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Case Report
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A Case Report Successful Deceased Donor Renal Transplant in a Complicated Vascular Patient

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Abstract

This case presents a successful deceased donor renal transplant in a patient with multiple factors contributing to its complexity, including complicated vasculature with occluded distal superior vena cava and abdominal varices requiring an intraperitoneal approach rather than retroperitoneal approach. Secondly, the donor kidney had two renal arteries requiring a side-to-side anastomosis reconstruction, while the patient was positive for anticardiolipin antibodies increasing her risk of artery thrombosis. Lastly, the patient had chronic thrombocytopenia preventing standard protocol anti-thymocyte globulin induction balancing the increased risk of bleeding with anticoagulation in the setting of thymoglobulin-induced thrombocytopenia. With this successful transplantation the patient was able to come off of hemodialysis after seven years, which will significantly impact the patient's life in a positive way.

Abbreviations

NSAIDS: Nonsteroidal Anti-Inflammatory Drugs; eGFR: estimated Glomerular Filtration Rate; ESRD: End Stage Renal Disease; SVC: Superior Vena Cava

Case Presentation

A 33-year-old woman presented for deceased donor renal transplant due to end stage renal disease secondary to nonsteroidal anti-inflammatory drug-induced nephropathy. Patient developed juvenile rheumatoid arthritis in her teenage years leading to excessive use of NSAIDs and ultimately renal failure. Patient started hemodialysis at the age of 26, initially was on peritoneal dialysis for a short period of time, but eventually resumed hemodialysis due to peritonitis and need for peritoneal dialysis catheter removal. Patient had multiple hemodialysis vascular access failures requiring multiple hemodialysis access catheters leading central venous stenosis and ultimately to superior vena cave syndrome. Due to life-limiting vascular access complications, she underwent extra-anatomic left axillary artery to left external iliac vein arteriovenous grafting. She was maintained on anticoagulation with warfarin to maintain graft patency for a period of time. At time of the transplant operation patient had been receiving hemodialysis via this left arteriovenous graft from left axillary to left external iliac vein (Figure 2). Furthermore, the patient had a history of deep venous thrombosis in the past, was treated with warfarin for one year, but was no longer on anticoagulation at the time of transplantation, even though she was known to be anticardiolipin antibody positive.

Preoperatively, the patient underwent CT scanning with contrast that showed an occluded distal superior vena cava, with small venous collateral along the anterior chest and abdominal wall (Figure 1). The patient's main drainage of blood from her head was collaterals down her abdominal wall to the inferior epigastric vessels and then up to the inferior vena cava, which resulted in varices of her inferior epigastric vessels (Figure 1). In addition, patient's preoperative lab work showed thrombocytopenia with a platelet count of 98,000/mcl.

Presented with the inability to disturb the left iliac vein arteriovenous graft and the inability to disturb the right sided epigastric venous collaterals for typical pelvic kidney transplant exposures, it was decided that the best approach for this patient was intraperitoneal placement of the kidney *via* midline laparotomy.

Patient received corticosteroids and anti-thymocyte globulin for induction of immunosuppression. A lower midline incision was performed with mobilization of the right colon for exposure of the right iliac vessels. The right kidney had two renal arteries that were reconstructed with a side-to-side anastomosis using 6.0 polypropylene sutures on the backbench. The short renal vein was extended

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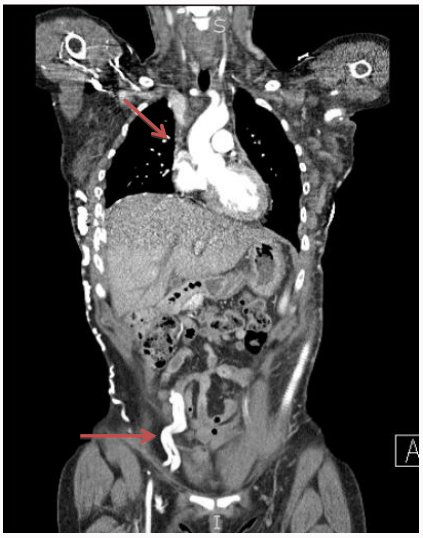

Figure 1: CT scan with contrast of chest, abdomen, and pelvis, arrow 1 showing distal occlusion of superior vena cava, and arrow 2 showing inferior epigastric vessel size.

