



Qualification of patients with reduced left ventricular ejection fraction for kidney transplant still remains controversial. It was noted that KT is associated with improvement of reduced LVEF and increases survival of patients with systolic heart failure.

## Effect of Left Ventricular Systolic Dysfunction on Renal Transplantation Outcomes: A Paired Kidney Analysis

Michał Gniewkiewicz, Marta Serwanska-Swietek, Michał Wszola, Piotr Domagała, Rafał Kieszek, Łukasz Górski, Karolina Bednarska, Monika Bieniasz, Agnieszka Jozwik, Edyta Karpeta, Andrzej Chmura, Artur Kwiatkowski

**Affiliation of all authors:** Department of General and Transplantation Surgery, Warsaw Medical University, Nowogrodzka 59th Street, 02-006 Warsaw, Poland

**Corresponding author:** Marta Serwanska-Swietek, Department of General and Transplantation Surgery, Warsaw Medical University, Nowogrodzka 59th Street, 02-006 Warsaw, Poland, Tel: +48225021113, Fax: +48225022155,

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### ABSTRACT

**Background:** Reduced left ventricular ejection fraction (LVEF) is thought to be a relative contraindication for kidney transplantation (KT). It is not clear how to manage congestive heart failure (CHF) due to left ventricular systolic dysfunction in patients with end-stage renal disease (ESRD). **Material and Methods:** A total of 21 kidney recipients transplanted between 2011 and 2013 who had LVEF <55% were analysed in this retrospective single-centre study. This group was compared with 21 patients with LVEF  $\geq$  55% who had received another kidney from the same deceased donor. The mean duration of follow-up was 32 $\pm$ 10 months. **Results:** Concerning post-transplant characteristics there were no significant differences between groups regarding rate of urinary tract infection after transplantation, level of serum creatinine at 12 months post KT, patient survival and subjective opinion of patient about their ability to physical effort at the end of follow up comparing to pre-transplant condition. In the group with reduced EF there were more incidences of delayed graft function (28.8% vs 14.3%,  $p=0.29$ ) and lower rate of graft survival (85.7% vs 100%,  $p=0.23$ ) but the differences did not reach statistical significance. **Conclusion:** Reduced EF should not exclude patients from consideration for KT, however greater caution is recommended.

## BACKGROUND

Cardiovascular disease is the major cause of mortality and morbidity in patients with end-stage renal disease (ESRD).[1] Prior studies indicate that cardiovascular mortality in dialysis patients is 10 to 20 times higher compared with the general population. [2] Congestive heart failure (CHF) is the most common cardiovascular risk factor for death in dialysis patient. [3] CHF was recorded to be present in 36% of dialysis patients. [4]

It is unclear how to manage CHF due to left ventricular systolic dysfunction in patients with ESRD. Reduced left ventricular ejection fraction is thought to be a relative contraindication for renal transplantation. However, some studies show that patients with reduced LVEF can benefit from kidney transplantation as it results in an increase in LVEF and improves functional status of CHF. [5-7] On the other hand, it has been reported that systolic dysfunction is connected with greater delayed graft function and worse graft survival.[8,9]

## MATERIALS AND METHODS

The aim of this study was to determine the impact of left ventricular systolic dysfunction that was defined as LVEF < 55% on echocardiography in kidney transplant recipients.

We retrospectively analysed all patients who underwent KT from deceased donors at the Department of General and Transplant Surgery, University Hospital of the Infant Jesus in Warsaw from 2011 to 2013 (n=345). 21 patients had reduced LVEF (6.1%). We compared this group with 21 patients with LVEF ≥ 55% who had received another kidney from the same deceased donor. Echocardiography examination was performed on each patient in the one year prior to the transplantation. The study protocol was reviewed and approved by the local institution review board. The mean duration of follow-up was 32±10 months. All patients received tacrolimus, mycophenolate mofetil and corticosteroids for maintenance immunosuppression. Demographics profile and comparison of cardiac risk factors between groups are given in Table 1. The following pre-transplant data were studied: age, gender, BMI, cold ischaemic time, comorbidities (hypertension, IHD), type and duration of dialysis, cause of renal disease, induction immunosuppression, history of prior transplants and cardiovascular events (MI, stroke or any type of revascularization).

