CHAPTER 14

Kidney Transplantation in Pittsburgh: Experience and Innovations

BERND H. MARKUS,[1] THOMAS R. HAKALA,[2] ANDREAS TZAKIS,[1] SANDI MITCHELL,[1] IGNAZIO R. MARINO,[1] ROBERT D. GORDON,[1] RENE J. DUQUESNOY,[3] AND THOMAS E. STARZL[1]

Departments of [1]Surgery, [2]Urology and [3]Pathology
University of Pittsburgh
Pittsburgh, Pennsylvania

The first kidney transplant at the University of Pittsburgh was performed in 1963, but it was not until 1977 that kidney transplants were done on a regular basis. Since then the University of Pittsburgh has developed into a major transplant center. In 1986 alone 271 kidney transplants, 344 liver, 104 heart, and 15 heart/lung transplants were performed at the University Health Center of Pittsburgh.

The data presented here are maintained on a newly developed center-oriented computerized transplant data management system. A scoring system for equitable allocation of kidney transplant organs is an integral part and will be discussed further.

MATERIALS AND METHODS

From 1977 to the end of May 1987, 1,243 cadaveric kidney transplants, 17 kidney transplants from living related donors, and 16 multiorgan transplants including a kidney were performed at the University Health Center in Pittsburgh. Azathioprine and steroid immunosuppressive baseline treatment was routinely used until a randomized trial versus combined CsA and steroid treatment was performed in early 1981. This was followed by the formal introduction of CsA and steroids as the baseline immunosuppressive treatment. Azathioprine and steroids remained the first choice only for living related kidney transplants. Since November 1984 the murine monoclonal antibody OKT3 (ORTHOCLONE OKT3, ORTHO Pharmaceutical Corporation, Raritan, NJ) has been used for treatment of severe rejection episodes.

Statistical analysis was performed using the SPSSPC (SPSS/PC Software Inc., Chicago, IL) (1) and BMDP/PC (BMDP Software Inc., Los Angeles, CA) software packages. Statistical analysis of differences in actuarial survival among groups was done by the Breslow (generalized Wilcoxon) and the Mantel-Cox (generalized Savage) test. The Breslow test is weighted towards earlier events and the Mantel-Cox test towards later events (2).

For analysis of transplant outcome in various groups, all grafts or patients lost were included for analysis. No patient was omitted, even if the graft was lost because of reasons presumably unrelated to transplantation. Follow-up of patient data continued until the end of July 1987. When not stated otherwise, actuarial survival is reported for the one-, 2-, and 5-year periods.

RESULTS

Demographics

The age of the kidney transplant patients ranged from 0.6 to 73.6 (mean 37.9 ± 4.5 SD years). Of these patients, 1,104 received 1,276 cadaveric kidney transplants; 985 of these were primary cadaveric transplants, 258 cadaveric retransplants, 16 combined organ transplants including a kidney, and 17 living related kidney transplants (Table 1). Of the pediatric age group, 87 patients (<18.0 years, mean 12 ± 4.6 SD years) received 112 grafts and 1,017 patients belonging to the adult patient group (≥ 18.0 years, mean 40.4 ± 12.6 SD years) received 1,164 grafts. Of these, 12 were

Clinical Transplants 1987, P. Terasaki, Ed. UCLA Tissue Typing Laboratory, Los Angeles, California.

below 5 years and 181 equal or over 55 years. Seven hundred seventy-seven kidney grafts were transplanted into male versus 499 grafts into female recipients.

Multiorgan Transplants Including the Kidney

Ten combined liver/kidney, 3 of them in the pediatric age group, one heart/kidney, and 5 pancreas/kidney transplants were performed using organs from the same donor. Seven of the combined liver/kidney recipients are currently alive with 6 patients having functioning kidneys (3). Of the pancreas/kidney recipients 4 are still alive with functioning kidney grafts. The heart/kidney recipient died 3 months following the combined transplant procedure.

Analysis of panel-reactive antibody (PRA) and donor-reactive crossmatch data in combined liver/kidney transplants has shown in some patients a significant decrease in PRA and donor-reactive antibodies starting immediately after induction of blood flow through the liver donor. Three recipients had a strong donor-positive crossmatch. In 2 patients the donor-specific antibody titer was decreased after the liver transplant. The kidneys from the same donor transplanted shortly thereafter were not affected by humoral rejection. The third patient presented with persistently high levels of donor-specific antibodies. The kidney graft in this patient did not begin to function (3,4).

Table 1. Cadaveric kidney transplants performed at the University of Pittsburgh between 1977 and May 1987[a].

Transplant Year	Total Number	Primary Transplants	Retransplants
1977	17	16	1
1978	25	18	7
1979	42	37	5
1980	45	39	6
1981	100	69	31
1982	118	97	21
1983	160	135	25
1984	204	164	40
1985	175	138	37
1986	263	200	63
1987[b]	94	72	22
Total	1243[a]	985	258

[a] Additional 17 living-related and 16 combined kidney transplants were performed.
[b] From January to the end of May 1987.

Survival Analysis

Azathioprine versus CsA

One hundred forty-one primary, cadaveric kidney transplants were performed using azathioprine and steroids as the baseline immunosuppressive therapy. One-, 2- and 5-year actuarial graft survival was 58.9%, 48.2%, and 36.1%, respectively. Since the introduction of CsA and steroid treatment in 1981, 844 patients received primary cadaveric kidney transplants. Actuarial graft survival was 74.1%, 67.8%, and 52.7%, respectively (Breslow $p<0.0001$, Mantel-Cox $p<0.0001$) (Fig. 1).