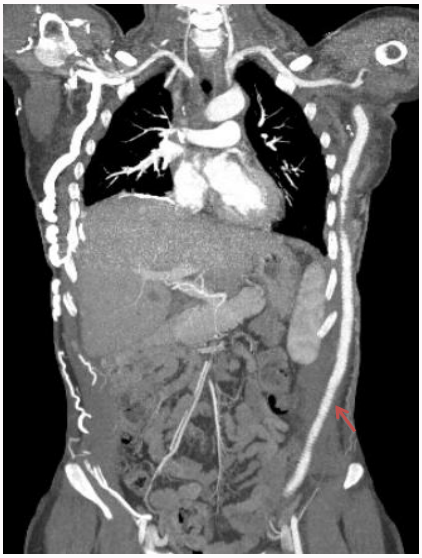

Figure 2: CT with contrast of chest, abdomen, and pelvis, arrow showing arteriovenous graft from left axillary artery to left external iliac vein.

with donor inferior vena cava patch venoplasty using a TA-30 stapler. Systemic heparin was given to avoid thrombosis formation due to her hypercoagulable state. The anastomosis of the renal vein and right external iliac vein was created with 5 to 0 polypropylene sutures in an end-to-side fashion. The common donor arterial anastomosis was created in an end-to-side fashion to the right external iliac artery with 6 to 0 polypropylene sutures. Flow was restored to the kidney after 35 min of warm ischemia time. Cold ischemia time was 17 h. An extra-vesicular ureteroneocystostomy was created over a ureteral stent.

Postoperatively, the patient had immediate allograft function and was maintained on heparin infusion for anticoagulation. Patient received a total of only 4.5 mg/kg of anti-thymocyte globulin due to chronic thrombocytopenia. Her nadir platelet count was 78,000/mcl. Her admission hemoglobin was 11.4 gm/dl and upon discharge on post-operative day 5 was 9.1 gm/dl. Her creatinine was 0.7 mg/dl upon discharge with eGFR of 96 ml/min. She was started on tacrolimus and mycophenolate for maintenance immunosuppression. She was placed on apixaban for chronic anticoagulation. The patient is clinically well with stable allograft function 4 months from transplantation.

Discussion

The first attempted human kidney transplant was in 1902 by Ullman, over the next 50 years multiple attempts were made, but all failed either due to technical errors or graft rejection [1]. The first successful kidney transplant was in 1954 by Joseph Murray [1]. Over the years many advances both medically and surgically have been made, and today, a kidney transplant remains the most definitive and durable renal replacement therapy for patients with ESRD. It offers better survival and improved quality of life and is considerably more cost-effective than dialysis (1) But the number of patients on the kidney waiting list continues to increase rapidly [2].

In this particular case, many factors contributed to the complexity. First the patient had complicated vasculature with occluded distal SVC and abdominal varices requiring an intraperitoneal approach rather than retroperitoneal approach.

Second, the donor kidney had two arteries requiring a side-to-side anastomosis reconstruction while being historically hypercoagulable with positive anticardiolipin antibody significantly increased her risk of arterial thrombosis without acute anticoagulation. The use of multiple renal arteries in renal transplant hasn't been clearly established. According to a systematic literature review completed by the department of transplant surgery in Groningen Netherlands, multiple renal artery grafts were associated with a higher risk of complications and delayed graft function but comparable long-term outcomes for graph and patient survival [3]. The study included 18,289 patients and the results showed significantly higher complications rates 13.8% *vs.* 11.0% for multiple arteries *vs.* single arteries with a p value <0.001, and more delayed graft function 10.3% *vs.* 8.2% respectively [3]. This patient did not follow the statistics of this study. Our patient was started on heparin drip intraoperative to decrease thrombosis risk and transitioned to apixiban postoperatively, which she will remain on indefinitely.

According to a study from the Nephrology Dialysis Transplantation in 2018, kidney transplant recipients, anticardiolipin antibodies without antiphospholipid syndrome are found in up to 38% of patients and could be associated with thrombotic events [4]. However, the prognostic factor of anticardiolipin is not well defined. The study was a retrospective cohort study that included 446 kidney transplant recipients, 247 of those patient were tested for anticardiolipin, 101 of them were positive while 146 were negative [4]. Interestingly, in the negative *vs.* positive groups the 36-month risk of thrombotic event was similar with hazard ration of 1.18 *vs.* 0.98 [4]. It was found however, that the positive group was independently associated with an eGFR decrease in the first 12-month post transplant period.

Thirdly, the patient had baseline thrombocytopenia, which lowered the total dose of anti-thymocyte globulin given in order to lower the risk of peri-operative bleeding while on anticoagulation. Many months following transplantation, the patient did develop heavy menstrual bleeding from ovarian cystic disease requiring hormonal therapy. She remains with excellent allograft function and stable hemoglobin on apixiban. She has not had any thrombotic complications to date.

Conclusion

Patients with ESRD, hypercoagulability and chronic veno-occlussive disease may present technical challenges for renal transplantation. Diligent histories, physical examination, contrast enhanced cross-sectioning imaging, and pre-operative multi-disciplinary planning can result in successful transplant outcomes despite these disease-specific and anatomic challenges.

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