LONGITUDINAL FOLLOW-UP ON CARDIOPULMONARY EXERCISE CAPACITY AND CARDIOVASCULAR HEALTH IN CHILDREN WITH RENAL TRANSPLANTS

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CHILDREN WITH KIDNEY TRANSPLANTS SHOWED DECREASED EXERCISE CAPACITY COMPARED WITH MATCHED HEALTHY CONTROLS, BUT MORPHOLOGICAL VASCULAR CHANGES WERE MINIMAL.
THERE WERE NO CHANGES IN EXERCISE CAPACITY OR VASCULAR MEASUREMENTS IN PATIENTS OVER TIME.

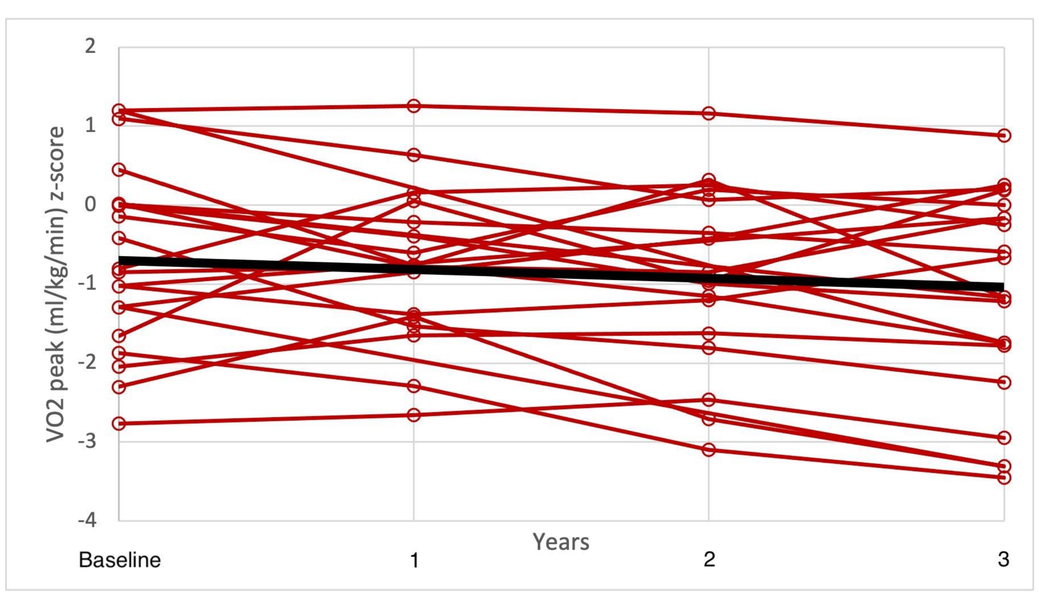
Background

Chronic kidney disease and kidney transplantation (KT) are associated with an increased risk of cardiovascular disease. The aim of this study was to examine the cardiovascular health after KT compared to matched healthy controls, to relate the results to physical activity, blood pressure (BP) and biochemical findings and to follow the cardiovascular health over time.

Method

Patients with KT (n=38), with a mean time from transplantation of 3.7 years (0.9-13.0) were examined at inclusion and annually for up to three years. Matched healthy controls (n=17) were examined once. All subjects underwent a cardiopulmonary exercise test, ultra-high frequency ultrasound (UHFUS) of the carotid artery, pulse wave velocity (PWV) assessment, resting blood pressure measurement, anthropometry and activity assessment. Patients also underwent 24-h ambulatory BP measurements annually.

Figure 1. Development of maximal oxygen consumption (VO_{2peak}/kg z-score) during the 3-year follow-up



Results

As compared to healthy controls, KT patients showed significantly decreased exercise capacity measured as VO_{2peak} also when comparing z-scores. The KT patients were shorter and had higher body mass index (BMI) z-score than controls, as well as increased resting systolic BP (SBP) and diastolic BP (DBP) z-scores.

There was a significant difference in activity score (1.7 vs 2.5), a tendency towards higher aortic PWV (5.8 vs 5.4 m/s) and increased carotid artery intima-media thickness measured by UHFUS, compared to matched healthy controls.

Within the KT group, low exercise capacity was associated with high fat mass index (FMI) and low activity score.

Table 1. Demographic and anthropometric data on kidney transplanted children and healthy controls

	TRANSPLANT RECIPIENTS N = 38	HEALTHY CONTROLS N= 17	P-VALUE
Age (years)	13.6 (7.7 – 18.0)	11.7 (7.3 – 8.6)	0.2754
Sex ratio female : male	18:20	7:10	0.67
Height, cm	152 (117 – 185)	159 (120 – 185)	<0.0001
z-score	-0.40 (-2.77 – 2.63)	1.17 (-0.33 – 2.01)	
Weight, kg	44 (20 – 75)	50 (21 – 65)	0.5120
z-score	0.08 (-2.56 – 1.99)	0.28 (-0.80 – 2.19)	
BMI, kg/m²	19.2 (14.6 – 30.3)	18.9 (13.1 – 21.1)	0.0444
z-score	0.38 (-2.04 – 2.39)	-0.57 (-2.37 – 1.98)	
SBP, mm Hg	114 (91 – 134)	103 (85 – 110)	<0.0001
z-score	0.64 (-1.35 – 2.91)	-0.86 (-1.69 – 0.45)	
DBP, mm Hg	70 (50 – 90)	60 (51 – 70)	<0.0001
z-score	0.63 (-1.01 – 2.54)	-0.27 (-1.23 – 0.68)	
Maximal heart rate, bpm	186 (151 – 206)	193 (179 – 208)	0.0107
Minute ventilation, L/min	59.5 (33 – 108)	76 (28 – 149)	0.0843
Respiratory exchange ratio	1.15 (1.00 – 1.38)	1.11 (0.93 – 1.34)	0.7855
Maximal load, Watt/kg	2.6 (1.6 – 3.8)	3.5 (2.2 – 4.4)	<0.0001
z-score	-1.4 (-3.7 – 1.4)	0.3 (-1.2 – 1.5)	
$VO_{2peak,}$ mL/kg/min	34.5 (18.0 – 53.0)	43.9 (37.0 – 50.5)	0.0003
z-score	-1.6 (-4.0- – .2)	0.1 (-0.8 – 0.5)	
Activity score	1 2 3	1 2 3	0.0003
n	19 12 7	0 8 9	

Conclusion

Patients with KT showed decreased exercise capacity and increased BP compared to matched healthy controls, but morphological vascular changes were minimal. Low exercise capacity was associated with low activity score and high FMI. There were no changes in exercise capacity or vascular measurements in patients over time.

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Department of Pediatrics

Ref: Longitudinal Follow-Up on Cardiopulmonary Exercise Capacity Related to Cardio-Metabolic Risk Factors in Children With Renal Transplants. Frontiers Sports Act. Living, 16 August 2021

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