One, 2-, and 5-year actuarial patient survival of primary cadaveric kidney transplants in the

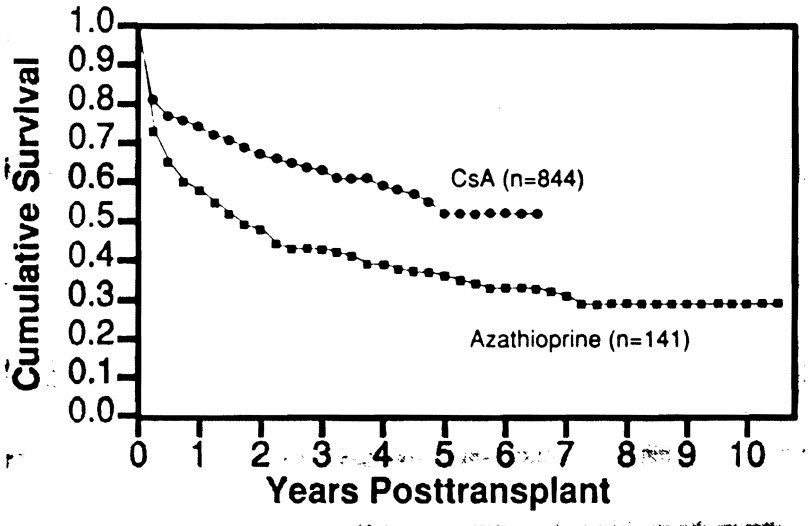

Figure 1. Actuarial graft survival of primary cadaveric kidney transplants using azathioprine or CsA and steroids as baseline immunosuppressive treatment (Breslow $p<0.0001$, Mantel-Cox $p<0.0001$).

azathioprine era was 77.7%, 72.6%, and 63.6% while 91.3%, 89.2%, and 83.3% in the CsA era.

The primary cadaveric kidney transplants when divided into various years of transplantation showed again a definitive improvement during recent years since the introduction of CsA. One-, 2- and 5-year actuarial graft survival for 71 transplants performed during 1977 to 1979 was 61.9%, 47.9%, and 33.8%. From 1980 to 1982, 205 transplants showed 68.6%, 61.5%, and 48.2% graft survival. Since 1983, 708 kidneys were transplanted with a survival of 73.9%, 67.7%, and 59.5% (at 4 years) (Breslow p=0.009, Mantel-Cox p=0.001) (Fig. 2).

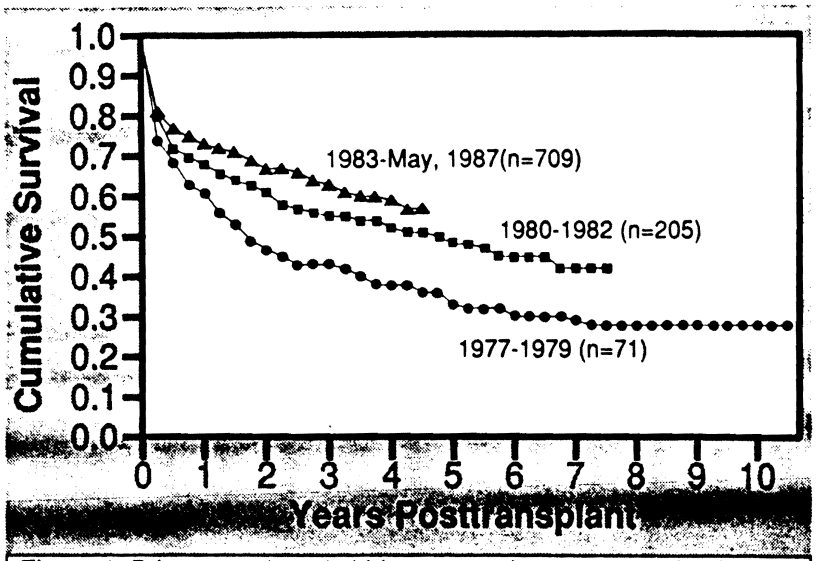

Figure 2. Primary cadaveric kidney transplants grouped by the year of transplantation. There is a definite improvement in survival since the introduction of CsA in 1981 (Breslow p=0.009, Mantel-Cox p=0.001).

Retransplantation

Two hundred and one second, 30 third, 4 fourth, and one fifth cadaveric kidney transplants were performed during the CsA era. Many of the patients had previous transplants at other institutions. One-, 2- and 5-year actuarial graft survival for second transplants was 66.2%, 57.6%, and 42.7% and for third transplants 59.7%, 55.5%, and 47.5%. A single fourth kidney graft (25%) continued to function at these time intervals and a fifth transplant was lost at the day of transplantation (Fig. 3).

Living-Related Transplants

Living-related kidney transplants were performed at a very low rate of only 17 transplants (1.3%) since 1977, with only one living-related transplant since 1983. All used azathioprine as the basic immunosuppressive drug. Complete follow-up data were available for 16 of these. The survival of living-related kidney transplants was not improved (5-year actuarial survival of 53.3%) over cadaveric transplants with CsA.

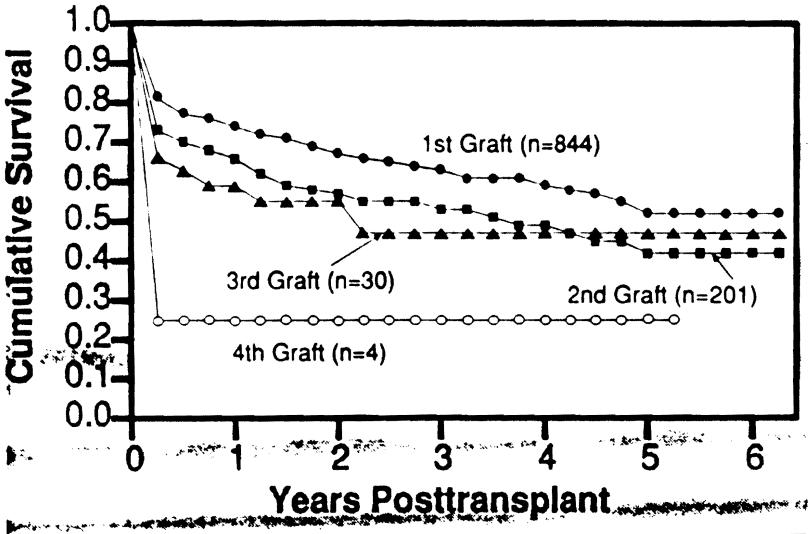

Figure 3. Actuarial survival of primary and retransplants in cadaveric kidney transplantation during the CsA era. A fifth transplant was lost at the day of transplantation.

Recipient and Donor Age

In recipients age 55 or older, 135 primary cadaveric kidney transplants were performed during the CsA era. Actuarial one-, 2- and 5-year graft survival was 71.7%, 68.1%, and 55.1%. This did not differ from the survival of 651 grafts transplanted in the patient group 18 to 54.9 years of age. Younger recipients showed a lower survival with 63.6%, 60.0% and 50.7% (at 4 years) for 50 recipients age 5 to 17.9. For 8 grafts in recipients under 5 years of age, survival was 16.7% at one to 3 years (Fig. 4).

