Current Status of Renal Transplantation in the US

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The following is based on US Renal Transplant Registry reports, the Oregon Health & Science University’s experience with 3529 kidney transplants that were done between 1959 and 2004, and my experience as a transplant surgeon at that institution for thirty-one years. This report is primarily for urologists who do not do kidney transplants.

In the US, end stage renal disease (ESRD) were a cancer, its incidence would be between that of prostate cancer and bladder cancer. The annual mortality rate for ESRD is 25% greater than that for prostate cancer. The most common treatment for ESRD in the US is in-center hemodialysis. Renal transplantation is considered to be the best treatment for ESRD for most patients because of improved patient survival, better quality of life and less cost when compared with maintenance dialysis.

About 14,000 kidney transplants are performed annually in the US, 8,000 of which are from deceased, or cadaveric, donors. This is inadequate because there are about 60,000 patients wait-listed in the US for deceased donor renal transplantation. The annual number of deceased donor kidney transplants has not increased significantly in the past decade, but the annual number of living donor kidney transplants has doubled during the same time period. The reasons for this are thought to be 1) superior short and long term patient and kidney graft survivals when kidney transplants are from living donors, 2) wide adoption of minimally invasive donor nephrectomy surgical techniques, 3) public education about the relative safety of life with one kidney and about the need for living donor kidneys, 4) the refinement of ABO incompatible kidney transplantation, 5) the development of techniques to reduce donor-specific anti-HLA antibodies in recipients, 6) increased use of living, genetically unrelated donor kidneys.

Although brain death has been accepted as death of an individual in the US for decades, it has become progressively more necessary to use kidneys from expanded criteria and non-heart beating donors, and to accept inferior results when compared with the results from renal transplantation of living donors and standard criteria deceased donors. There are about 1200 US kidney transplants each year from these expanded criteria deceased donors. Kidney transplants from expanded criteria donors are recommended for diabetic ESRD patients over 40 years old, ESRD patients over 60 years old, and patients who have significant dialysis access problems. Many US transplant programs, including ours, have renal biopsy criteria to select kidneys suitable for transplantation, and some transplant programs will transplant two deceased donor kidneys of relatively poor quality into one recipient. Median waiting time for a deceased donor kidney transplant is about 38 months. Deceased donor kidneys are distributed by the United Network for Organ Sharing with a point system based on histocompatibility, time of waiting, youth, and previous organ donation.

Projected half-lives, calculated for 45,887 kidney transplants done between 1998 and 2002 that have survived for one year, are 29.4, 18.7, 18.5, 18.0 and 10.2 years from HLA-identical siblings, one haplotype matched siblings, spouses, other genetically unrelated donors, and deceased donors, respectively. The projected half-life of kidney transplants from expanded criteria deceased donors is 6.6 years. These data demonstrate the superior results obtained from living donor kidney transplants.

Living donor pain, prolonged hospitalization and convalescence, lost wages, and unsatisfactory cosmetic results from open flank nephrectomy led to the development of minimally invasive donor nephrectomy procedures. In the US, about 70% of living donor nephrectomies are with laparoscopic assistance. Although the US Renal Transplant Registry has reported one day less hospitalization, the 3-year kidney transplant survival rates are 3% less, and the projected kidney transplant half-lives are 2 years less when laparoscopic donor nephrectomy is compared with the open flank approach. In spite of isolated reports of living donor deaths, the safety of living renal donation has been well established.
ABO blood group incompatible kidney transplantation has become more common in the US, in part because of successful reports from Japan where it is more widely practiced. Reduction of anti-donor blood-type antibody titers can be accomplished with plasma exchange, anti-B cell antibody infusions, intravenous immune globulin infusion and splenectomy. Immunosuppression is usually with antilymphocyte antibody, calcineurin inhibitors, purine antagonists, and glucocorticoids. Treatment of humoral rejection is with high dose glucocorticoids, plasma exchange, immunoglobulin infusion, and anti-B cell antibody treatment. Short term results are nearly as good as for ABO-compatible kidney transplants. The principles of ABO-incompatible kidney transplantation have been applied to reduce donor-specific anti-HLA antibodies in kidney transplant candidates. Currently, about 30% of living donor kidney transplants are from genetically unrelated donors such as spouses or friends, and the results are nearly the same as those for kidney transplants from half-matched siblings. Payment to living renal donors is not done in the US, but the concept is periodically revisited. Renal transplantation into HIV patients has been done in some US centers.

The close association with our colleagues in nephrology and the development of algorithms for donor selection, recipient preparation, immunosuppression, management of complications, and long term follow-up have resulted in kidney transplant survivals and patient survival rates that were only imagined four decades ago.

General References