Outcomes and Mortality in Renal Transplant Recipients Admitted to the Intensive Care Unit

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ABSTRACT

Introduction. In the intensive care unit (ICU), mortality is considered higher among renal transplant recipients than among nontransplantation patients. However, data regarding severe complications after kidney transplantation are scarce.

Materials and Methods. In this study, we evaluated all consecutive renal transplant recipients admitted to our ICU between July 2012 and July 2013 (n = 70), comparing their outcomes with those of a control group of nontransplantation patients admitted during the same period (n = 153). Among the transplant recipients, we compared survivors and nonsurvivors to identify predictors of ICU mortality.

Results. The mean age of the transplant recipients was 52 ± 13 years. Of the 70 transplant recipients, 18 (25%) required mechanical ventilation, 28 (40%) required inotropic support, and 27 (39%) required hemodialysis, all of which are factors that worsen the prognosis significantly. Twenty-two (31%) of the transplant recipients died in the ICU and 17 (24%) died within 30 days after ICU discharge, rates similar to those observed for the control group.

Conclusions. We observed similar mortality between recipient and control groups, albeit the mortality was higher in the clinical group. In the multivariate model, the need for mechanical ventilation and the need for hemodialysis were independently associated with mortality.

KIDNEY transplantation is the treatment of choice for end-stage renal disease (ESRD) because it improves quality of life and overall survival, more so than hemodialysis, and is proven to be cost effective [1–5]. Despite advances in pharmacological management and immune modulation, which have resulted in 1-year survival rates for transplants approaching 96% [2,6,7], long-term survival of renal transplant recipients has failed to improve [1,5]. The main etiologies of long-term graft failure are chronic glomerulopathy and death with functioning kidney [8]. Increasing numbers of older patients are starting dialysis; although such patients were not previously considered candidates for kidney transplantation due to comorbidities [9], more will be undergoing the procedure in the coming years [1,5,6,10]. Renal transplant recipients are also at a high risk for cardiovascular disorders, de novo malignancies, and infectious complications, which have become the leading causes of morbidity and mortality among such individuals [1,2,4,11].

The incidence of renal transplant recipient admission to the intensive care unit (ICU) ranges from 1% to 25% [2,3]. It has been suggested that, in the ICU, mortality is higher among renal transplant recipients than among nontransplantation patients, although there is a lack of comprehensive data regarding severe complications of kidney transplantation treated in the ICU [1,3,12]. Therefore, in the present study, we evaluated clinical characteristics and severity of renal transplant recipients needing ICU support, outcomes, and mortality in renal transplant recipients admitted to an ICU in São Paulo,

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Table 1. Baseline Characteristics of Renal Transplant Recipients Admitted to the ICU Compared With the Whole Group of Recipients