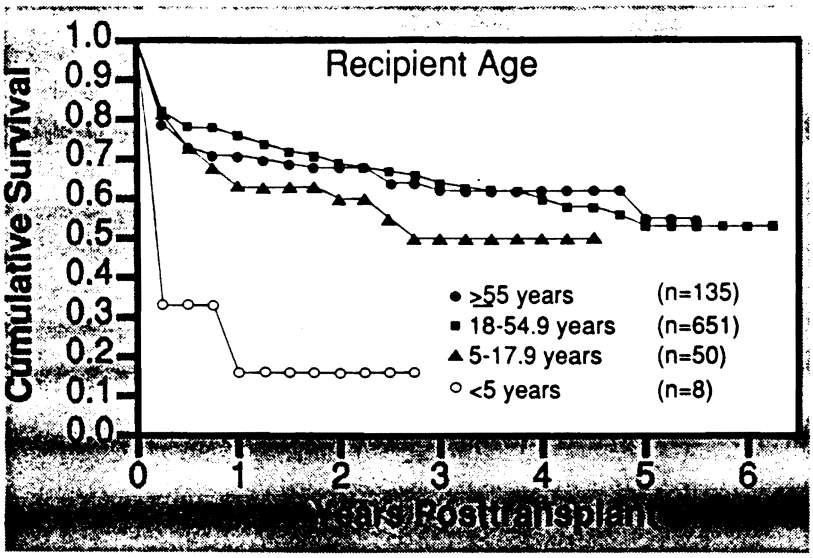

Figure 4. Effect of recipient age on actuarial survival of primary cadaveric kidney transplants under CsA.

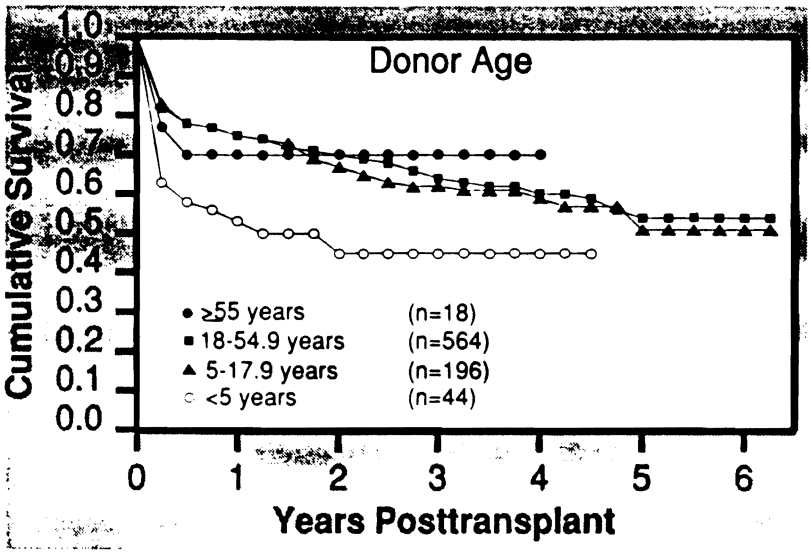

Figure 5. Donor age and actuarial survival of primary cadaveric kidney transplants using CsA. Note that organs harvested from donors over age 55 showed a first inferior but then similar survival to that of grafts harvested from donors age 5 to 55. Kidneys harvested from donors under 5 years of age showed an inferior performance (see Fig. 6).

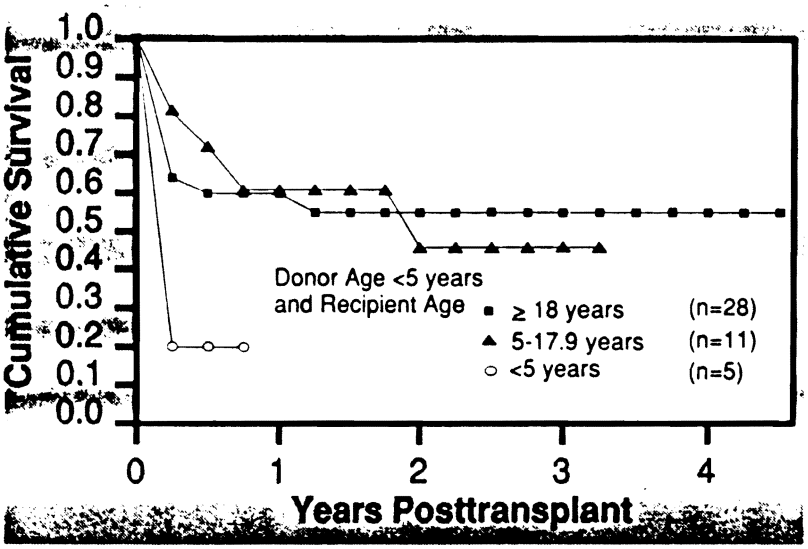

Figure 6. Survival of kidneys harvested from donors under 5 years of age analyzed according to recipients' age. Note that grafts of these young donors showed inferior survival in the very young recipients with age under 5 years. When used in recipients over age 5 years the survival was still slightly less than survival of grafts from donors over 5 years of age (see Fig. 5).

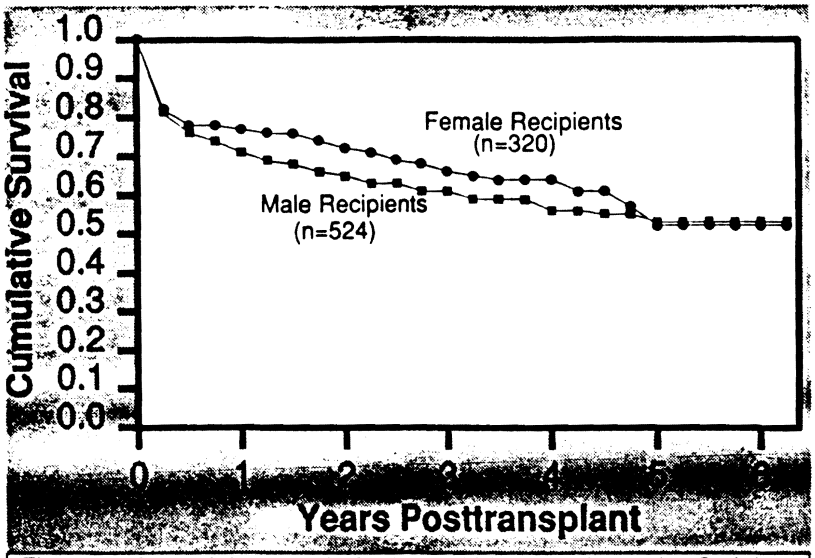

Figure 7. Actuarial survival of primary kidney grafts under CsA for males or females (Breslow p=NS, Mantel-Cox p=NS).

