



Acceptable graft volume and recipient physique ratio in kidney transplant



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Background

The compatibility between kidney graft size and recipient physique is a crucial factor in determining graft outcomes in kidney transplantation. However, donors and recipients with poorly matched physiques and ages are sometimes forced to undergo transplantation. This study examined the relationship between kidney volume and the physique of the recipient in living-donor kidney transplantation and considered the clinical course of recipients.

Material Methods

Between Jan. 2018 and Dec. 2022, 151 pairs of living-donor kidney transplants were performed.

13 cases who had irreversible damage to graft function within 1 year after transplants were excluded.

1 case: Acute myocardial infarction and died. **1** case: An unexplained primary nonfunction.

1 case: Hyperacute antibody-mediated rejection.

6 cases: Acute T-cell mediated rejection / Antibody mediated rejection

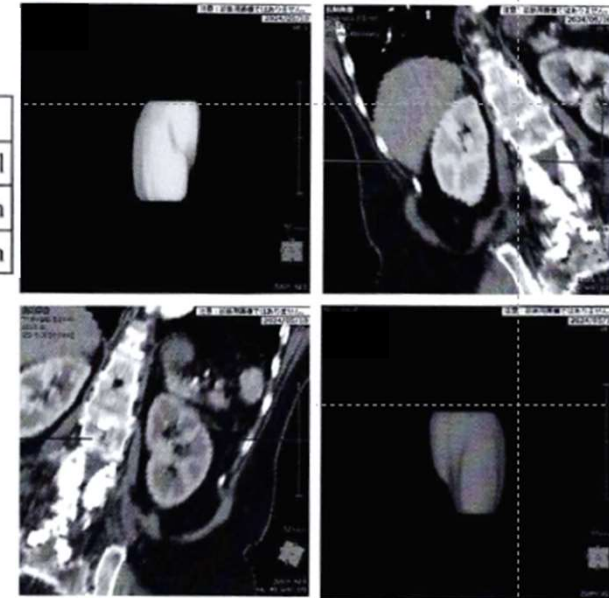
3 cases: BK virus infection. **1** case: Urinary tract infection.

138 patients were included in the study.

Material Methods

Donor kidney volume was calculated using SYNAPSE VINCENT from computed tomography (CT) scans.

Total	267.08 ml	
	RIGHT kidney	LEFT kidney
Volum	126.91 ml	140.17 ml
LD	100.94 mm	103.51 mm
SD	50.09 mm	48.86 mm



The ratio of transplant kidney volume as determined on CT (CTV; mL) to recipient body mass index (BMI) (CTV / BMI) was determined before transplantation, and patients were grouped into low (L group), medium (M group) and high groups (H group).

CTV (76.17mL ~ 209.59mL, (mean 127.40mL))

BMI (15.51 ~ 39.03, (mean 23.22))

L group; CTV / BMI < 4.8; n = 45

M group; CTV / BMI 4.8 to 6.0; n = 44

H group; CTV / BMI > 6.0; n = 49

Results

		L group CTV / BMI < 4.8; n = 45	M group; 4.8 to 6.0; n = 44	H group > 6.0; n = 49	
Recipient	Age	53.2 ± 11.5	49.7 ± 12.7	51.2 ± 12.6	0.406
	Male / Female (n)	37 / 8	31 / 13	24 / 25	<0.001
	Diabetic nephropathy (n)	10 / 45	13 / 44	5 / 49	0.110
	IgA nephropathy (n)	7 / 45	6 / 44	12 / 49	0.395
	Polycystic Kidney Disease (n)	7 / 45	6 / 44	11 / 49	0.750
	Duration of dialysis (year)	3.9 ± 18.1	3.8 ± 19.0	3.8 ± 7.5	1.000
Donor	Age	61.4 ± 14.7	59.8 ± 10.2	57.1 ± 12.9	0.062
	Male / Female (n)	7 / 38	10 / 34	31 / 18	<0.001
	PEKT (n)	18 / 45	21 / 44	18 / 49	0.478
	ABO incompatible KTx (n)	16 / 45	10 / 44	14 / 49	0.559
Recipient BMI at KTx	26.3 ± 4.1	23.2 ± 4.0	20.4 ± 2.9	<0.001	
Recipient BMI 1 year after KTx	25.7 ± 4.2	22.8 ± 3.8	20.5 ± 2.9	<0.001	
Graft volum (g)	155.0 ± 34.4	162.7 ± 53.2	195.3 ± 48.9	<0.001	
CT volumetry (mL)	107.8 ± 16.5	124.0 ± 18.8	148.4 ± 21.4	<0.001	
S-Cr 1 year after KTx (mg/dL)	1.48 ± 0.41	1.35 ± 0.32	1.09 ± 0.26	<0.001	
eGFR 1 year after KTx (mg/dL)	41.3 ± 10.7	44.7 ± 12.0	52.5 ± 13.3	0.001	

There were more female recipients and more male donors in the L group. The gender was significantly different in these groups.