Post-transplant characteristics are shown in Table 2. Collected data: incidences of delayed graft function (DGF) and urinary tract infection (UTI) after KT, serum creatinine at 12 months post transplantation, graft and patient survival, subjective patient's opinion about their ability to physical effort at the end of follow-up comparing to pre-transplant condition. The

following scale was used: 1-much worse, 2- a little worse, 3 - no different, 4- a little better, 5 - much better.

To compare groups we used chi-square tests or Fisher exact tests for categorical variables and 2-sample t-test for continuous variables.

## RESULTS

We compared the group of 21 patients (13 men, 8 women) who had LVEF <55% (mean EF was 46.1%±5.3%) with 21 patients (15 men, 6 women) with LVEF ≥55 (mean EF was 63.1%±4.6%, P<0.0001) who received contralateral kidney from the same deceased donor. Concerning pre-transplant characteristics there were no significant differences between groups regarding age, gender, BMI, cold ischaemic time, rate of hypertension, type and duration of dialysis, induction immunosuppression, history of prior transplants and primary cause of renal failure. However, patients with lower EF had higher rate of of ischaemic heart disease than those with normal EF (52.4% vs 14.3%, P=0.02). Also, group with reduced ejection fraction experienced a significant higher incidence of prior cardiovascular events (47.6%) than group with EF ≥55 (14.3%, P=0.04).

No statistical difference was observed in rate of urinary tract infection after transplantation, level of serum creatinine at 12 months post KT, patient survival and subjective opinion of patient about their ability to physical effort at the end of follow up.

In the group with reduced EF there were more incidences of delayed graft function(28.8% vs 14.3%, p=0.29)and lower rate of graft survival( 85.7% vs 100%, p=0.23) but the differences did not reach statistical significance.

## DISCUSSION

Qualification of patients with reduced left ventricular ejection fraction for kidney transplant still remains controversial.

Our study shows that group of patients with ejection fraction < 55% (simultaneously with higher rate of IHD and prior cardiovascular events) has similar outcome ( with-out statistical differences) as control group with normal EF. A paired kidney analysis was used to minimise the variability of donor. The findings are consistent with others studies. It was noted that KT is associated with improvement of reduced LVEF and increases survival of patients with systolic heart failure. [5, 10]

The major limitation of this research could be that it is retrospective and single-centre, whereas it ought to be performed as prospective study.

## CONCLUSION

It is reasonable to conclude that reduced ejection fraction should not exclude patients from kidney

transplant consideration, however greater caution is recommended.

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**TAB. 1. PATIENT CHARACTERISTICS BEFORE TRANSPLANTATION**

	EF <55% (n=21)	EF ≥ 55% (n=21)	P
Age at transplantation (y)	56.9 ± 10.2	51.5 ± 12.9	0.14 (NS)
Male gender (%)	61.9	71.4	0.74 (NS)
BMI (kg/m <sup>2</sup> )	26.1 ± 4.2	24.8 ± 4	0.32(NS)
Cold ischaemic time (h)	22.4 ± 7.4	23.8	0.75(NS)
Hypertension (%)	95.2	90.5	1(NS)
Ischaemic heart disease (%)	52.4	14.3	0.02
Type of dialysis			0.72(NS)
Hemodialysis (%)	71.4	81	
Peritoneal dialysis (%)	28.6	19	
Time on dialysis (months)	44 ± 36.2	26.9 ± 23.7	0.08(NS)
Induction immunosuppression (%)	90.5	76.2	0.25(NS)
Primary cause of renal failure			0.26(NS)
Glomerulonephritis (%)	38.1	38.1	
Polycystic kidney disease (%)	14.3	38.1	
Hypertensive nephropathy (%)	9.5	9.5	
Diabetic nephropathy (%)	9.5	0.0	
Other/unknown (%)	28.6	14.3	
Prior cardiovascular events (%)	47.6	14.3	0.04
Transplants > 1 (%)	9.5	9.5	1(NS)

**TAB. 2. POST-TRANSPLANT CHARACTERISTICS**

	EF < 55% (n=21)	EF ≥ 55% (n=21)	P
DGF (%)	28.6	14.3	0.29(NS)
UTI after KT	14.3	5.8	0.61(NS)
Serum creatinine at 12 months post KT (mg/dL)	1.3 ± 0.23	1.24 ± 0.3	0.35(NS)
Graft survival (%)	85.7	100	0.23(NS)
Patient survival (%)	95.2	100	1(NS)
Ability to physical effort at the end of follow-up comparing to pre-transplant condition.	3.75 ± 1	3.78 ± 0.81	0.93(NS)

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