There was no disadvantage in the longer follow-up of 18 grafts harvested from donors 55 or older even when the earlier function was slightly diminished. Long survival was similar to transplants using grafts harvested from donors of age groups 5 to 17.9 and 18 to 54.9. Instead, survival was inferior for 44 donor kidneys harvested from donors 5 years or younger (Fig. 5). Further analysis revealed that grafts of these very young donors, when used in recipients over 5 years of age, showed inferior survival than grafts from older or adult donors. Grafts of these very young donors when used in recipients under 5 years showed a drastically inferior survival (Breslow p=0.007, Mantel-Cox p=0.002) (Fig. 6).

Recipient Presensitization

In the CsA era 774 primary cadaveric transplants were performed in recipients with a most recent PRA of zero to 39.9%. One-, 2- and 5-year actuarial graft survival was 75.7%, 70.0%, and 53.5%. For 66 transplants in patients with a most recent PRA of 40.0% or higher, actuarial survival was 55.7%, 46.3%, and 46.3%, respectively (Breslow p<0.0001, Mantel-Cox p<0.001).

Historically highest PRA values of zero to 39.9% were found in 658 recipients. Survival was 75.4%, 70.5%, and 55.5%. For 171 recipients the highest PRA was 40.0% or higher, with 68.6%, 58.9%, and 42.8% survival (Breslow p=0.005, Mantel-Cox p=0.004).

ABO, Sex

Five hundred fifty-two transplants were performed in blood group O patients, 502 in blood group A patients, 162 in blood group B patients, and 59 in blood group AB patients. No differences in actuarial graft survival for various ABO groups of the recipient or of the donor were detected. In contrast to previous reports (5) female recipients or grafts harvested from female donors showed a trend toward a slightly better survival (p=NS) (Fig. 7) in our series.

Dialysis

For 772 of the primary kidney transplants during the CsA era, information about the principal type of former dialysis was available. Kidney recipients with previous hemodialysis showed a trend toward a better survival than recipients with former peritoneal or continuous ambulatory peritoneal dialysis (Fig. 8). There was no significant difference

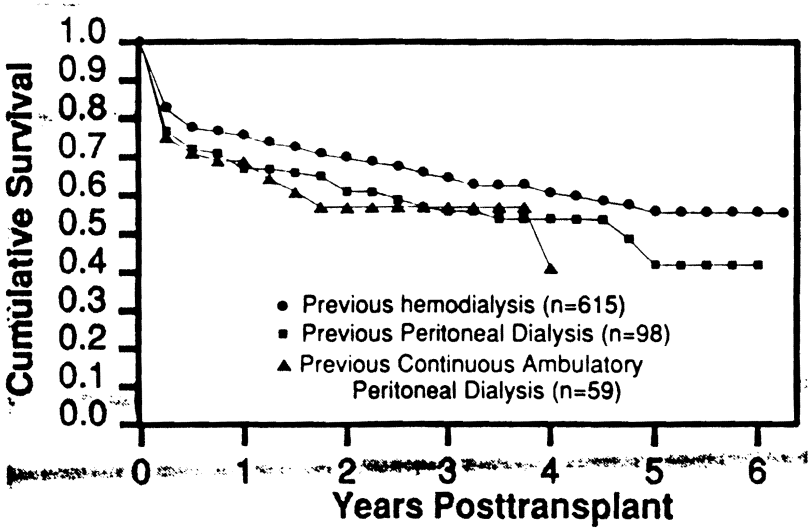

Figure 8. Survival of 772 primary cadaveric kidney transplants according to type of previous dialysis of patient (Breslow p=NS, Mantel-Cox p=NS).

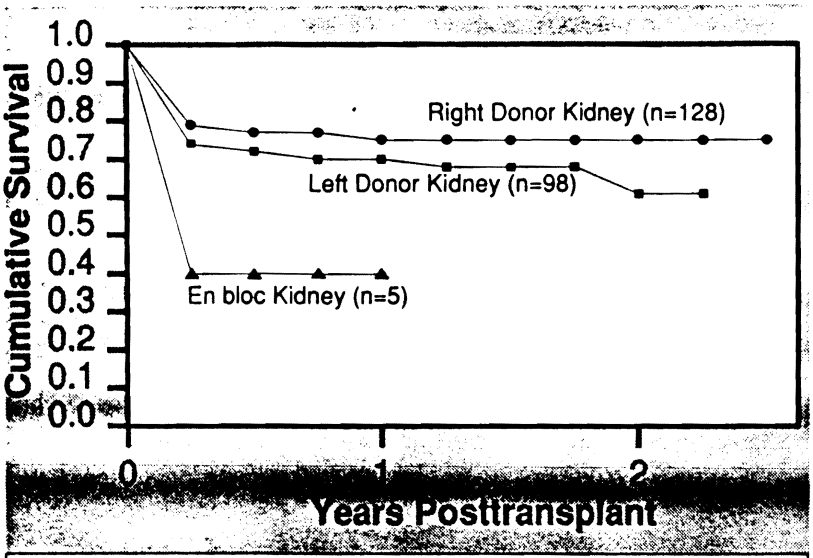

Figure 9. Actuarial survival according to donor kidney side. Data was available for 231 of the most recent primary cadaveric transplants under CsA (Breslow p=NS, Mantel-Cox p=NS).

in transplant groups according to length of previous dialysis, but a trend toward a better survival for patients with shorter dialysis history was noted.

Donor Kidney Side

For 231 of the most recent primary kidney transplants in the CsA era, the side of the harvested donor kidney was known. Actuarial one- and 2-year survival for 128 right donor kidneys was 75.6% and 75.6%; 98 left donor kidneys were transplanted with a survival of 70.8% and 61.8%. Five en bloc kidney transplants showed an inferior one-year survival of only 40.0% (Breslow p=0.036, Mantel-Cox p=0.039)(Fig. 9).

