Effect of Donor-Recipient Age Match in Expanded Criteria Deceased Donor Kidney Transplantation

K. Ko[a], Y.H. Kim[a], M.H. Kim[a], K.W. Jun[b], J.K. Hwang[c,*], S.D. Kim[d], S.C. Park[a], J.I. Kim[e], and I.S. Moon[f]

[a]Department of Surgery, Seoul St. Mary's Hospital, [b]Department of Surgery, Bucheon St. Mary's Hospital, [c]Department of Surgery, Daejeon St. Mary's Hospital, [d]Department of Surgery, Incheon St. Mary's Hospital, [e]Department of Surgery, Uijeongbu St. Mary's Hospital, and [f]Department of Surgery, Yeouido St. Mary's Hospital, The Catholic University of Korea, Seoul, Republic of Korea

ABSTRACT

Purpose.   Our objective was to investigate the effects of age on patient and graft survival in expanded criteria donor (ECD) renal transplantation.

Methods.   Between February 2000 and December 2015, we analyzed 405 deceased donor renal transplants, including 128 grafts (31.9%) from ECDs. Based on recipient age and ECD criteria classification, the recipients were divided into four groups: Group I, non-ECD to recipient age <50 years; Group II, non-ECD to recipient age ≥50 years; Group III, ECD to recipient age <50 years; and Group IV, ECD to recipient age ≥50 years.

Results.   Among the four groups, there were significant differences in baseline characteristics (age, body mass index [BMI], cause of end-stage renal disease [ESRD], number of kidney transplantations, and use of induction agent). The mean modification of diet in renal disease (MDRD) glomerular filtration rate (GFR) level at 1 month, 6 months, 1 year, 3 years, and 5 years after transplantation was significantly lower in patients with ECDs but MDRD GFR level at 7, 9, and 10 years did not differ significantly ($P = .183$, .041, and .388, respectively). There were no significant differences in graft survival ($P = .400$) and patient survival ($P = .147$).

Conclusion.   Our result shows that, regardless of recipient age, kidney transplants donated by deceased ECDs have similar graft and patient survival.

THE EUROTRANSPLANT Senior Program (ESP) allocation scheme was established to match the available capacity of kidneys from donors ≥65 years to the functional requirements of recipients ≥65 years [1]. As implemented in Europe, common practice in the United States is to give older donor kidneys to older recipients [2]. Although giving a different definition of the expanded criteria donor (ECD), a French Study in 2002 reported that these older donor kidneys transplanted into significantly older recipients had similar 2-year patient and graft survival as the control donor-recipient group [3]. Our objective was to investigate the effects of age on patient and graft survival in ECD renal transplantation.

METHODS

Patients

In this retrospective study, we reviewed the medical records and electronic transplant registry of kidney transplant recipients at Seoul St. Mary's hospital, Catholic University of Korea, from February 2000 to December 2015. We analyzed 405 deceased donor renal transplants from 328 brain-dead donors. The data included

*Address correspondence to Jeong Kye Hwang, MD, PhD, Department of Surgery, Daejeon St. Mary's Hospital, College of Medicine, The Catholic University of Korea, 64 Daeheung-ro, Jung-gu, Daejeon 34943, Republic of Korea. E-mail: jjungyong@catholic.ac.kr
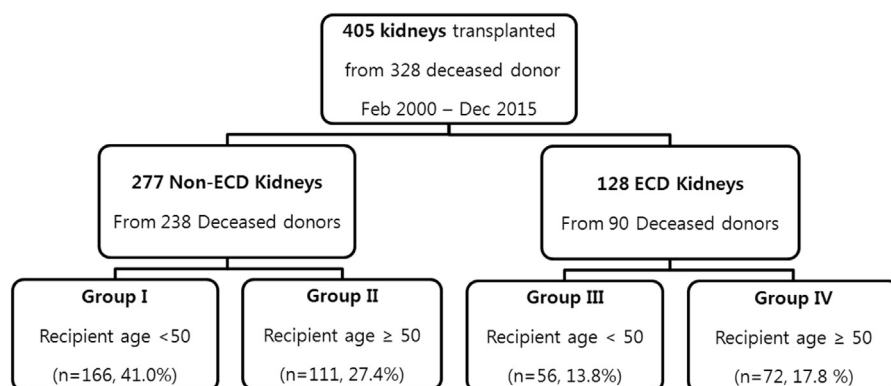
Fig 1. Study groups.

information about 128 grafts (31.9%) from ECD kidney transplantations. Based on the recipient age and ECD classification, the recipients were divided into four groups: Group I, non-ECD to recipient age <50 years; Group II, non-ECD to recipient age ≥50 years; Group III, ECD to recipient age <50 years; and Group IV, ECD to recipient age ≥50 years. In Group I, 166 recipients received non-ECD kidneys. In Group II, 111 recipients received transplants from non-ECDs. For ECD kidney transplantation, 56 recipients were allocated in Group III and 72 recipients underwent transplantation in Group IV (Fig 1).

