

Case Report

Successful Second Kidney Transplantation Using a Living Donor Kidney with Complex Vascular and Urological Anatomy—A Case Report

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Abstract

Kidney transplantation is the treatment of choice for patients with end-stage renal disease. Kidneys with complex vascular anatomy are prevalent in donors, and due to donor shortage, the acceptance of these kidneys for transplantation has increased over time. Donor kidneys with both complex vascular and urological anatomy are rare and using it in a recipient for second kidney transplantation with successful outcome is very rare. We report a case managed at our facility. A 40-year-old male presented at the urology clinic, Zenith Medical and Kidney Center, Abuja, Nigeria, as a potential kidney donor for a 62-year-old male with end-stage kidney disease (ESKD) secondary to human immunodeficiency virus-associated nephropathy (HIVAN). Donor renal angiogram revealed 3 left renal arteries and 2 right renal arteries, with bilateral duplex ureters. The donor had a left open donor nephrectomy that yielded a kidney with 3 renal arteries, 1 renal vein, and 2 ureters. This was used for the recipient surgery, which was a second kidney transplant with a successful outcome. The need for more donors for kidney transplantation has led to the use of donor kidneys with both complex vascular and urological anatomy. The outcome following these surgeries was successful for both the donor and recipient, with immediate graft function after kidney transplant.



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Keywords

Kidney; complex; transplantation; anatomy

1. Introduction

Kidney transplantation is the treatment of choice for patients with end-stage renal disease. Live donor transplant now represents 46% of kidney transplants with a 10-year graft survival of 58.6% [1]. The greater advances in transplant surgery techniques, immunosuppressant types, and post-operative follow-up have led to wider use of kidney transplantation and an increase in allograft survival [2]. Kidneys with complex vascular anatomy are prevalent in donors (18-20%), and due to the donor shortage, the acceptance of these kidneys for donation and transplantation is expected to increase over time [3, 4].

Multiple renal arteries are reported unilaterally in 23-25% and bilaterally in 6-10% [5]. A donor kidney with a complex renal vascular anatomy is generally considered a relative contraindication for donation because of the idea that it is related to greater surgical complication rates [6]. In addition to pool expansion caused by allograft kidney transplantation with multiple renal arteries, many adverse events were reported like acute graft rejection, longer warm ischaemia time, vessel thrombosis and tubular necrosis [7].

A meta-analysis found that transplantation of multiple renal artery kidneys prolongs warm ischaemic time, leading to delayed graft function [8].

Donor kidneys with both complex renal vascular and urological anatomy are rare and using it in a recipient for second kidney transplantation with resultant successful outcome is very rare. We report a case of such a case managed at our facility.

2. Case Presentation

A 40-year-old male presented at the urology clinic, Zenith Medical and Kidney Center, Abuja, Nigeria, in November 2025 as a potential kidney donor for a 62-year-old male on management for ESKD secondary to HIVAN. The recipient came with his donor for review and investigations to determine compatibility.

Donor history revealed no positive history of hypertension or diabetes mellitus. There was no positive history of consumption of alcohol, cigarettes, or use of herbal medications. His physical examination revealed no abnormal findings and the requested laboratory investigations were normal.

Renal angiogram revealed 3 left renal arteries and 2 right renal arteries, with bilateral duplex ureters. He had video-covered counselling on open living donor nephrectomy and consent for the procedure was obtained.

Recipient history revealed a positive history of retroviral disease on treatment, positive history of hypertension, excision of penile squamous cell carcinoma in 2014 and kidney transplantation in 2013. His physical examination revealed a palpable renal allograft in the right iliac fossa.

Immunology- Immunological workup revealed a Human Leukocyte Antigen (HLA) mismatch of 1-2-1(A-B-DR loci) with a negative T-cell crossmatch.

Donor: Non-related.

Ethical Clearance: The recipient/donor relationship was passed through the hospital's kidney transplant ethical committee and the Federal High Court of Nigeria to ascertain that there was no financial inducement from the recipient to the donor to donate his kidney, as they were not related.

The donor had an open left donor nephrectomy under general anaesthesia with the harvested kidney revealing 3 renal arteries, 1 renal vein and 2 ureters (Figure 1).

