

Kidney Transplant for the Twenty-First Century



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KEYWORDS

- Kidney transplant • Kidney allocation system • Domino transplants • Immunizations
- Immunosuppressant medications

KEY POINTS

- Kidney transplantation is vital in improving the length and quality of life in patients with chronic kidney disease.
- Transplant medications can have serious side effects and require a team approach to decrease complications among transplant patients.
- Shortage of donated kidneys remains a problem in transplantation; however, a new allocation system is in place to improve outcomes.
- Cardiovascular disease is the main cause of mortality in transplant patients; therefore, it is vital to monitor, manage, and prevent cardiovascular events. Preventative medicine including certain immunizations can decrease complications and increase the life of the transplanted kidney.

HISTORY OF KIDNEY TRANSPLANTATION

Kidney transplantation is an amazing medical advancement that has allowed those with kidney failure to live fairly normal lives. In the realm of treatment options for kidney failure, transplantation is one of the new kids on the block. Although the ancient Greeks first recognized kidney disease and various treatments have been tried over the centuries, transplanting a viable organ into a patient with a failed kidney seemed to be a pipe dream.¹

In the early days of the twentieth century, European scientists successfully transplanted organs between animals. However, survival was an issue. In 1906, two French vascular surgeons, Mathieu Jaboulay and Alexis Carrel, attempted two kidney transplants using a goat kidney into one patient and a pig kidney into the other. Neither patient survived.

In 1909, slices of a rabbit kidney transplanted into a 2 year-old child were successful, but the child died 2 weeks later. In 1933 there was a successful human-to-human

No disclosures.

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Physician Assist Clin 1 (2016) 205–220
<http://dx.doi.org/10.1016/j.cpha.2015.09.012>

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transplant but again, the recipient died. It was not until 1936 that Yu Yu Voronoy completed six renal transplants between humans. However, these failed postoperatively related to what is now thought to be the ischemic time of the kidney. The concept of transplant had to wait until the postoperative care could catch up to the surgical expertise.

The breakthrough came in 1954 with a successful kidney transplant between identical twins done at what is now Brigham and Women's Hospital in Boston; this landmark surgery was performed by Nobel prize-winning surgeon Dr Joseph Moore.² As the 1950s progressed, live kidney donors were used and the donor kidney was placed extraperitoneally in the iliac fossa. This led to improved outcomes. As the years went on, the true appreciation for the role the immune system played in kidney transplant outcomes became more apparent and continues to be redefined to this day. Major advances in tissue typing, immunosuppression, and techniques have developed.^{1,3} Today, kidney transplantation is considered not only a treatment option for kidney failure but is the preferred option with better patient outcomes for mortality and morbidity.^{4,5}

Kidney transplants have a lifespan: deceased donor average is survival of 12 years and living donor average survival is 15 years.⁶ Thus patients may require more than one transplant in their lifetime, especially if transplanted at a young age. This means management of the graft is vital and all disciplines of medicine must assist in managing and preventing complications in transplant recipients. Prolonging the life of the transplant helps to improve the quality of life for thousands of patients and the entire management team plays a role. All transplant patients, no matter what the organ, are defined as patients with chronic kidney disease (CKD) and all precautions regarding treating the CKD patient extend to the transplant patient.⁷

PRETRANSPLANT EVALUATION

Patients qualify to be listed on the kidney transplant waiting list once they have a glomerular filtration rate less than or equal to 20 mL/min/1.73 m², dialysis dependent or not.⁴ Initial evaluation involves a thorough laboratory work including multiple tests:

- Complete blood count
- Comprehensive metabolic panel
- Complete urine analysis
- Screening for hepatitis
- Screening for cytomegalovirus (CMV)
- Screening for HIV

In addition tests that determine the appropriateness of the donor kidney include blood ABO typing, human leukocyte antigen (HLA) typing, and panel reactive antibody assay (PRA). Diagnostic testing includes

- Chest radiograph and/or purified protein derivative testing
- Electrocardiogram
- Cardiac stress test or angiogram
- Colonoscopy
- Abdominal and pelvic ultrasounds
- For women, a PAP smear and mammogram
- For men, a prostate-specific antigen and testicular examination⁸

It should be noted that although there are some general commonalities among transplant centers, each center sets its own inclusion and exclusion criteria and

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