Characteristic	ICU Patients N = 70	Whole Group N =1660	*P*
Mean age (y), mean ± SD (range)	52 ± 13	47 ± 14	.07
Female gender, n (%)	29 (41.4%)	796 (47.9%)	.28
Causes of ESRD, n (%)			<.001
Diabetes mellitus	20 (28.6%)	198 (11.9%)	
Glomerulonephritis	11 (15.7%)	559 (33.7%)	
Hypertensive nephrosclerosis	8 (11.4%)	206 (12.4%)	
Polycystic kidney disease	6 (8.6%)	65 (3.9%)	
Other	11 (15.7%)	206 (15.4%)	
Unknown	14 (20.0%)	424 (25.6%)	
Type of donor, n (%)			.01
Living	17 (24.3%)	777 (46.8%)	
Deceased	53 (75.7%)	883 (56.2%)	
Donor age (y), mean ± SD (range)	44 ± 16 (18–71)	40 ± 12	.03
Human leukocyte antigen mismatches, mean ± SD	3.0 ± 1.5	3.5 ± 1.7	<.001
Median time from transplantation to ICU admission, d (range)	194 (1–10896)	n/a	
Dialysis period (mo), mean ± SD (range)	53 ± 41	33 ± 24	<.001
Induction immunosuppression therapy, n (%)			<.001
None	3 (4.3%)	90 (5.4%)	
Anti–IL-2 receptor	27 (38.6%)	896 (54.0%)	
Antilymphocyte globulin	35 (50.0%)	429 (25.8%)	
Maintenance immunosuppression therapy, n (%)			.78
Azathioprine	7 (10%)	248 (14.9%)	
Mycophenolate	58 (82.8%)	1278 (77.0%)	
Cyclosporine	10 (14.3%)	248 (14.9%)	
Tacrolimus	51 (72.9%)	1213 (73.1%)	
Sirolimus	2 (2.9%)	69 (4.2%)	
Acute rejection, n (%)	14 (20%)	429 (24.8%)	.27
Diabetes mellitus, n (%)	24 (34.3%)	386 (23.3%)	.03
Retransplantation, n (%)	5 (7.1%)	126 (7.6%)	.89
Multiple organ transplant, n (%)	6 (8.6%)	65 (3.9%)	.05
>30 d from transplantation to ICU admission, n (%)	31 (44.3%)	n/a	

Abbreviations: IL, interleukin; n/a, not applicable.

Brazil, comparing those patients with nontransplantation patients.

MATERIALS AND METHODS

This was a retrospective study carried out at the University of São Paulo School of Medicine Hospital das Clínicas, in São Paulo, Brazil, where an average of 250 kidney transplantations is performed each year. We evaluated data related to all consecutive renal transplant recipients admitted to the Nephrology ICU, which has 5 hospital beds, between July 2012 and July 2013, including those admitted for perioperative and postoperative complications. The study was approved by the Hospital das Clínicas Research Ethics Committee, which waived the need for informed consent.

Renal transplantation postoperative management is routinely made at the renal transplantation ward, except for patients with high preoperative risk or with perioperative and postoperative complications. Transference to the ICU occurs in the presence of sepsis, respiratory failure, cardiovascular disease, and neurological impairment. Nephrologists were responsible for this decision, in agreement with ICU staff.

We collected data related to age, gender, causes of ESRD, underlying diseases, and duration of renal replacement therapy. Kidney transplantation parameters, including type of kidney donation, donor age, human lymphocyte antigen mismatches, and use of immunosuppression therapy, were also evaluated. The immunosuppressive protocol followed at the Hospital das Clínicas includes induction therapy with polyclonal antilymphocyte globulin (for high-risk patients) or anti–interleukin-2 receptor antibodies, together with a triple-drug immunosuppressive maintenance regimen with steroids, a calcineurin inhibitor (cyclosporine or tacrolimus), and an antiproliferative agent (azathioprine, mycophenolate sodium, or mycophenolate mofetil). The baseline characteristics of renal transplant recipients admitted to ICU were compared with the whole group of recipients, to identify who needs ICU care after transplantation.

We evaluated data related to the following variables at ICU admission: the reason(s) for admission; serum creatinine; estimated glomerular filtration rate (eGFR), as determined using the Modification of Diet in Renal Disease equation; serum albumin, lactate, and bilirubin; C-reactive protein; and hemoglobin, platelet count, and leukocyte count. Disease severity was assessed using the Simplified Acute Physiology Score III (SAPS III) and the Sequential Organ Failure Assessment (SOFA) score.

We evaluated the need for and duration of mechanical ventilation or dialysis, as well as the use of vasoactive drugs, during the ICU stays. We noted the length of stay in the ICU and the outcome, including ICU mortality, 30-day survival, and 1-year survival. The ICU outcomes in the renal transplant recipients were compared with those observed in a control group of nontransplantation patients admitted to the same ICU during the same period. Among the renal transplant recipients, we compared survivors with nonsurvivors, to identify predictive factors for ICU mortality. We also performed comparisons of ICU mortality