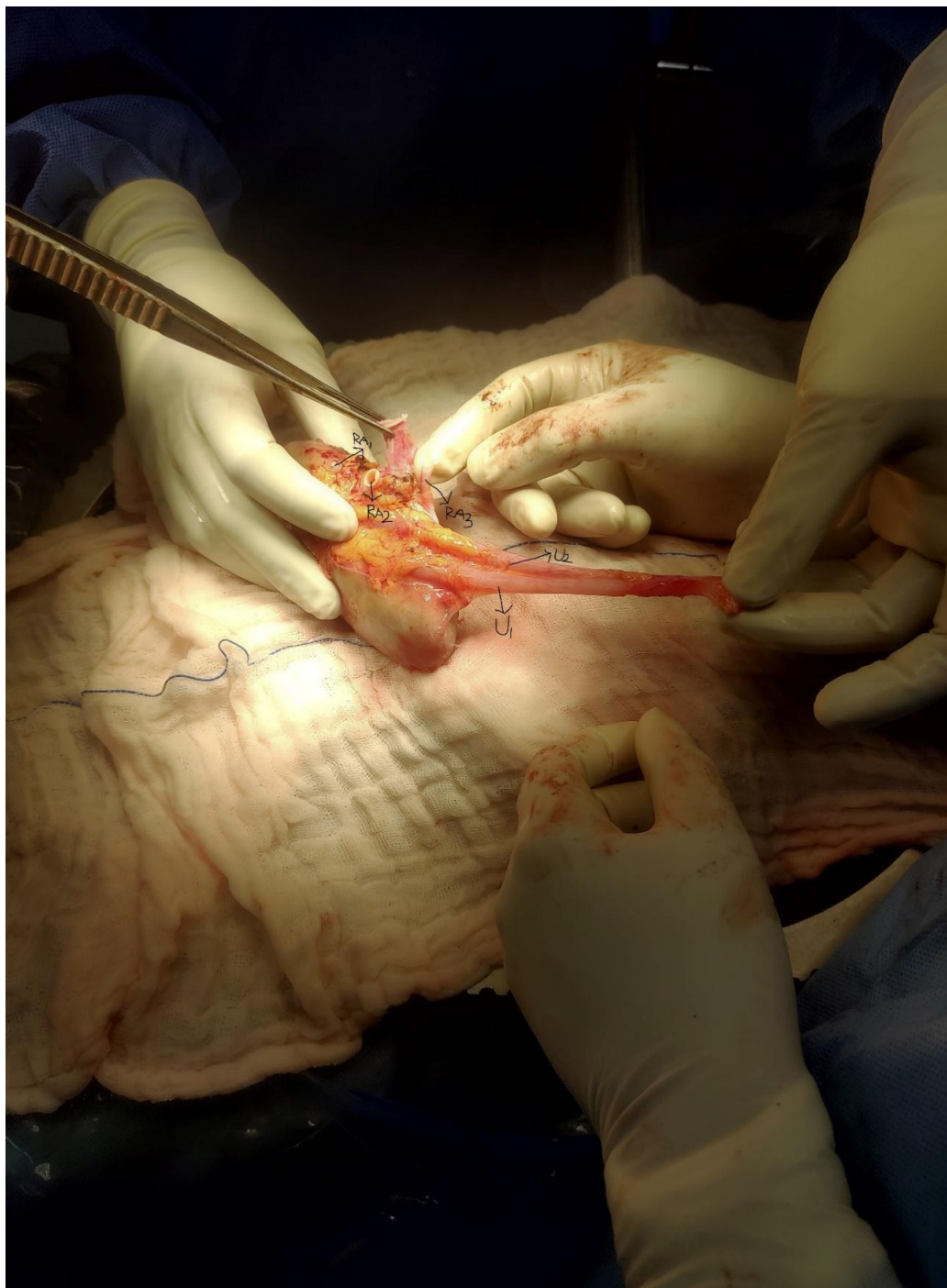


Figure 1 Harvested left donor kidney with 3 renal arteries (RA1, RA2, RA3), 1 renal vein and 2 ureters (U1, U2).

