

Machine Measured Renal Resistance (MMRR) is the most sensitive tool for prediction of early renal allograft survival.

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Purpose: To evaluate the significance of renal allograft and donor parameters as predictors of one year renal allograft survival.

Method: We performed retrospective analysis of the outcome of 470 preselected kidneys for transplantation that were placed on the LifePort Kidney Transporter. These kidneys were perfused for at least 5 hours, biopsied using the Optimized Needle Biopsy Technique protocol, and transplanted between January 2007 and June 2008 in our Donor Service Area. All frozen sections were evaluated by a single renal pathology group and characterized by degree of glomerulosclerosis (GS), tubular interstitial scarring (TIS), and arterial intimal fibrous narrowing (AIFN). Univariate analysis using the log-rank test on the categorical predictors was performed to compare survival functions of groups, followed by Cox regression analysis to assess the association between all the parameters and one year graft survival. Donor age, type (SCD, ECD and DCD), terminal creatinine, calculated donor Glomerular Filtration Rate (GFR), renal biopsy parameters (GS, TIS, AIFN), MMRR values of <0.2, 0.2-0.3, >0.3 and cold ischemia time (CIT) were included in the analysis. 16 of 470 (3.4 %) allografts failed within the first week and were excluded from the analysis as a technical failure.

Results: Of this cohort, 35 of 454 (7.7%) allografts failed within one year of transplant. CIT ranged from 5 to 56 hours and had a mean (SD) of 27.67 hours (9.53). Median terminal creatinine was 1.2mg/dL (range of 0.3, 8mg/dL). Survival curves for donor sex (p=0.4546) and donor type (p=0.8193) did not differ statistically. There is an inverse relationship between MMRR and one year graft survival. Graft survival for MMRR at 3 hours (<0.2, 0.2-0.3, >0.3) (p=0.0412) and 5 hours (<0.2, 0.2-0.3, >0.3) (p=0.0199) was found to be statistically different between resistance cohorts. The Cox regression analysis indicates that only MMRR >0.3 at both 3 hours and 5 hours, (p=0.02 and 0.01, respectively), are significant predictors of the adverse allograft outcome. Ordinal regression analysis demonstrates that increased allograft TIS (25-50%) is predictive of increased MMRR at 1.5 hours (p=0.01), 3 hours (p=0.01) and 5 hours (p=0.02).

Conclusions: MMRR may be used as a tool in predicting early renal allograft outcome. Of the various donor and allograft parameters, MMRR at 3 hours is the earliest significant predictor of one year allograft outcome. may be a more sensitive histologic marker than GS to predict adverse allograft outcomes in part due to its direct relationship with MMRR.