Definitions and Assessment

All deceased donors (DDs) older than 60 years and DDs 50 to 59 years of age that met two of the following criteria were classified as ECDs based on United Network for Organ Sharing (UNOS) definitions [2]: (1) history of hypertension, (2) cerebrovascular accident as a cause of brain death, and (3) final preprocurement serum creatinine (SCr) level >1.5 mg/dL. DDs were compared with respect to gender and age at transplantation, body mass index (BMI), cause of death, history of hypertension, preretrieval SCr level, and days of intensive care unit (ICU) stay.

The following variables were compared: gender and age at transplantation, BMI, cause of end-stage renal disease (ESRD), type and duration of renal replacement therapy (RRT), number of HLA mismatches and other immunologic factors, nephron mass index (donor kidney weight to recipient body weight ratio [Kw/Rw]; g/kg), total ischemic time, mean SCr level, modification of diet in renal disease (MDRD) glomerular filtration rate (GFR) at 1 month, 6 months, 1 year, 3 years, 5 years, and 10 years post-transplantation, incidence of acute rejection (AR) episodes, incidence of delayed graft function (DGF) episodes, duration of graft function, patient survival, and complications. DGF was defined as (1) failure of SCr to decrease within 72 hours and/or (2) the need for dialysis in the first week post-transplantation. Renal allograft loss was defined as graft nephrectomy, resumption of ongoing dialysis, or return to the pretransplantation SCr level. Patient death with a functioning graft was censored.

Statistical Analysis

The unpaired t test for continuous variables and the chi-square test for categorical variables were used to compare data between the two groups. All data were expressed as the mean ± standard

Table 1. Characteristics of the Study Groups According to ECD and Recipient Age

| | Recipients (N = 405) | | | | |
	Group I (n = 166)	Group II (n = 111)	Group III (n = 56)	Group IV (n = 72)	P
Age (y)	40.0 ± 6.2	55.73 ± 4.8	41.3 ± 5.9	57.8 ± 5.2	<.001
Male	89 (53.6%)	58 (52.3%)	30 (53.6%)	48 (66.7%)	.218
BMI (kg/m²)	22.1 ± 3.29	22.9 ± 3.10	23.9 ± 3.42	22.9 ± 3.15	.003
Cause of ESRD					.001
GN	79 (47.6%)	42 (37.8%)	15 (26.8%)	14 (19.4%)	
DM	19 (11.4%)	20 (18%)	12 (21.4%)	15 (20.8%)	
HBP	33 (19.9%)	17 (15.3%)	15 (26.8%)	26 (36.1%)	
ADPCKD	6 (3.6%)	11 (9.9%)	2 (3.6%)	5 (6.9%)	
SLE	6 (3.6%)	1 (0.9%)	3 (5.4%)	0	
Others	4 (2.4%)	6 (5.4%)	0	2 (2.8%)	
Unknown	19 (11.4%)	14 (12.6%)	9 (16.1%)	10 (13.9%)	
Type of dialysis (HD)	118 (71.1%)	80 (72.1%)	35 (62.5%)	50 (69.4%)	.610
Duration of dialysis	124.6 ± 207.4	141.7 ± 227.3	87.8 ± 166.7	84.7 ± 147.6	.170
Total ischemic time (min)	227.1 ± 120.0	224.4 ± 133.5	230.2 ± 98.9	221.9 ± 109.2	.980
Number of KTs, % (>1)	27 (16.3%)	10 (9.0%)	2 (3.6%)	4 (5.6%)	.013
Number of HLA mismatches	3.71 ± 1.29	3.52 ± 1.40	3.64 ± 1.39	3.81 ± 1.34	.529
Induction agent (IL-2RA)	133 (83.1%)	73 (71.6%)	34 (72.3%)	37 (59.7%)	.003

Abbreviations: GN, glomerulonephritis; DM, diabetes mellitus; HBP, hypertension; ADPCKD, autosomal-dominant polycystic kidney disease; SLE, systemic lupus erythematosus; HD, hemodialysis; KT, kidney transplantation; HLA, human leukocyte antigen; IL-2RA, interleukin-2 receptor antagonist.