HLA

Throughout the analysis there was a trend towards enhanced survival for better HLA-A, B or DR matched kidney allografts. This effect was not statistically significant, presumably because of relatively low numbers in the analysis (Figs. 10-12).

DISCUSSION

Many of the patients transplanted at the University of Pittsburgh were referred from other institutions, either having previous transplants performed or because of clinico-pathologic circumstances presenting a higher risk for transplant outcome. Once feasibility for transplantation was established using predefined criteria, patients are activated on the candidate list. Lowest risk was not the primary guiding factor in patient selection.

The introduction of combined CsA and steroid treatment as the baseline immunosuppressive medication significantly enhanced the results of kidney transplantation in our series. But various other preexisting recipient or donor conditions may still have an important effect on kidney transplant survival and should not go unrecognized. Also in our series, a lower PRA antibody level was a main determinant for better success of the kidney transplant. HLA showed a trend towards enhanced survival for better-matched grafts, but presumably because of relatively small numbers, this trend was not statistically significant.

One main advantage of CsA was described to be the enhanced survival of older transplant recipients (6). Also in our series older recipients aged 55 or more showed a good survival similar to that of younger adult recipients.

Combined liver/kidney transplants have been shown to offer a favorable treatment modality for patients with endstage liver and renal disease. It is important to note that 2 of the kidney allografts performed against a positive donor-specific crossmatch seemed to be protected against a deleterious immune response by the liver allograft transplanted only hours before (3,4).

Living-related kidney transplants were almost totally abandoned at our institution with only one living-related transplant since 1983. Reasons for this approach are the increased availability of cadaveric donor organs, the improved results with cadaveric transplants under CsA, and the possible risks to the living donors (7). The latter seems of major importance since an increased incidence of hypertension might appear in these donors and long-term follow-up studies are still rare. This is of special significance since living-related donors are in perfect health. In addition psychological and other undiscovered factors influencing the decision of a parent, brother, sister, or other living donor might not be fully appreciated by the surgeon. Nevertheless, in countries with a more limited availability of cadaveric donor organs, another approach must depend on the surgeon and patient decisions.

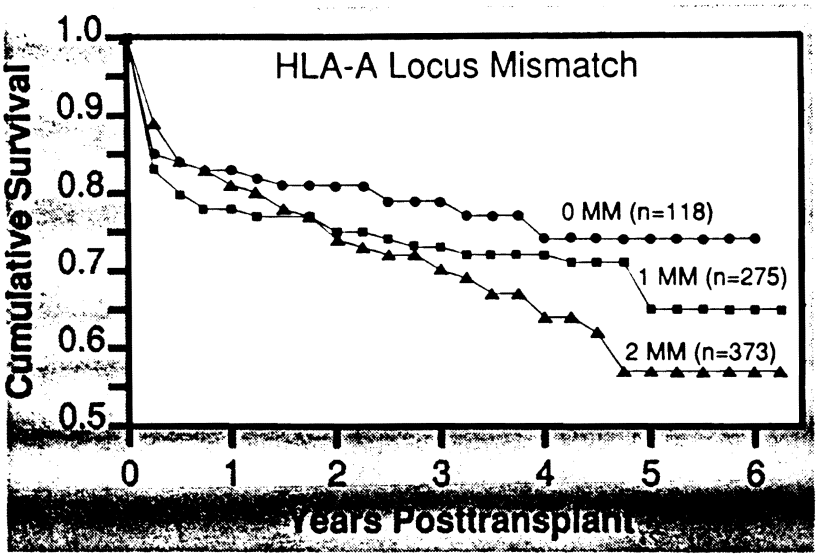

Figure 10. Actuarial survival of primary cadaveric kidney grafts with CsA when grouped according to mismatches at the HLA-A locus. Transplants lost because of technical problems, poor patient compliance, or presumably unrelated factors leading to patient death were not considered for this analysis (Breslow p=NS, Mantel-Cox p=NS).

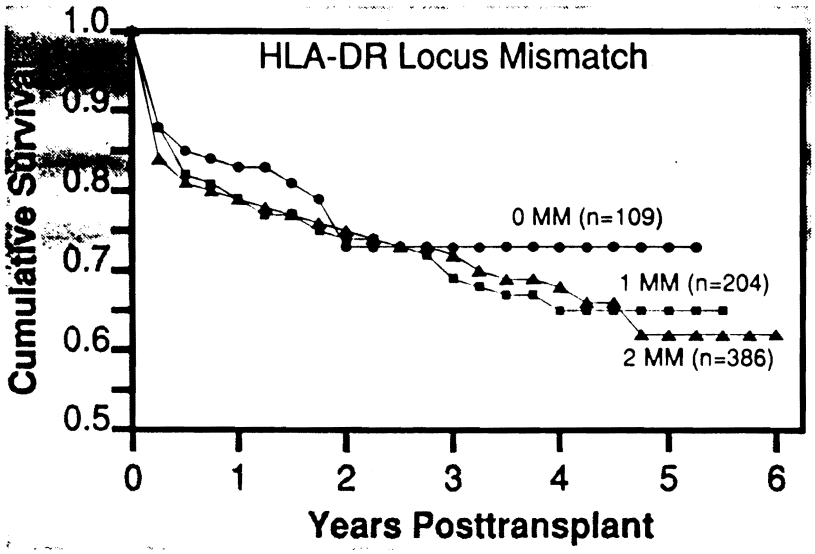

Figure 11. Actuarial survival of primary cadaveric kidney grafts under CsA when grouped according to mismatches at the HLA-DR locus. Transplants lost because of technical problems, poor patient compliance, or presumably unrelated factors leading to patient death were not considered for this analysis (Breslow p=NS, Mantel-Cox p=NS).

