Case Report

A case of successful kidney transplantation after a long-term maintenance in haemodialysis

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Abstract

Kidney transplantation is the preferred choice of treatment of end-stage kidney disease (ESKD). Improvement in surgical techniques and immunotherapy has transformed the field of kidney transplantation. Patients undergoing a kidney transplant have 95% and 90% graft survival rate at one and 5 years. Although advances in immunosuppressive agents have reduced the incidence of acute rejection, the outcome of kidney grafts is still limited by chronic rejection and complications of these medications. The goal of kidney transplantation is to use the combination of immunosuppressive agents that best optimizes allograft and patient survival while limiting drug toxicity and complications. In this review, the immunology of transplantation is described with a focus on current immunosuppressive agents used in kidney transplantation.

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1. Anatomy and Physiology

The kidneys are one of the paired retroperitoneal organs in the body. The diaphragm abuts the kidneys superiorly and posteriorly, along with the 12th rib. The right kidney is bordered by the right colonic flexure, liver (hepatorenal ligament), duodenum, and head of the pancreas anteriorly. The left kidney is bordered by the colon's splenic flexure, the splenic vessels, and the pancreas anterosuperiorly. The left kidney also shares a relationship with the spleen, which is anteromedial and connected via the lienorenal ligament. Inferoposteriorly, both kidneys lie on and adjacent to the psoas muscle medially. The upper pole of both kidneys includes the adrenal glands. Both kidneys are enveloped by the perinephric fascia, eponymously known as Gerota's fascia.

In the classical anatomic position, the kidney's hilar structures are organized from anterior to posterior in the following order: renal vein, renal artery, and ureter/renal pelvis. The renal arteries come directly off of the aorta laterally just below the takeoff of the superior mesenteric artery to supply each kidney. The right renal artery traverses behind the inferior vena cava. The renal artery then divides into its anterior and posterior divisions. The anterior division supplies 75% of the blood to the kidney, and the posterior division supplies 25%. The arterial divisions divide into segments; the anterior division divides into four segments: apical, upper, middle, and lower and the posterior division becomes the posterior segmental branch. Segmental arteries are end arteries and thus do not demonstrate collateralization. Consequently, the parenchyma they supply is susceptible to ischemic injury in the event they are injured/occluded. Lastly, further branching of the segmental arteries gives rise to interlobar arteries, then arcuate arteries, and finally interlobular arteries.

The renal vein is most often found anterior to the renal artery. Similar to the arterial distribution, the venous plexus capillaries coalesce into arcuate veins, which then drain into interlobular veins, trunks, and finally the renal vein. The right renal vein is often short given the ipsilateral location of the vena cava, drains directly into the cava, and has no tributaries. The left renal vein courses anterior to the aorta to reach the inferior vena cava. As such, it is 2 to 3 times longer than the right renal vein. Unlike the right renal vein, the left renal vein has many tributaries: gonadal vein, adrenal vein, inferior phrenic, lumbar, and paravertebral veins. Of note, the SMA can reliably be found anterior and superior to the left renal vein as it crosses the aorta. All things being equal, the left kidney is preferred in living donation secondary to its extra length, which tends to make anastomosis technically easier to perform.

1.1 Indication

The incidence of end-stage renal disease (ESRD) is rapidly rising. The most common etiologies of renal failure are diabetes and hypertension. Other causes of CKD/ESRD are grouped into prerenal (chronic or acute ischemia), intrinsic renal (glomerulonephritis, focal-segmental glomerulosclerosis), or postrenal categories (reflux nephropathy, obstruction). Patients who reach chronic kidney disease (CKD) stage 4, which correlates to a glomerular filtration rate (GFR) less than 30 mL/min/1.73 m, should be seeing a nephrologist and educated about kidney failure and treatment options, including transplantation.

1.2 Contraindication

Absolute contraindications for kidney transplantation are the inability to tolerate surgery due to severe cardiac or pulmonary disease, active malignancy, active infection, active drug abuse, and uncontrolled psychiatric disease.

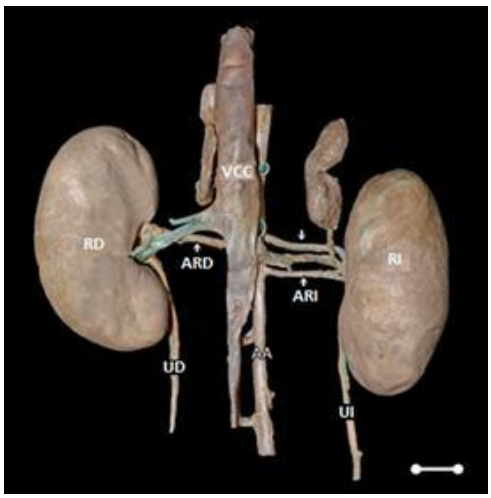
Relative contraindications are more variable and may differ depending on the institution and geographic region: morbid obesity with a recommended body mass index (BMI) less than 40 kg/m, history of noncompliance with dialysis schedule or medication regimen, frailty, psychiatric problems, and limited life expectancy (defined as less than the anticipated waiting time for a kidney).

