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Improvement of Left Ventricular Diastolic Function after Kidney Transplantation

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Background: Left ventricular (LV) diastolic dysfunction is frequently observed in patient with end-stage renal disease (ESRD), and has been known as a significant risk factor for cardiovascular events in these patients. We hypothesized that the ratio of early diastolic peak mitral flow velocity to early mitral annulus velocity (E/E`), widely used non-invasive index of LV diastolic dysfunction, would improve following kidney transplantation (KT). **Methods:** Among patients who received KT at Ulsan University Hospital, 126 KT recipients (73 were female) whose pre- and post-KT echocardiographic findings were available were included this analysis. Linear mixed-effect models with random intercept were used to assess changes in cardiac function and morphology over time after KT. **Results:** Median duration from KT to post-KT echocardiography (TTE) was 999 days. Mean serum creatinine measured at the time of post-KT TTE was 1.54 mg/dL. Serum level of hemoglobin (P <0.001), phosphorus (P <0.001), and intact parathyroid hormone (PTH, P <0.001) were significantly improved after KT, however the change of body weight was not (64.4 to 62.6kg, $p=0.286$). In the adjusted model, LV mass index ($p=0.044$), left atrial volume index ($p=0.020$) and E/E` (-0.86, 95% CI -1.71 to -0.01, $p=0.048$) was significantly decreased over time. **Conclusion:** In addition to cardiac structural abnormality, LV diastolic dysfunction may be successfully improved after KT. Further studies for understanding myocardial pathophysiology after KT may be helpful for improving survival of patients with chronic kidney disease.

Table 1. Baseline characteristics of kidney transplant recipients

N = 126	Pre KT	Post KT*	P**
Age, years, mean (SD)	46.5 (11.3)		
Sex, female, n (%)	73 (57.9)		
Weight, kg, mean (SD)	64.4 (11.7)	62.6 (15.1)	0.286
Diabetes, n (%)	36 (28.6)		
RRT, HD / PD / preemptive	81 / 20 / 25		
Induction, IL2RA/ATG	117 / 9		
Donor type, deceased/living	64 / 62		
HLA mismatches, mean (SD)	3.4 (1.7)		
ABO incompatible, n	5 (4.0)		
DGF, n (%)		8 (6.3)	
BPAR, n (%)		27 (21.4)	
Graft failure, n (%)		4 (3.2)	
Medications, n (%)			
calcium channel blocker	122	52	
ACE inhibitor and/or ARB	148	114	
beta blocker	96	76	
Laboratory findings, mean (SD)			
serum creatinine, mg/dL	8.35 (3.09)	1.54 (1.72)	< 0.001
hemoglobin, g/dL	11.3 (1.5)	13.2 (1.6)	< 0.001
serum phosphorus, mg/dL	4.9 (1.4)	3.3 (0.8)	< 0.001
intact PTH, Ln, mean (SD)	5.13 (0.91)	4.08 (0.76)	< 0.001
Echocardiography, mean (SD)			
duration after KT, days, median (range)	-6 (-1096 ? 0)	999 (403 ? 2822)	
LVIDs	31.7 (5.6)	28.9 (4.4)	< 0.001
LVIDd	49.7 (5.4)	46.3 (5.5)	< 0.001
EF, %	63.5 (6.5)	64.7 (4.5)	0.060
LV mass index	117.4 (37.1)	103.3 (59.3)	0.030
LA diameter	37.5 (6.6)	36.6 (5.9)	0.156
LA volume index	28.8 (11.6)	26.4 (8.6)	0.030
peak E	77.7 (23.1)	75.3 (21.5)	0.294
peak A	80.3 (25.2)	76.7 (25.4)	0.045
Deceleration time, mins	236.1 (50.2)	233.7 (47.2)	0.637
E/E`	11.2 (4.5)	10.1 (4.3)	0.009
E/A	1.10 (0.94)	1.05 (0.41)	0.514