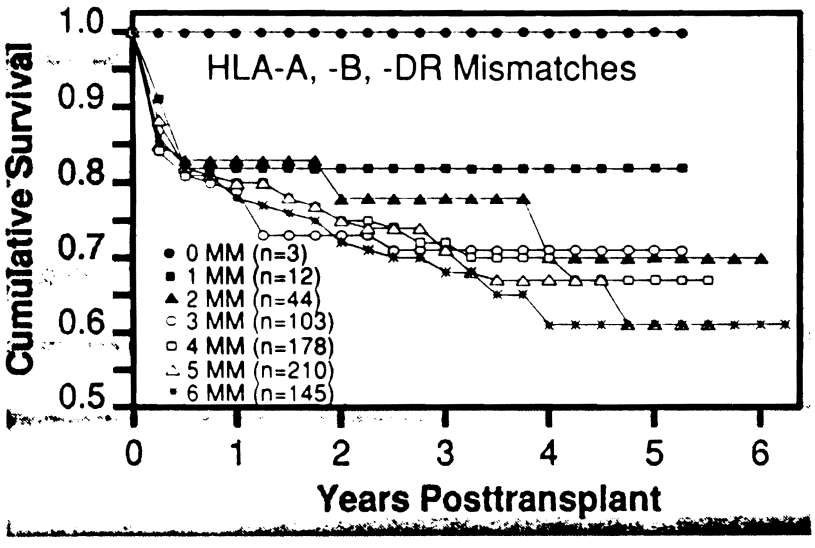

Figure 12. Actuarial survival of primary cadveric kidney grafts under CsA when grouped according to mismatches at the HLA-A, -B and -DR loci. Transplants lost because of technical problems, poor patient compliance or presumably unrelated factors leading to patient death were not considered for this analysis (Breslow p=NS, Mantel-Cox p=NS).

In reviewing the type of dialysis, a trend towards better survival of a following kidney transplant in patients on hemodialysis versus peritoneal or continuous ambulatory peritoneal dialysis was noted. In addition a shorter dialysis history seemed to improve kidney graft survival. How far this was influenced by other circumstances leading to a particular dialysis method or by the dialysis method itself could not be determined from our series. It seems likely that patient conditions, such as hemodynamic instability, no access sites for hemodialysis, and higher presensitization with HLA antibodies and a subsequently longer waiting time, were influencing the outcome. If possible hemodialysis might suggest the better choice, but further studies are needed.

Interestingly, the donor kidney side showed a benefit in survival for right donor kidneys in comparison to left donor kidneys. En bloc transplants showed an inferior survival possibly because of additional size considerations, preexisting anatomic factors, and increased technical difficulties. Both these findings need to be evaluated in a larger transplant population in order to draw firm conclusions.

TIMY - Transplant Information Management System

A center-oriented computerized transplant information management system (TIMY) was developed for processing the kidney transplant data. The system focuses on the everyday informational needs of both the clinician and the researcher. Therefore the computer must be user friendly and readily accessible to all levels of the departmental staff according to their specific information needs. Similar systems are currently in use for the liver transplant program and to some extent for the heart transplant service.

Using the DATAEASE database program (DATAEASE INTERNATIONAL, Trumbull, CT), TIMY was designed and implemented using an IBM-AT with a 30 megabyte harddisk. Part of the data was transferred from a previously existing database. Many of the data-entry fields are choice fields which help to eliminate data-entry errors, with additional precoding of fields allowing for convenient statistical analysis. System modifications required to customize the database according to the needs of the individual transplant center are readily accomplished.

The system design covers the candidacy, transplant, and the follow-up phases. Data can be entered in the appropriate forms (Figs. 13-15) with easy movement between the various patient records. In addition, addresses and telephone numbers of referring physicians, patients, and their home dialysis centers are stored in specific files and used to print the weekly candidate list. Various established reports are available for clinical and research tasks. Included are the comprehensive candidate listings, regular summary reviews, and statistics (Figs. 16-17).

The database is available to the transplant coordinators via a laptop computer. Therefore pertinent patient data can be reviewed from any telephone connection, facilitating the coordinators' work during nights and weekends. The dynamic nature of the data requires constant updating and the coordinator can review any data changes since the last printing of the candidate list.

The system structure encompasses the data necessary for reporting to government agencies as well as to the UCLA and CTS Kidney Transplant Registries. The electronic data transfer via diskettes or modem to the UCLA Kidney Transplant Registry and to the CTS study at the University of Heidelberg, West-Germany, is currently being implemented.

Scoring System

In order to facilitate the allocation of the best suitable transplant candidate when a donor organ is offered, an integral computerized scoring system was developed as an objective allocation method (8). The results do not mandate, but facilitate the decision-making process of the surgeon. Currently in Pittsburgh the Transplant Organ Procurement Foundation is running this scoring system.

Various factors were thought to play an important role in the assessment of a suitable candidate. Of these, the 5 most significant are used in the scoring system: time of waiting, quality of HLA antigen match, presensitization state with PRA, medical urgency, and logistical factors. Since donor and recipient should be of the same blood group with only rare exceptions, renal candidates are grouped according to whether their blood type is O, A, B, or AB. Candidates who weigh less than 27 kg or are 10 years or younger are listed separately. Sera from all candidates of the appropriate blood type and size are matched against lymphocytes from the donor of the offered kidney. A negative crossmatch, connoting the absence of antidonor cytotoxic antibodies in the recipient serum, is a necessary condition for placement on the list of potential candidates.

The waiting score is determined as a rank order of waiting time, established from the date of referral for consideration of transplantation. A maximum of 10 points is awarded to the candidate waiting for the longest period, with fewer points given for shorter waits.

The quality of antigen match points is determined by the grade of histocompatibility at the HLA-A, B, and DR loci. Two points are given for each antigen matched, with a score of 12 being possible.

The present state of alloimmunization, as defined by the most recent PRA level, is used for calculating the PRA score. One point is given for each 10% PRA value up to a maximum of 10 points.

The medical urgency score is used in cases where dialysis is not a feasible option for the patient, so transplantation within a short period of time is essential. This is used, for example, in patients whose access sites for dialysis had been exhausted. A total of 10 points can be assigned to such a patient.

A maximum logistics score of 6 points can be awarded for logistical factors based on the ease and rapidity with which the transplantation could be performed. For example, if a kidney was offered near the end of its permissible storage time, logistical points might be given to a candidate whose proximity to the hospital and history of recent dialysis could permit prompt transplantation.

As stated above, the result of the scoring system does not mandate, but facilitates the selection of an appropriate candidate for this particular donor organ. Certainly additional medical circumstances, such as CMV status of donor and recipient, size limitations, etc. have to be considered. When there is a deviation from the computerized scoring result, an explanation is documented. Scoring results and overriding explanations are routinely reported to community boards for review purposes. Since its introduction in 1986 this computerized scoring system has proven to be a very valuable tool in the transplant candidate selection process.

A similar scoring system is routinely used for candidate selection in our liver transplant program (9). A system for heart transplantation is currently under evaluation.

