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The influence of organ acceptance criteria on long-term graft survival: outcomes of a kidney transplant program

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Abstract

Background: In an effort to improve our transplant program's dead-donor kidney acceptance criteria, we compared 2 different consecutive time periods in our transplant program. Period I, in which the program used more-restrictive criteria in accepting dead-donor kidneys for our patients, and period II, when the program used less-restrictive criteria for the dead-donor kidneys that were accepted. The less-restrictive criteria resulted in an increase in the number of renal transplants performed.

Methods: A retrospective database analysis was performed of all organ-donor offers to a single kidney transplant program from July 1, 2004, to September 30, 2006 (period I = July 1, 2004, through July 10, 2005, and period II = July 11, 2005 through September 30, 2006). Kidney acceptance rates were compared between 2 consecutive time periods during which the program used different organ acceptance criteria. Data analysis included a comparison of donor characteristics, reason for organ refusal, creatinine clearance, and graft survival. Graft survival was obtained for both kidneys associated with each offer, even if 1 or both of the organs were transplanted at a different center.

Results: Donor age and kidney quality were the most common reasons for refusal during both transplant periods. The organ acceptance rate improved markedly during period II. There was a marked increase in the number of kidney transplants performed during a 12-month period when comparing the 2 periods: 16 transplants during period I versus 46 transplants during period II. Graft survival was not significantly different between the 2 periods. Calculated creatinine clearance, which we used as a marker of organ quality, was statistically lower during period II.

Conclusions: Increased acceptance rate was not associated with statistically significant decreased graft survival. Although an increase in delayed graft function was associated with broader acceptance criteria, this factor did not affect overall graft survival. By increasing our kidney acceptance rate, we were able to successfully transplant more patients.

Keywords: Acceptance criteria; Acceptance rate; Kidney transplant; Kidney transplantation; Kidney transplant outcomes; Organ acceptance; Organ acceptance criteria; Organ acceptance rate; Organ criteria; Transplant rate

Providing a successful organ transplant to every patient in need of one is the ultimate goal for all organ transplant programs. Currently, the greatest obstacle to achieving this goal is the shortage of organs. This has been caused in part by increased transplant success rates, which have led to ever-increasing numbers of patients who are waiting for an organ [1]. In addition to calling for efforts to increase the numbers of organs donated, this imbalanced ratio of recipients to donors has demanded efforts to increase organ use and to let no organ be unduly wasted [2]. These efforts have led to improvements at multiple levels, ranging from the establishment of local, regional, and national organ procurement networks to improvements in organ preservation. More recently, innovative transplant programs have pioneered the use of organs from less-than-ideal donors with excellent results [3]. Expanded-criteria donor (ECD) kidneys are defined by donor characteristics that are associated with a 70% greater risk of kidney graft failure compared with a reference group of nonhypertensive donors age 10 through 39 years whose cause of death was not a cerebral

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vascular accident and whose terminal creatinine was ≤1.5 mg/dL. The donor factors associated with this increased relative rate of graft failure are age ≥50 years, terminal creatinine >1.5 mg/dL, cerebral vascular accident as cause of death, and history of hypertension. All donors ≥60 years of age meet the ECD threshold and are included in the ECD definition. Donors ≥50 years and <60 years of age with any 2 or more of the other identified ECD risk factors also meet and are included in the ECD definition. Approximately 15% of current United States donors meet the ECD criteria [4]. Also important to the discussion are donations made after cardiac death (DCDs). These have been defined by the United Network of Organ Sharing as follows: (1) the controlled donation is made after cardiac death of the donor, and the donor's family plans to remove life support; (2) the donor's family has given legal consent to the donation; and (3) the donation takes place in the controlled environment of the operating room. Occasionally, there are exceptions regarding uncontrolled donations [5].