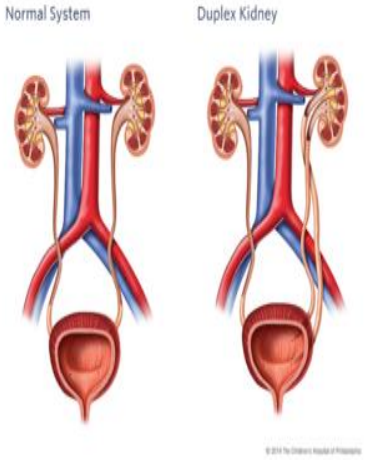
In the absence of contraindications for transplantation, the nephrologist will refer the patient to a transplant center, in addition to setting in motion the necessary interventions for possible initiation of dialysis. There is a clear survival benefit for kidney transplant recipients over those who remain on dialysis. And the length of time on dialysis is an independent risk factor for poorer outcomes.

2. Case Presentation

A 23 yrs old male developed headache and was found to be hypertensive. On evaluation his creatinine was 10 mg/dl. He was initiated on haemodialysis and was on HD at TKMCH –Thoothukudi for 11 months via left RC AVF. He was worked up for live renal transplant and was found to have bilateral vesicoureteral reflux grade 4 on MCU. Urodynamic study was done and urology fitness obtained. Bladder contractility was found to be low and pressure studies revealed low pressure good compliant bladder. His mother of same blood group was worked up for transplant and she was willing to donate kidney to her son. She was a cancer survivor, who had complaints of ductal carcinoma situ and was operated with left breast removal 3 years before. She was on Tab.Tamoxifen past 3 years till date.

CT Renal Angio of donor revealed double renal arteries on both sides and double ureter on left side.



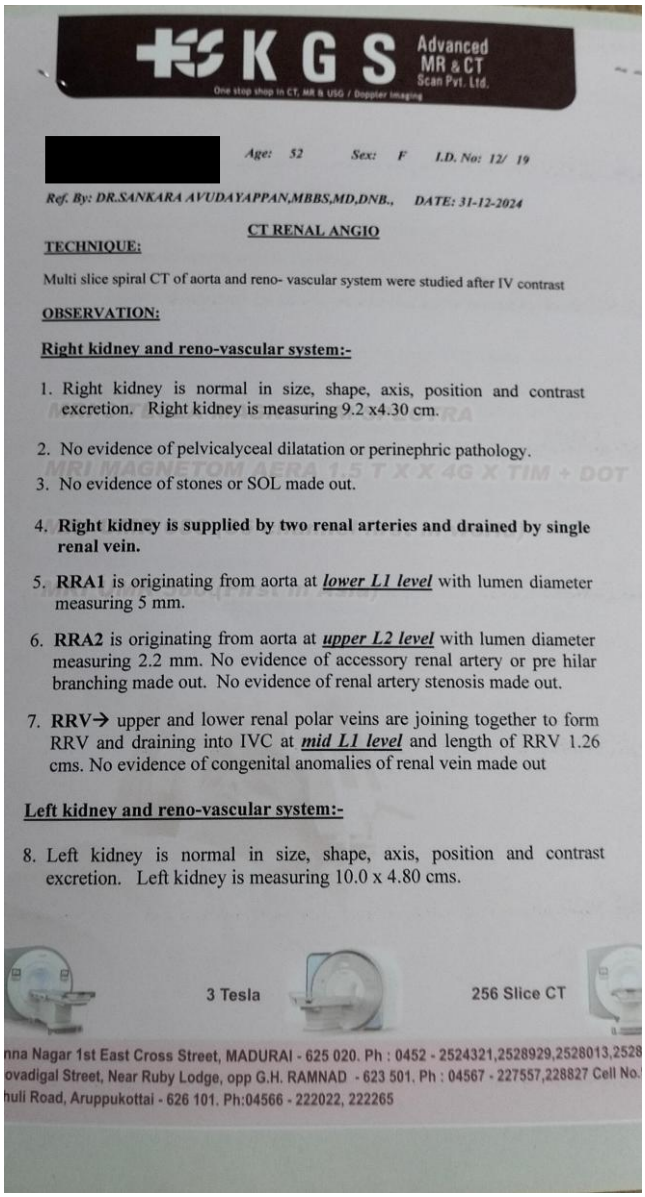


2.1 On Clinical Assessment

- BP: 200/110 mm/hg,
- HR: 76/bpm,
- Resp: 16/bpm,
- Temp: 98.6◎F,
- SPo2: 99%

3. Investigation

- Hb – 11.3
- PCV – 39.7
- WBC – 7250
- Platelet – 282000
- PT – 16.8
- APT – 33.9
- Sodium – 138.0
- Potassium – 2.50
- Urea – 192
- Creatinine – 10
- Uric acid – 4.95
- Protein – 4.91
- SGPT – 20.90
- SGOT – 16.78
- Globulin – 1.31
- A/G Ratio – 2.75
- Triple H – Negative



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Ref. By: DR.SANKARA AVUDAYAPPAN,MBBS,MD,DNB., DATE: 31-12-2024