TRANSPLANT INFORMATION MANAGEMENT SYSTEM - KIDNEY REGISTRY - DEMOGRAPHICS

ID# _____ LAST NAME _____ FIRST NAME _____
DATE OF BIRTH _____
SEX _____ RACE _____
BLOOD GROUP ABO _____ RH _____ LEWIS ANTIGEN A ____ B ____
HLA TYPE A__,__B__,__Bw__DR__,__DQ__,__DRw__,__ TISSUE TYPING #____
DIAGNOSIS _____
DATE DIAGNOSIS WAS FIRST MADE _____
COMMENT _____

IF PATIENT LOST TO FOLLOW-UP, ENTER DATE OF LAST FOLLOW-UP _____
IF PATIENT DIED, ENTER DATE OF DEATH _____
PRIMARY CAUSE OF DEATH
_____
SECONDARY CAUSES OF DEATH
2._____
3._____
4._____
5._____
COMMENT _____

Figure 13. Every patient entered in the TIMY kidney transplant management system has a pertinent record with demographic data. Most of the data is entered in precoded choice fields, which minimizes data-entry errors and greatly facilitates later analysis.

TRANSPLANT INFORMATION MANAGEMENT SYSTEM - KIDNEY REGISTRY - CANDIDATE DATA

ID# _____ LAST NAME _____ FIRST _____
CURRENT RECORD ___ CANDIDACY FOR GRAFT #_ ABO _____ ALIEN _____

PHYSICIAN CODE_____ DIALYSIS CENTER CODE_____ SEND LETTER_____

DATE REFERRED_____ PREFERENCE_____
LIST STATUS _____ URGENCY_____ LOGISTICS _____

INSURANCE_____ SECONDARY _____

AGE_____ AGE GROUP _____TOTAL PREGNANCIES_____ LIVE BIRTHS_____
HEIGHT__ft__in OR ___cm WEIGHT___lbs OR ___kg

PRA HIGHEST____ DATE ____ PRA RECENT____ DATE ____

HAAb____ HBsAg_____ HBsAb _____ HBcAb _____
CMV_____ HIV ELISA TESTING __ WESTERN BLOT __

PRE-KTX BLOOD TRANSFUSIONS WHOLE BLOOD_____ PACKED RED CELLS_____
WASHED CELLS__ FROZEN/FILTERED PLASMA____ PLATELETS___ BUFFY COATS___

IF LIVING DONOR, ENTER # OF DONOR SPECIFIC TRANSFUSIONS ___
DATE OF LAST PRE-KTX TRANSFUSION _____

START OF DIALYSIS _____ TYPE _____
NEPHRECTOMY _____ DATE _____ REASON _____
SPLENECTOMY _____ DATE _____

ADDITIONAL DIAGNOSIS
HEPATIC _____
PULMONARY _____
CARDIOVASCULAR _____
JUVENILE DIABETES MELLITUS _____
ADULT DIABETES MELLITUS _____
DIABETIC TREATMENT _____

COMMENTS _____

Figure 14. Form for candidate information. Additional forms exist for patient address, referring physician, and dialysis center.

TRANSPLANT INFORMATION MANAGEMENT SYSTEM - KIDNEY REGISTRY - TRANSPLANT DATA

ID# _____ LAST NAME _____ FIRST _____
NUMBER FOR THIS GRAFT (GX#)__ TRANSPLANTED ORGANS_____
DATE OF KTX _____ SERVICE _____ DONOR# _____ TRANSPLANT ID# _____
AGE AT KTX ____

IMMUNOSUPPRESSIVE BASELINE _____ CyA STARTED DAY _____

DONOR LOCALITY _____ OTHER _____

HARVEST MODE _____ COLD STORAGE _____

MACHINE _____ PERFUSATE _____

ISCHEMIA TIME WARM DONOR____min COLD___hr___min WARM RECIPIENT__min

RECIPIENT SURGEON _____ 1st ASSISTANT _____ DONOR SURGEON _____

INTRA-OPERATIVE-BLOOD-TRANSFUSIONS WHOLE BLOOD___ PACKED RED CELLS___
WASHED CELLS___ FROZEN/FILTERED PLASMA___ PLATELETS___

DONOR INFORMATION
LAST NAME _____ FIRST _____ SEX _____

WEIGHT__lbs or__kg AGE _____ RACE _____
BLOOD GROUP ABO _____ RH _____ LEWIS ANTIGEN A___ B___

RELATIONSHIP_____ DONOR KIDNEY SITE_____

CAUSE OF DEATH _____ CANCER _____

HBsAg____ CMV_____ VDRL_____ HIV ELISA_____ WESTERN BLOT____
OTHER INFECTION _____ IF YES, SPECIFY _____

RECENT BUN _____ RECENT CREATININE ___

TISSUE TYPING #_____ HLA TYPE A__,___B__,__Bw__DR__,__DQ__,__DRw__,__
DATE OF SERA_____ CROSSMATCH ___ TEST TYPE _____
AUTOLOGUS CONTROL_____ TEST TYPE _____

RESULTS OF SCORING SYSTEM
WAITING____ PRA____ HLA____ URGENCY____ LOGISTICS____ TOTAL____
OVERRIDER _____ IF YES, FULL EXPLANATION HAS TO BE GIVEN IN COMMENTS
INCLUDING ID# 0F OVERRIDEN PATIENTS. EXPLANATION HAS TO BE KEPT IN ADDITION
AS A HARD COPY FOR ALL TIMES WITH SCORING PRINTOUT ATTACHED TO IT!
COMMENTS: _____

Figure 15. Data-entry form covering the essential information related to the transplant event and of the particular donor. For survival and status information there are additional forms.