Recent research in the use of ECD kidneys shows a lower rate of graft function [6]. These organs are also associated with higher cost, longer length of hospitalization, and increased delayed graft function (DGF) [7]. Currently, there are no strict exclusion criteria for the suitability of kidneys procured for transplantation [8]. The challenge for the transplant surgeon is to determine whether the potential benefits of transplanting an available organ outweigh any potential risks to any given patient. Many patients are willing to accept less-than-optimal organs when given the choice. The patient's desire to receive a higher-risk organ, rather than remain on the waiting list, is an important factor the surgeon must take into account during the decision-making process [9]. Based on available data, evaluation of kidney donations is far from an exact science [8,10]. There has not been much single-center reporting on the effect of employing a less-restrictive organ acceptance rate on organ and patient outcomes.

Another way to improve organ use is to allow only transplant centers with good success rates to access the limited supply of donors. Some may interpret this focus on success as running counter to the goal of increasing organ transplant rates because long-term graft failure rates are higher with less-than-ideal donors [6]. The Scientific Registry of Transplant Recipients publishes center-specific transplant success rates and attempts to account for such graft failures by risk adjustments. The Scientific Registry of Transplant Recipients has recently begun calculating organ acceptance rates from individual transplant programs [11]. Stakeholders hope these data will provide another metric with which to compare the performance of transplant programs because the number of organs accepted will clearly correlate to the number of transplants performed.

Although there exist many programmatic and recipient-related reasons for refusing an organ offer, variations in the criteria used to determine donor-organ quality accounts for much of the differences in organ acceptance rates between centers. Programs may apply more restrictive donor criteria to achieve better success, but they do so at the expense of lower organ acceptance and transplant rates. It has clearly been shown that higher acceptance rates correlate with an increase in a center's transplant rates [11]. Transplant programs with less-restrictive donor criteria must ensure that higher donor acceptance and transplant rates are not adversely affecting patient and graft survival.

We analyzed our kidney acceptance rates (KARs) during 2 different kidney organ acceptance periods to determine if the less-restrictive period resulted in adverse outcomes. We reviewed 2 periods during which a less-restrictive period followed a more-restrictive period. Our goal was to compare the outcomes and long-term quality of the organs that were accepted during the 2 periods.

Patients and Methods

To offer renal transplantation to more of our patients, we implemented less-restrictive kidney acceptance criteria on July 11, 2005 (period II). These new less-restrictive criteria were as follows: the age of potential donors was expanded to include dead donors age 0 to 16 years of age as well as dead donors >50 years. This expanded the pool of potential donors by accepting higher-risk dead donors. These 2 age classes of donors were not generally accepted during period I. Pediatric-age dead donors are associated with greater perioperative complications and risks. Many programs are reluctant to use younger, smaller-sized kidney donors because of this higher complication rate and the smaller theoretic nephron mass of pediatric kidney donors [12]. During period II, the transplant program also became less restrictive in the acceptance of ECD kidney offers. An ECD kidney transplant consent form was developed and mailed to all adult patients on the active kidney waiting list in October 2005. Subsequent to this date, any adult patient who presented for a transplant evaluation received a full explanation of the benefits and risks of ECD kidney transplantation and was considered for this procedure. It has been well established that the use of ECD allografts is associated with a greater risk of graft loss and shortened kidney function [6]. The benefit of receiving an ECD kidney is a shorter waiting period [6]. This new ECD policy resulted in >30% of our patients being listed for ECD kidneys. This less-restrictive kidney acceptance policy could result in poorer graft and patient outcomes. Recognizing that we were performing more kidney transplants in our patients and that less-restrictive criteria for choosing organs could be associated with poor outcomes, we decided to perform this study to evaluate the effect this less-restrictive policy may have had on our transplant program outcomes.

A retrospective patient database analysis and medical record review was performed. A United Network of Organ Sharing and Organ Procurement Transplant Network Patient Transplant Refusal database analysis was made of all organs offered to a single kidney transplant program. All dead-donor kidney offers made to the program from July 1, 2004, to September 30, 2006, were reviewed. KARs were compared between 2 periods of organ acceptance during which the program used different organ acceptance criteria (period I = July 1, 2004 to July 10, 2005, and period II = July 11, 2005, to September 30, 2006). Period I had more-restrictive criteria, and period II had less-restrictive criteria as previously defined. There was also greater acceptance of ECD and DCD kidney donors during period II. Through our local organ procurement organization, we obtained infor-