CT RENAL ANGIO

TECHNIQUE:

Multi slice spiral CT of aorta and reno- vascular system were studied after IV contrast

OBSERVATION:

Right kidney and reno-vascular system:-

1. Right kidney is normal in size, shape, axis, position and contrast excretion. Right kidney is measuring 9.2 x4.30 cm.
2. No evidence of pelvicalyceal dilatation or perinephric pathology.
3. No evidence of stones or SOL made out.
4. **Right kidney is supplied by two renal arteries and drained by single renal vein.**
5. **RRA1** is originating from aorta at ***lower L1 level*** with lumen diameter measuring 5 mm.
6. **RRA2** is originating from aorta at ***upper L2 level*** with lumen diameter measuring 2.2 mm. No evidence of accessory renal artery or pre hilar branching made out. No evidence of renal artery stenosis made out.
7. **RRV→** upper and lower renal polar veins are joining together to form RRV and draining into IVC at ***mid L1 level*** and length of RRV 1.26 cms. No evidence of congenital anomalies of renal vein made out

Left kidney and reno-vascular system:-

8. Left kidney is normal in size, shape, axis, position and contrast excretion. Left kidney is measuring 10.0 x 4.80 cms.

3 Tesla 256 Slice CT

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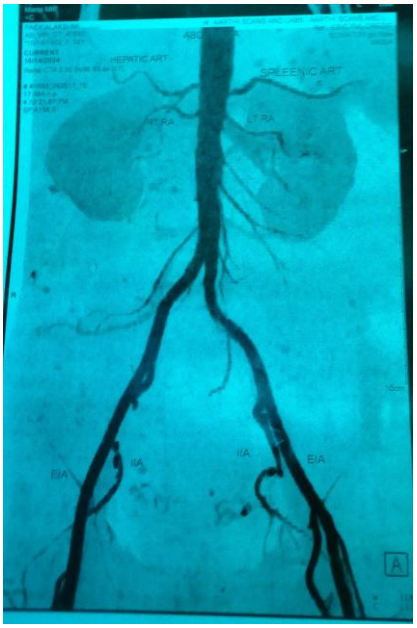

4. Operational Notes

- Laparoscopic Left Donor Nephrectomy – double renal artery and single renal vein, double ureter.
- Warm ischemia time: 11 min
- Cold ischemia: perfusion with bench dissection [perfused fluid graft sol solution]
- Main renal artery was found to be normal.
- Rewarm ischemia time: 45 mins (extended cold ischemia time) for main renal artery (lower pole) as it was anastomosed with inferior epigastric artery after dissecting it. Bluish discolouration, lower pole of kidney noted which gradually improved after anastomosing with inferior epigastric artery. After clamp release patient was stable and no ooze noted. Lower pole returned to normal colour after clamp release.

4.1 Anastomosis

- Artery - donor main Renal artery to right external iliac artery (end to side)
- Lower polar artery was anastomosed with inferior epigastric artery
- Donor renal vein to right external iliac vein (end to side)
- Double ureter of donor kidney was spatulated and medial borders sutured. Neo cys-toureterostomy was done as a single opening into bladder.
- Two DJ Stent kept in view of double ureter.
- Inj. MPS 1gm infusion given just before clamp release

4.3 Intra Op

- Fluid given – 2000 ml
- Total urine output while shifting from OT - 650ml

5. Renal Transplant ICU Care

- The patient is closely monitored in the initial postoperative phase.
- The initial objective is to control the dynamic fluid balance of a fresh kidney, which can respond to a high urea nitrogen load with an osmotic diuresis but has little capacity for urine concentration or salt reabsorption.
- Fluid balance must be maintained, hypertension treatment may need adjustment, and electrolyte imbalances may need to be corrected while kidney function improves.
- Cap. Tacrolimus and Tab. Mycophenolate mofetil (MMF) and Inj. MPS 500MG to be given 6hourly and changed to oral steroids.
- Each day urea, creatinine and electrolytes to be checked and also to check drain fluid creatinine and urine culture. On POD 4TH to check tacrolimus level.
- Sips of water may be allowed before increasing the diet as tolerated after the digestive function has been restored.
- The patient begins with a clear fluid diet, continues to full fluids, and then, as soon as it is tolerated, advances to solid food. Daily total fluid intake must be adjusted against the patient's volume status.
- The amount of urine produced is initially noted hourly. The catheter often remains in place for two to five days.
- In case of an uncomplicated kidney transplant, the patient usually stays in the hospital for four days. After stabilization, the patient is discharged to the transplant outpatient clinic for follow-up care.

Follow up

He has to review 15 days after in nephro department OPD.

6. Conclusion

Kidney transplantation is the treatment of choice for end-stage renal disease and confers significant advantages over dialysis. Many of the historical donor and recipient related barriers to kidney transplantation have recently been overcome and transplantation is now offered to an increasing number of patients, being limited only by the supply of kidneys. With improvements in surgical technique, immunosuppression and histocompatibility testing, early outcomes of kidney transplants have improved dramatically over the last few decades and chronic graft dysfunction now represents a major challenge for the future.