The recipient surgery was done under spinal/epidural anaesthesia. Through a left groin incision, the 2 main renal arteries were anastomosed separately to the left external iliac artery end-to-side, while the renal vein was anastomosed to the left external iliac vein end-to-side; the 3rd renal artery was tied off as it supplies less than 5% of the middle pole of the kidney. Ureteroneocystostomy was done using the Lich-Gregoir technique with 2 ureteric stents passed (Figure 2).

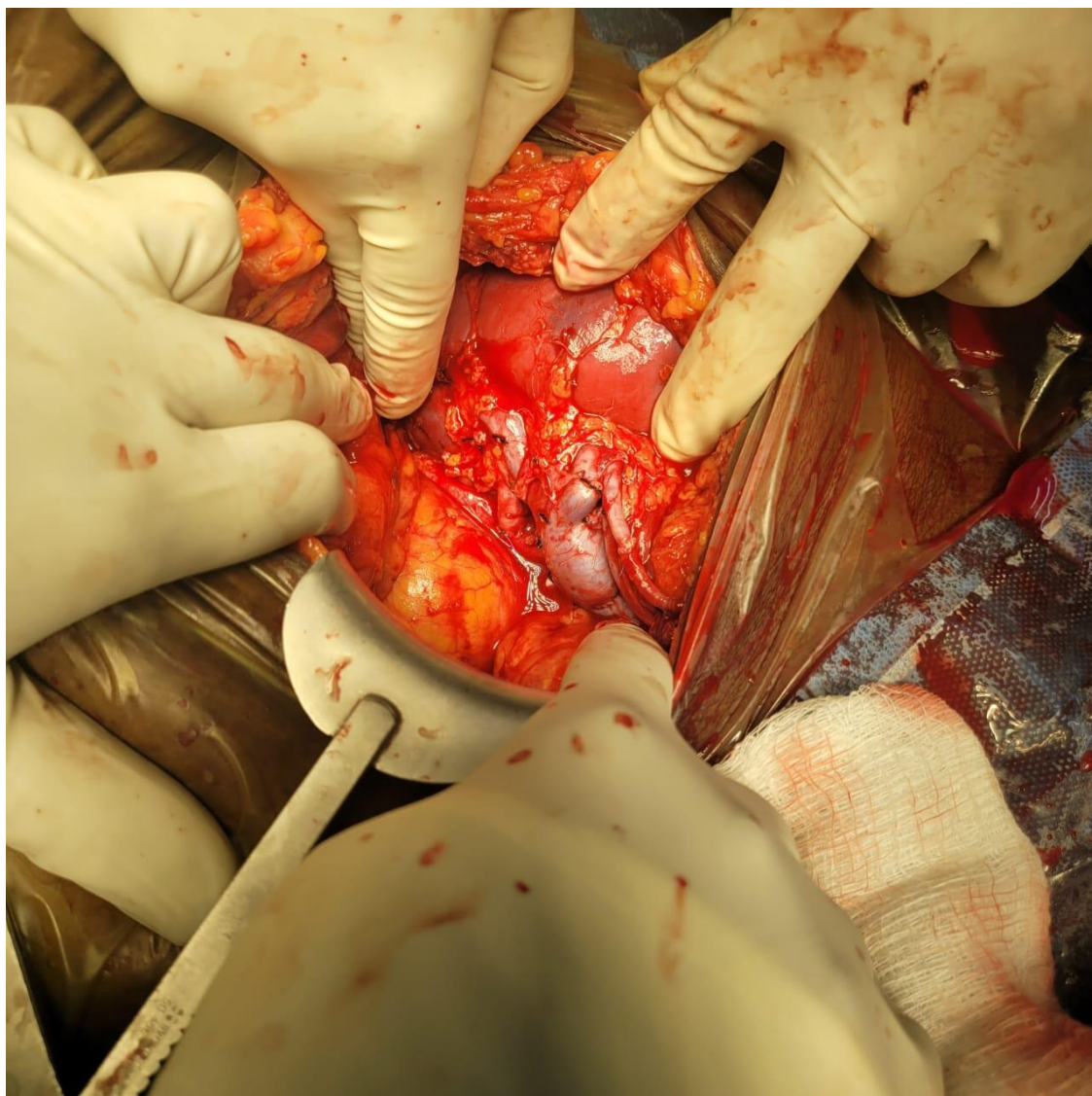


Figure 2 Completed kidney transplant showing anastomosed 2 renal arteries, 1 renal vein, and 2 ureters with less than 5% mid pole dusky area supplied by the tied-off 3rd renal artery.