Serum creatinine levels and eGFR 1 year after KTx were significantly lower in the L group.

TABLE 1. Comparison of baseline characteristics and kidney graft outcomes in these groups.



Results

	β	95.0% CI		P
eGFR at 12 months after KTx				
CTV / BMI	0.45	2.33	5.12	<0.001
Donor age	-0.27	-0.42	-0.13	<0.001
Donor gender (male)	-0.25	11.29	-2.29	0.003
Recipient age	-0.20	-0.36	-0.05	0.008
Serum creatinine level at 12 months after KTx				
CTV / Bw	-0.50	-0.39	-0.18	<0.001
Donor age	0.21	0.00	0.01	0.002
Recipient gender (male)	0.25	0.07	0.33	0.004
Donor gender (male)	0.22	0.04	0.30	0.011

CTV / BMI ratio, donor age, donor sex, and recipient age independently associated with eGFR 12 months after KTx by multi-variable linear regression analysis.

CTV / Rw ratio, donor age, recipient sex, and donor sex independently associated with serum creatinine level 12 months after KTx by multi-variable linear regression analysis.

TABLE 2. Multivariable linear regression analysis of predictors of eGFR at 12 months and S-Cr at 12 months



Results

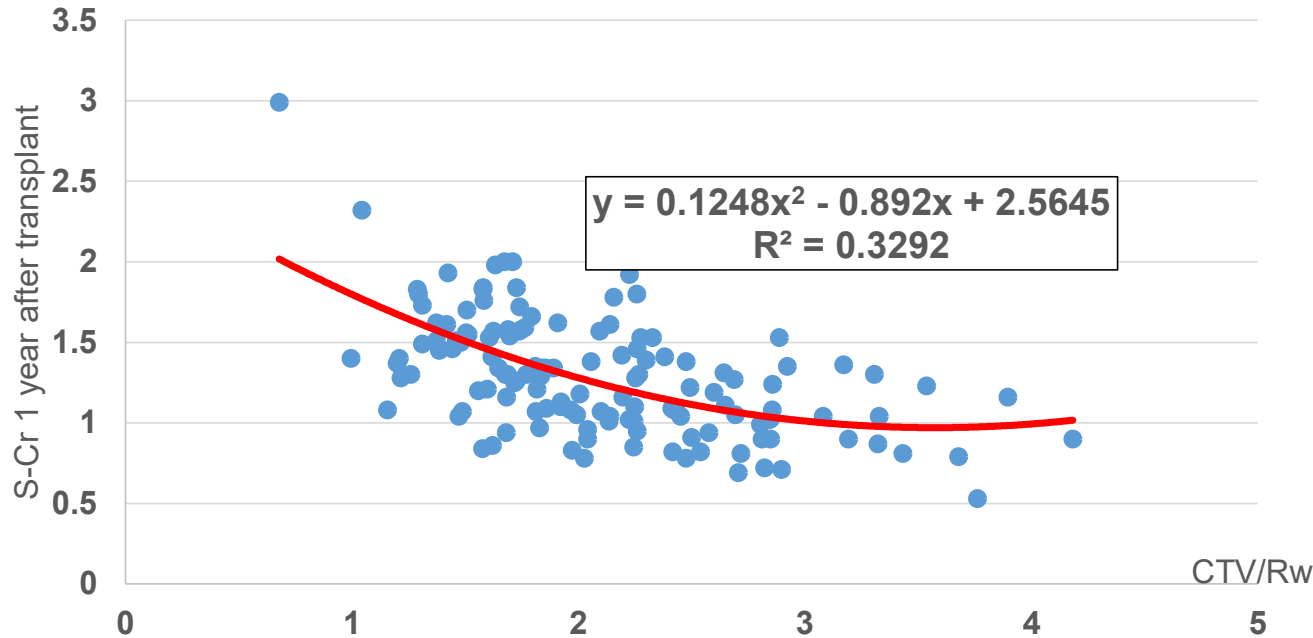


FIGURE 1. Serum creatinine level at 12 months after KTx correlated with the CTV / Rw ratio.

The CTV/Rw ratio at KTx significantly influences creatinine 12 months after KTx.

Conclusion

A CTV/BMI ratio less than 4.8 is associated with significantly lower graft function. Matching the physique of the recipient to that of the donor is important in determining the outcome of kidney transplantation.