such collaboration is vital for optimal patient outcomes and reinforces the importance of interdisciplinary approaches in managing complex transplant cases.

Ethics

Patient informed consent was obtained to publish her information. The patient's private information remained confidential with the researchers.

Financial support and sponsorship

None.

Declaration of competing interest

The authors report no conflicts of interest in this work.

References

1. Ruben Geevarghese, Neil Gupta. Successful endovascular management of an arteriovenous fistula presenting with massive hematuria in a failed renal transplant. *Journal of endourology case reports*. 2020;6(2):73–76. <https://doi.org/10.1089/CREN.2019.0095>.
2. Aktas S, Fatih Boyvat, Sinasi Sevmis, Gokhan Moray, Hamdi Karakayali, Mehmet Haberal. *Analysis of Vascular Complications After Renal Transplantation*. 2011; 43(2):557–561. <https://doi.org/10.1016/J.TRANSROED.2011.01.007>.
3. Nitin Sharma, Samir Bidnur, Mauricio Caldas, et al. *Renal transplant anastomotic pseudoaneurysms: Case report of open repair and endovascular management*. 2019;2(2): 86–89. <https://doi.org/10.1002/LJU5.12047>.
4. Al-Wahaibi KN, Aquil S, Al-Sukaiti R, Al-Riyami D, Al-Busaidi Q. Transplant renal artery false aneurysm: case report and literature review. *Oman Med J*. 2010;25(4): 306–310. <https://doi.org/10.5001/omj.2010.88>.
5. Lee S, Jung S, Kim HJ, et al. Spontaneous rupture of a renal artery pseudoaneurysm in a hemodialysis patient: a case report. *Medicine*. 2021;100(20), e25970. <https://doi.org/10.1097/MD.00000000000025970>.