ELSEVIER

Kidney Exchange Program: A Viable Alternative in Countries With Low Rate of Cadaver Harvesting

M. Lucan, P. Rotariu, D. Neculoiu, and G. Iacob

THE KIDNEY EXCHANGE (KE) concept proposed by Rapaport in 1986[1] is a controversial issue. Although accepted by patients and their doctors, this method has had to face many legislative barriers thus allowing application in only a few countries. The aim of this study was to assess the role of KE transplantation in countries with a low rate of cadaver donor retrievals.

MATERIAL AND METHODS

Nineteen pairs of genetically and emotionally related living donor-recipient pairs were included in KE program. The incompatibility was due to a positive cross-match in seven pairs; ABO incompatibility in 10 pairs and two pairs with six HLA mismatches. The eight transplantations performed included one session of two donor-recepient pairs, one session of three pairs, and another of four pairs. After extensive literature review we consider that our experience with multiple pairs kidney exchange (three and four pairs) is unique in Europe.

All recipients had problems tolerating dialysis, Their donors were highly motivated to help. The pairs involved in the KE program were interviewed to exclude any coercion on the donor. They were informed about the advantages and the risks of this method; informed consent was obtained. In addition, all donors underwent psychological evaluation.

The inclusion criteria pursued the goal of exchanging equivalent kidneys of similar size, anatomy, renal function, and age. The donors were assessed preoperatively by high-resolution IV pyelograms, quantitative renal nuclear scan, and spiral CT scan. Although we avoided kidneys with anomalies, with respect to the principle of equivalent exchange, we accepted four cases with multiple arteries and one case with a duplicated urineary system. These cases were accepted based on our previous experience that transplantation of grafts bearing anatomic anomalies displayed similar results to grafts with normal anatomy. The pairs were informed about the difference in anatomy and the additional risks. Nevertheless, all pairs accepted the donation.

During the preoperative evaluation the pairs became acquainted; some of them became good friends. In addition, the psychological benefit of living donation remains high without being diminished in an unknown indirect donation as Rapaport proposed in 1986.[1] The frustration of the donor, if his own kidney is functioning and the recipient kidney does not, cannot be avoided, but once the pairs have a good relationship the risk may be assumed to be easier. Despite this risk, the donors accepted and joined the program, as this was the only way to help their relatives.

The transplants, involving two and three pairs, were performed simultaneously, except the session with four pairs, wherein the transplants were performed successively. All transplants were performed by the same surgical team with respect to the principle of equivalent quality of the surgical act.

In the transplantation sessions involving two donor-receptor pairs, two sessions were performed between pairs with ABO incompatibility. In two transplantation sessions, a pair with ABO incompatibility exchanged the kidney with a pair with a positive cross-match. In one transplant session, the kidneys were exchanged between two ABO-compatible pairs and positive cross-matches. In one situation the kidneys were exchanged between pairs with A blood group. One pair had a positive cross-match and the other six mismatches. By changing donors the cross-match became negative and the HLA matching improved to four mismatches.

In the transplant session involving three pairs, two displayed ABO incompatibility (A vs B in the first pair and B vs A in the second pair). Although regarding ABO matching between the two pairs, transplantation was feasible, the direct exchange was not possible because the A donor had a positive cross-match with the A recipient of the other pair. A third pair with A blood group but a positive cross-match was used to solve the problem. The kidney from the first pair went to the second pair; the second, to the third, and the first pair received the kidney from the third.

In the transplant session with four pairs: the first pair had an O blood group donor with an A blood group recipient and a positive cross-match. In the second pair, both donor-recipient had A blood group but six mismatches. The third pair had an A blood group donor with a B blood group recipient, and the fourth pair a B blood group donor and O blood group recipient. The exchange of kidneys among these four pairs, was performed as follows: first to second, second to third, third to fourth, and fourth to first.

RESULTS

All the grafts had good outcomes with a mean creatinine value of 1.12 mg/DL at 6 months after transplantation. No graft complications were reported. One recipient experienced a stroke episode in the postoperative period, which was treated successfully. Since KE program started in our institute, the monthly mean number of transplants increased from 4.2 to 6.1.

From the Clinical Institute of Urology and Renal Transplantation, Cluj-Napoca, Romania.

Address reprint requests of Mihai Lucan, MD, Clinical Institute of Urology and Renal Transplantation, 4-6 Clinicilor St, 3400 Cluj-Napoca, Romania.

0041-1345/03/$–see front matter
doi:10.1016/S0041-1345(03)00169-6

DISCUSSION

International statistics[2] show a 3:1 ratio between the cadaveric and the living donation. In Romania this ratio is reversed; most donations come from living donors. More than that the cadaveric donation is constantly decreasing. To overcome the organ shortage, living donors are the only means to keep the transplantation program ongoing.

Due to the particular conditions in the field of transplantation in Romania, our institute applies various methods to increase the rate of transplants: laparoscopic harvesting, utilization of grafts with anatomic abnormalities, immunomodulation through plasmapheresis, and administration of Iretravenous Immunoglobulin and recently, multiple pair kidney exchanges.

Among our waiting list of 374 patients, 68 patients have an available living donor but due to ABO incompatibility, low HLA compatibility, or a positive cross-match, transplants between these pairs cannot be performed. All of these patients are candidates for kidney exchange transplantation.

Since 1998 Romania has a modern transplant law that is similar that in other European countries. The donors are free of coercion. They are either spouses or siblings. Unlike Rapaport,[1] who considered that the pairs should be completely isolated from each other and the harvests should be performed at two different sites, we agreed with Thiel and colleagues,[3] to allow and encourage the pairs to get acquainted. This way philosophy overcome the suspicions concerning the origin and the destination of the organs. In addition the recipients and their real donors can establish emotional relationships.

The basic principle of KE is an equivalent exchange. To accomplish this, high-resolution preoperative workup is required to avoid unpredicted situations that hinder harvesting, thereby simultaneous harvesting is not mandatory. Our experience in transplantation of grafts with anatomic abnormalities (73 grafts) has shown similar functional and survival results as those organs with normal anatomy. Based on this experience we consider that we didn't break the principle of equivalence once the recipients were informed.

By introducing the KE program in our institute, 27.94% of recipients with available but incompatible living donors, due to a variety of reasons, could be transplanted. In addition to other modern transplantation techniques applied in our institute, the mean monthly number of transplants increased 45.24% since the KE program was started.

CONCLUSIONS

If the algorithm for selection and evaluation respects the principle of equivalence, the exchange method is feasible with good results. In countries where living donations are the main source of organs, this method should become more popular since it increases the number of transplants.

The kidney exchange program must be promoted since it offers solutions in cases where apparently there are none.

REFERENCES

1. Rapaport FT: Transplant Proc 18(Suppl 2):5, 1986
2. 2001 OPTN/SRTR Annual Report 1991–2000. HHS/HRSA/OSP/DOT; UXIOS; URREA
3. Thiel G, Vogelbach P, Gurke L, et al: Transplant Proc 33:811, 2001