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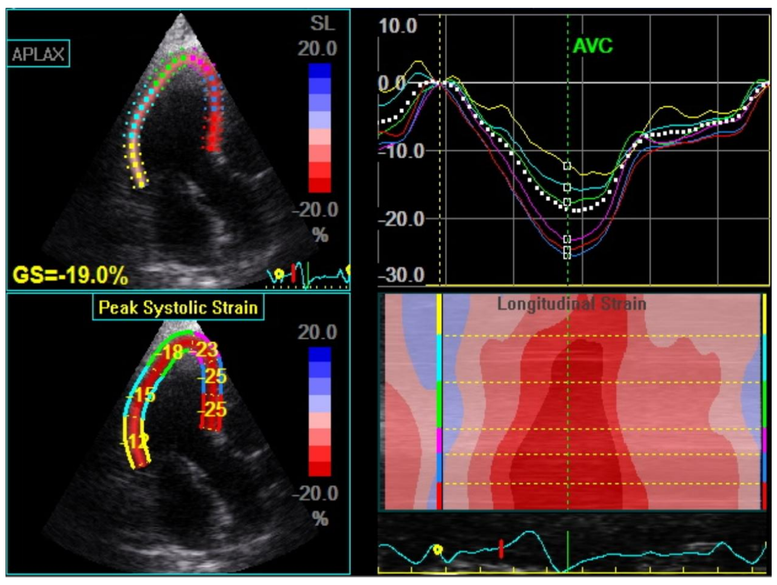

Left Ventricular Global Longitudinal Strain impairment is connected with the alteration of proximal to distal decrease of Renal Cortical Perfusion.

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Background:

Renal perfusion is a product of cardiac function and its decrease can lead to decline of renal function. However, venous congestion is a most common cause of cardio-renal syndrome. The aim of this study was to investigate cardiac parameters promoting decrease of renal perfusion in patients with hypertension and stable CKD without heart failure and clinical signs of congestion.

Methods:

54 patients (54 M; age 53.3 ±14.9) with stable CKD (Cys-Cre CKD-EPI 55.5 ±28.9 ml/min/1,73m^2) and a history of hypertension were enrolled in the study. Biochemical cardiac and renal data, echocardiography, ABPM, carotid IMT and Doppler renal cortical perfusion measurements (PixelFlux, Chameleon Software, Germany) were performed. The slope of renal arterial perfusion from proximal to distal (PDS) cortex, which expresses arterial rarefaction, was calculated for each patient.

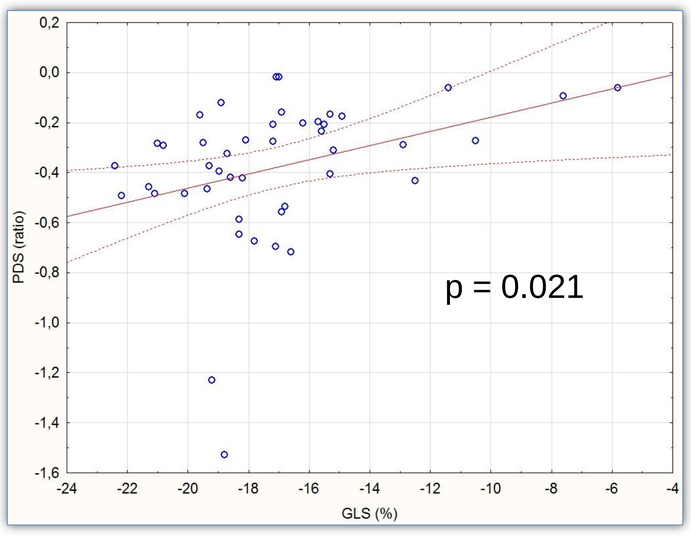
Results:

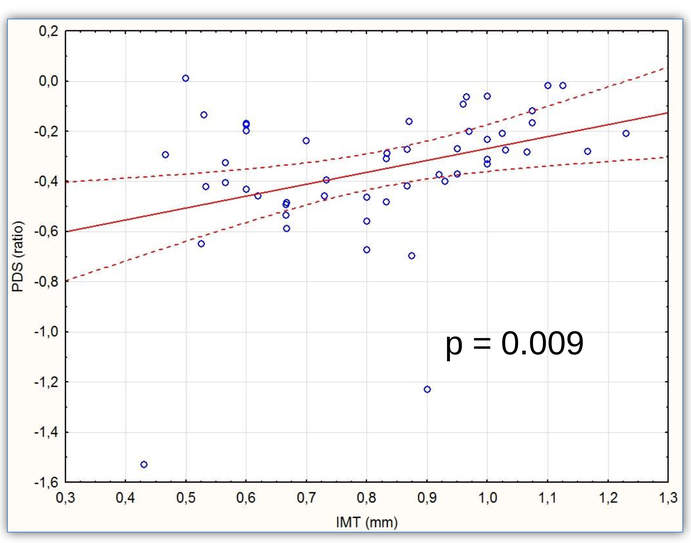
PDS significantly correlated with age, NT-proBNP, renal function (Cys-Cre CKD-EPI; E/E'), left ventricular global longitudinal strain (GLS), and IMT, whereas Troponin I and other left (ejection fraction (EF), cardiac output (CO)) and right (TAPSE - tricuspid annular plane systolic excursion) heart echocardiographic parameters were not significantly related to PDS (Table 1). Patients with lower PDS were younger, had better renal function, better renal cortex perfusion, and lower GLS. Although they have higher LVEF and CO, differences were not significant. In multiply stepwise regression analysis model including correlated significantly parameters, after adjusting to age, only IMT and GLS independently influenced proximal to distal slope of renal cortical perfusion (R^2=0.32, p <0.001).

Table 1. Results of investigated data

Parameter	All (n=54)	Correlation with PDS	low PDS* (n=27)	high PDS* (n=27)	Significance - p (low vs high PDS)
Age (years)	53.3 ±14.9	0.325	49.2 ±15.7	57.4 ±13.1	0.042
Cystatin C (mg/l)	1.53 ±0.75	0.507	1.21 ±0.60	1.86 ±0.74	<0.001
Creatinine (mg/dl)	1.83 ±0.79	0.443	1.55 ±0.73	2.11 ±0.76	0.002
CysCre-CKD-EPI (ml/min/1,73m^2)	55.5 ±28.9	-0.518	69.9 ±30.1	41.1 ±19.1	<0.001
Troponin I (ng/ml)	0.038 ±0.070	-	0.034 ±0.067	0.043 ±0.074	0.227
NT-proBNP (pg/ml)	763.1 ±3812.2	0.409	103.1 ±143.2	1423.0 ±5357.3	0.013
E/E' (ratio)	10.0 ±2.9	0.490	8.9 ±1.9	11.1 ±3.4	0.027
LVEF (%)	61.0 ±8.7	-	62.8 ±6.3	59.1 ±10.3	0.162
LVCO (l/min)	8.27 ±2.52	-	8.0 ±2.2	8.5 ±2.8	0.447
LVMI (g/m^2)	103.9 ±33.2	-	101.2 ±29.3	106.7 ±37.2	0.482
TAPSE (mm)	23.9 ±3.9	-	23.9 ±4.0	23.9 ±4.0	0.831
GLS (%)	- 17.06 ±3.46	0.405	-18.5 ±2.2	-15.6 ±3.9	0.005
IMT (mm)	0.82 ±0.21	0.420	0.75 ±0.16	0.89 ±0.22	0.006
SBP (mmHg)	127.4 ±15.1	-	127.5 ±13.3	127.4 ±17.0	0.873
DBP (mmHg)	77.7 ±11.0	-	78.8 ±9.2	76.5 ±12.6	0.194
PP (mmHg)	49.8 ±8.4	-	48.7 ±8.0	50.9 ±8.8	0.398
Proximal cortical perfusion (cm/s)	0.429 ±0.306	-0.976	0.634 ±0.302	0.223 ±0.109	<0.001
Distal cortical perfusion (cm/s)	0.067 ±0.063	-0.482	0.089 ±0.068	0.046 ±0.051	0.002
PDS (ratio)	- 0.361 ±0.259	-	-0.545 ±0.268	-0.177 ±0.096	<0.001

* - divided in relation to the median PDS





Conclusions:

Altered global longitudinal strain expressing left ventricular systolic function impairment is connected with the decrease and regional disturbance of renal cortical perfusion and could be an early marker of cardio-renal syndrome development.

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