Abbreviations: N, number; KT, kidney transplantation; SD, standard deviation; RRT, renal replacement therapy; HD, hemodialysis; PD, peritoneal dialysis; IL2RA, interleukin-2 receptor antagonist; ATG, anti-thymocyte globulin; HLA, human leukocyte antigen; DGF, delayed graft function; BPAR, biopsy-proven acute rejection;
* measured at the time of post-KT echocardiography
** paired t-test was use

Table 2. Unadjusted and adjusted comparisons of echocardiographic findings between pre- and post- kidney transplantation

	Unadjusted (95% CI)	P*	Adjusted (95% CI)**	P***
LVIDs	-2.83 (-3.85 to -1.81)	< 0.001	-2.61 (-3.63 to -1.59)	< 0.001
LVIDd	-3.47 (-4.46 to -2.48)	< 0.001	-3.30 (-4.29 to -2.31)	< 0.001
EF	1.20 (-0.05 to 2.45)	0.060	1.30 (-0.13 to 2.73)	0.075
LV mass index	-14.12 (-26.83 to -1.42)	0.030	-14.17 (-27.97 to -0.37)	0.044
LA diameter	-0.88 (-2.10 to 0.34)	0.156	-1.02 (-2.05 to 0.12)	0.054
LA volume index	-2.42 (-4.61 to -0.23)	0.030	-2.59 (-4.77 to -0.42)	0.020
peak E	-2.44 (-7.01 to 2.14)	0.294	-1.16 (-6.30 to 3.97)	0.654
peak A	-3.62 (-7.17 to -0.08)	0.045	-2.48 (-6.39 to 1.43)	0.212
Deceleration time	-2.42 (-12.55 to 7.72)	0.637	-4.77 (-15.57 to 6.04)	0.384
E/E`	-1.06 (-1.84 to -0.27)	0.009	-0.86 (-1.71 to -0.01)	0.048
E/A	-0.05 (-0.22 to 0.11)	0.514	-0.08 (-0.28 to 0.12)	0.446

*Paired t-test was used.
**Each outcome was adjusted for age at transplantation, sex, diabetes, transplant duration, change of body weight after transplantation, use of beta blocker, calcium channel blocker, angiotensin converting enzyme inhibitor or angiotensin receptor blocker and recent laboratory findings such as estimated glomerular filtration rate, hemoglobin, serum phosphorus and intact parathyroid hormone.
***Linear mixed-effect model with random intercept was used.

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The clinical implication of computed tomography in predicting severity of APN associated AKI

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Background: The aim of this study is to investigate the incidence and clinical characteristics of acute kidney injury (AKI) in patients with acute pyelonephritis (APN) and evaluate the efficacy of contrast-enhanced computed tomography (CECT). **Methods:** From May 2007 to December 2009, we included 541 patients with APN who underwent a CECT examination. We investigated the incidence and clinical characteristics of APN associated AKI using the RIFLE criteria. In addition, we divided these patients into four groups according to renal parenchymal involvement in CT (group 1; less than 25% involvement, group 2; 25% or greater involvement but less than 50% involvement, group 3; 50% or greater involvement but less than 75% involvement, group 4; greater than 75%), and compared their clinical characteristics, incidence of AKI. **Results:** The patients included 33 males and 508 females with a mean age of 55 years (range, 18 to 92). The incidence of AKI was 14.4%; of which, 8.0%, 5.4% and 1.0% were classified as Risk, Injury and Failure, respectively. When we compared clinical characteristics among groups, there were no differences except hospital stay. The patients in group 4 have longer hospital stay than other groups (grade 1; 9±5, grade 2; 9±4, grade 3; 9±4, grade 4; 10±5, $p=0.008$). There was no difference in baseline renal function (70±27 vs 76±27 vs 74±23 vs 74±23, $p=0.87$) and incidence of AKI among groups (G1: 9.4%, G2: 9.3%, G3: 7.2%, G4: 11.3%). **Conclusion:** The incidence of APN-associated AKI was 14.4%. Although CECT is useful to detect severe APN, it seems to be less helpful to predict the AKI in patients with APN. **Key words:** acute kidney injury, acute pyelonephritis, RIFLE