TRANSPLANT INFORMATION MANAGEMENT SYSTEM - KIDNEY TRANSPLANT REGISTRY
CANDIDATE LIST AS OF 07/07/87
* BLOOD GROUP O * PAGE 1

Doe, John ID#: 999-99-9999 DATE REFERRED: 12/01/86
ABO: O AGE: 53.6 SEX: MALE DOB: 01/01/34 HT: 173 WT: 77.9
CANDIDACY FOR GX#: 1 STATUS: ACTIVE URGENCY:
DIAG: Diabetic Nephropathy DIALYSIS: Hemodialysis
PRA HIGH: 2.0 DATE: 01/01/87 PRA RECENT: 0.0 DATE: 04/07/87
TISSUE TYPING #: 77777 HLA TYPE: A 2, 3 B 7,62 DR 3,5
HAAB: Neg HBsAg: Neg HBsAb: Neg HBcAb: Neg CMV: Neg
INSURANCES: Blue Cross/Blue Shield NEPHRECTOMY: None
COMMENTS: Patient had myocardial infarct in 10/85
ADDRESS: 1122 Beechwood Ave, Pittsburgh, PA. 15219
PHONE HOME: (412) 999-9999 PAGER: (412) 999-9999
PHONE WORK: (412) 999-9999 TYPE: VOICE
RELATIVES: (412) 999-9999 - Susan - aunt
RELATIVES: (412) 999-9999 - Jack - sister
DIALYSIS CENTER: ABC PHONE: (412) 999-9999 REFERRING MD: TES

Doe, John ID#: 999-99-9999 DATE REFERRED: 05/15/86
ABO: O AGE: 39.1 SEX: MALE DOB: 07/08/48 HT: 193 WT: 83.4
CANDIDACY FOR GX#: 2 STATUS: ACTIVE URGENCY:
DIAG: Polycystic Kidney Disease DIALYSIS: Hemodialysis
PRA HIGH: 54.0 DATE: 03/19/86 PRA RECENT: 41.0 DATE: 06/29/87
TISSUE TYPING #: 99999 HLA TYPE: A 1,28 B 7,60 DR 4,
HAAB: Neg HBsAg: Neg HBsAb: Neg HBcAb: Neg CMV: Neg
INSURANCES: Medicare NEPHRECTOMY: Yes
COMMENTS: First kidney transplant in 3/85, rejected after 12 months
ADDRESS: 1133 Fifth Ave, Pittsburgh, PA. 15216
PHONE HOME: (412) 999-9999 PAGER: (412) 999-9999
PHONE WORK: (412) 999-9999 TYPE: VOICE
RELATIVES: (412) 999-9999 - Terry - mother
RELATIVES: (412) 999-9999 - Greg - brother
DIALYSIS CENTER: ABD PHONE: (412) 999-9999 REFERRING MD: DVT

ETC. ETC. ETC.
BLOOD GROUP A
BLDOD GROUP B
BLOOD GROUP AB
ETC. ETC. ETC.

CANDIDATE LIST STATISTICS
FOR ALL BLOOD GROUPS

ACTIVE CANDIDATES	#	119	100.0 %
BLOOD GROUP 0	#	57	47.9 %
BLOOD GROUP A	#	34	28.6 %
BLOOD GROUP B	#	20	16.8 %
BLOOD GROUP AB	#	8	6.7 %

Figure 16. Weekly candidate listings are printed with comprehensive candidate data for use by transplant coordinators, procurement agency, and tissue typing laboratory.

TRANSPLANT INFORMATION MANAGEMENT SYSTEM - KIDNEY REGISTRY - 06/06/87
REPORT TO THE OVERSIGHT COMMITTEE
TIME PERIOD FOR THIS REPORT : FROM 05/01/87 TO 05/31/87

KTX DATE	SECTION	ID#	NAME	GX#	AIEN	AGE	ABO	ORGANS TRANSPLANTED	DIAGNOSIS	WAITING	PRA	HLA SCORING	URG	LOG	TOTAL	OVER-RIDER
01/01/87	URO SURG	999-99-9999	Doe John	1	NO	41.6	O	KIDNEY ONLY	Chronic GN	3.29	6.1	2	0	0	11.39	No
COMMENTS:																
01/08/87	GEN SURG	999-99-9999	Doe John	1	NO	37.4	A	KIDNEY ONLY	Diabetic Nephropathy	0.67	0.0	2	0	0	2.67	No
COMMENTS:																
01/08/87	GEN SURG	999-99-9999	Doe John	1	NO	28.9	A	KIDNEY ONLY	Interstitial Nephritis	0.33	0.0	4	0	0	4.33	No
COMMENTS:																
01/11/87	URO SURG	999-99-9999	Doe John	2	NO	21.5	A	KIDNEY ONLY	Chronic GN	8.28	7.7	8	0	0	23.98	No
COMMENTS:																
01/19/87	GEN SURG	999-99-9999	Doe John	1	NO	29.1	O	KIDNEY ONLY	Polycystic Kidney	1.35	0.2	2	0	0	3.55	No
COMMENTS:																
01/19/87	URO SURG	999-99-9999	Doe John	1	NO	9.1	O	KIDNEY ONLY	IgA Nephropathy	0.14	0.0	4	0	0	4.14	No
COMMENTS:																
01/30/87	GEN SURG	999-99-9999	Doe John	1	NO	47.2	O	KIDNEY ONLY	Goodpasture Syndrome	3.43	0.2	6	0	0	9.63	No
COMMENTS:																
01/30/87	URO SURG	999-99-9999	Doe John	1	NO	60.3	O	KIDNEY ONLY	Endstage Renal Disease	4.86	3.7	0	0	0	8.56	Yes
COMMENTS: Donor was CMV positive, this patient was 1st CMV positive on list.																

STATISTICS FOR THE PERIOD: 01/01/87 TO 01/31/87

ALIENS	# = 0 (0.00 %)	OVERRIDERS	# = 1 (12.50 %)
NON ALIENS	# = 8 (100.00 %)	NON OVERRIDERS	# = 7 (87.50 %)
NOT ENTERED	# = 0 (0.00 %)	NOT ENTERED	# = 0 (0.00 %)

Figure 17. The Oversight Committee, a community board established to review the transplant activities in Pittsburgh, receives every month a listing of the performed transplants, patient data, scoring results, and eventually overriding statements.

SUMMARY

1. The introduction of combined CsA and steroid treatment as the baseline immunosuppressive medication significantly enhanced the results of kidney transplantation in our series. But various other preexisting recipient or donor conditions may still have an important effect on kidney transplant survival and should not go unrecognized.
2. Living-related kidney transplants were almost totally abandoned at our institution. Reasons for this approach are the increased availability of cadaveric donor organs, the improved results with cadaveric transplants under CsA and the possible risks to the living donors.
3. Combined liver/kidney transplants have been shown to offer a favorable treatment modality for patients with endstage liver and renal failure.
4. A newly developed center-oriented Transplant Information Management System (TIMY) significantly facilitates the clinical and research tasks in our department.
5. An integrated, computerized scoring system for equitable allocation of donor organs has proven to be highly effective during routine clinical use.

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