There was immediate graft function with serum creatinine dropping to 110 micromol/l by the 6th post-operative day. Tacrolimus/Mycofenolate mofetil/Prednisolone were used for immunosuppression. Serum creatinine 2 months after kidney transplant was 123micromol/l and the patient is currently on follow-up visits.

2.1 Ethical Approval and Informed Consent

Written Informed consent to participate in the study was obtained from the patients involved. Ethical approval was not sought because this is a case report.

3. Discussion

The recipient in this case is a male. The aetiology of chronic kidney disease in the patient was HIVAN, however, in our environment the most common cause of chronic kidney disease is hypertension, followed by diabetes mellitus [9]. The recipient had treatment for human immunodeficiency virus (HIV) and the viral load was brought down to undetectable level (40 copies/ml), which was maintained for 4 months before kidney transplantation. The CD4 T-cell count was 300 cells/mm³ before kidney transplant and there were no active opportunistic infections detected, nor were there any acquired immunodeficiency (AIDS) defining cancers picked during evaluation in preparation for surgery. These were aimed at ensuring the patient's immune system can handle the kidney transplant procedure and post-kidney transplant medications.

The donor had a left nephrectomy, the preference for left-side nephrectomies was due to longer left renal vein, which makes vascular anastomosis technically easier and has also been shown to decrease operating time [10]. Right donor nephrectomy is performed when the vascular or urological anatomy is more complex on the left side; in this index case, although there were 2 renal arteries on the right side, we still went to the left side with 3 renal arteries, as both sides already have multiple renal arteries and the left will offer the additional advantage of a longer renal vein, which will make the anastomosis easier. Nayak SB et al reported anatomical variations of the right kidney showing 3 renal arteries and 5 renal veins but no ureteric anatomic variation [11].

Also, Nayak and colleagues also reported anatomical variation of the right kidney with eight renal arteries peri-hilar branches, they did not report any variation in the renal vein or ureter [12].

Kumar N et al reported bilateral anatomical variations of both renal arteries and veins at the renal hilum but as well did not report ureteric anatomical variations [13].

Rakesh V reported twisted renal vessels producing an abnormal shape of the right kidney; there were no multiple renal vessels or ureter reported [14].

Satheesha and colleagues reported an arterial glomerulus at the hilum of the right kidney and the abnormal course of the right testicular artery; they reported no ureteric anatomic variations [15].

The adverse events reported following kidney transplant using a donor kidney with complex vascular anatomy [7] were not seen during and after the recipient surgery despite the fact that it was a second kidney transplant. The patient also had to wait for more than 2 years before kidney transplantation, as he had treatment for penile cancer and the minimum waiting time following cancer treatment was 2 years before kidney transplantation.

The index patient did not have delayed graft function, as reported in a meta-analysis of kidney transplantation using multiple renal arteries [8]. The additional complex urological anatomy in the patient led to the placement of 2 ureteric stents during ureteroneocystostomy.

4. Conclusion

The shortage of donors for kidney transplantation has increased the use of donor kidneys with complex renal vascular anatomy. The need for more donors for kidney transplantation has led to the use of donor kidneys with both complex vascular and urological anatomy.

Post-operative complications and delayed graft function were not seen after kidney transplant using a donor kidney with both complex vascular and urological anatomy, despite the fact that it was used in a patient who has previously had kidney transplantation.

4.1 Limitations

The patient had a short follow-up period of 2 months, longer follow-up is necessary to further validate the findings from this study.

Author Contributions

OU-Conceptualization, writing-original draft, review, editing. UB-Software, writing-Review and editing. RW-Writing-Review and editing. MB-Writing-Review and editing. OP-Writing-Review and editing. All authors have read approved the published version of the manuscript.

Competing Interests

The authors have declared that no competing interest exists.

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