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Predictive factors of renal outcome in heart failure patients after heart transplantation

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Objectives : Cardiorenal syndrome (CRS) frequently occurs in end-stage heart failure patients waiting for heart transplantation (HT) and combined heart-kidney transplantation (HKT) is required in some patients. However, there have been few reports investigating predictive factors of renal outcome in patients receiving HT. Although eGFR < 30 ml/min/1.73m² was suggested as a relative contraindication for HT in ISHLT guideline, there is no consensus for indications of HKT. In this study, we investigated the factors predicting renal outcome after HT in end-stage heart failure patients, focusing on changes in renal function and chronic kidney disease (CKD) evaluated 1 year after HT.

Methods : A single-center retrospective cohort study of 181 patients receiving HT from 1996 to 2015 was conducted. A total of 150 patients were followed for at least 1 year after HT. The primary outcome was renal function at 1 year after HT; eGFR, %ΔeGFR [100 X (post-HT eGFR - pre-HT eGFR)/pre-HT eGFR], and CKD (eGFR < 60 ml/min/1.73m²). Subgroup analyses were performed according to the baseline eGFR and perioperative renal replacement therapy (RRT). Linear and logistic regression analyses were performed to determine risk factors of lower eGFR and CKD development. The results of pre-HT kidney ultrasound images were scored as follows: normal (0), increased echogenicity (1), loss of corticomedullary differentiation (2), cortical thinning (3), small sized kidney (4).

Results : Patients with baseline eGFR < 30 ml/min/1.73m² (n=13) showed lower eGFR and higher proportion of CKD at post-HT 1 year. Perioperative RRT group (n=45) showed higher mortality compared to non-RRT group (p<.001).

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However, there was no significant difference in renal dysfunction at post-HT 1 year between survivors ($p=.172$).

Higher eGFR at post-HT 1 year was associated with young age ($p<.001$) and high baseline eGFR ($p<.001$). Old age ($p<.001$), preexisting CKD ($p=.002$), and preoperative mechanical support ($p=.002$) were identified as independent risk factors of CKD at post-HT 1 year. Higher $\% \Delta eGFR$ at post-HT 1 week ($p=.023$) and 1 month ($p=.020$), and smaller difference between preoperative CCr and MDRD eGFR ($p=.020$) was associated with higher $\% \Delta eGFR$ (significant improvement of renal function) at post-HT 1 year.

Conclusions : Old age, preexisting CKD, and preoperative mechanical support were identified as independent risk factors of CKD at post-transplant 1 year. Patients with higher $\% \Delta eGFR$ at 1 week and 1 month after HT showed significant improvement of renal function at post-HT 1 year. Preexisting CKD, especially $eGFR < 30 \text{ ml/min/1.73m}^2$, may not be a contraindication for HT despite significantly lower eGFR at 1 year after HT. Our data suggest the necessity of early HT in end-stage heart failure patients with CRS and closer monitoring as well as careful management for better renal outcome after HT, especially during the first month after HT.

Keywords : Acute kidney injury, Renal function, Heart transplantation, Cardiorenal syndrome