

Patients after Arterial Switch Operation Have Impaired Global and Regional Systolic Right Ventricular Function: A Speckle Tracking Echocardiography Study

R. Marinov, Kr. Hristova, S. Georgiev, Iv. Velkovski, A. Kaneva, M.Pavlova, P. Mitev, S. Lazarov, M. Tzonsarova, Tzv. Katova, V. Pilosoff



National Heart Hospital – Sofia, Bulgaria

1.Introduction. Current treatment of D-Transposition of the great arteries is the neonatal arterial switch operation (ASO) with coronary artery transfer. Late coronary microcirculatory disturbances usually undetected by the standard methods, may result in global and regional dysfunction of both ventricles. Myocardial deformation imaging by 2D strain echocardiography – Speckle tracking echocardiography (STE) is a novel method representing a diagnostic possibility for assessing the RV systolic function. This study aims to investigate the global and regional systolic function of the RV with standard and speckle tracking echocardiography.

2. Methods.

➤ Patients:

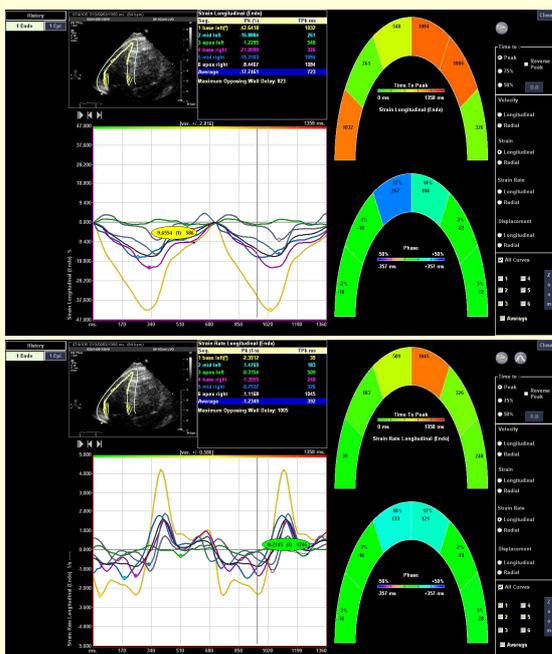
- 58 patients after arterial switch operation for isolated TGA, mean age 5.7±4 years
- 13 healthy volunteers, mean age 7.6±4 years

➤ Echocardiography:

- Philips ie33
- Standard and Tissue Doppler imaging (TDI) measurements of the RV free wall thickness, RV diastolic diameter, peak systolic velocity of the anterior RV wall by TDI, tricuspid annulus plane systolic excursion (TAPSE).

- STE - 4 chamber view images were acquired (frame rate 74±6 frames/s) for off-line analysis, in order to extract strain (rate) curves, using vector velocity imaging (VVI) software (Syngo-Siemens Soft, 2007) (fig 1.)

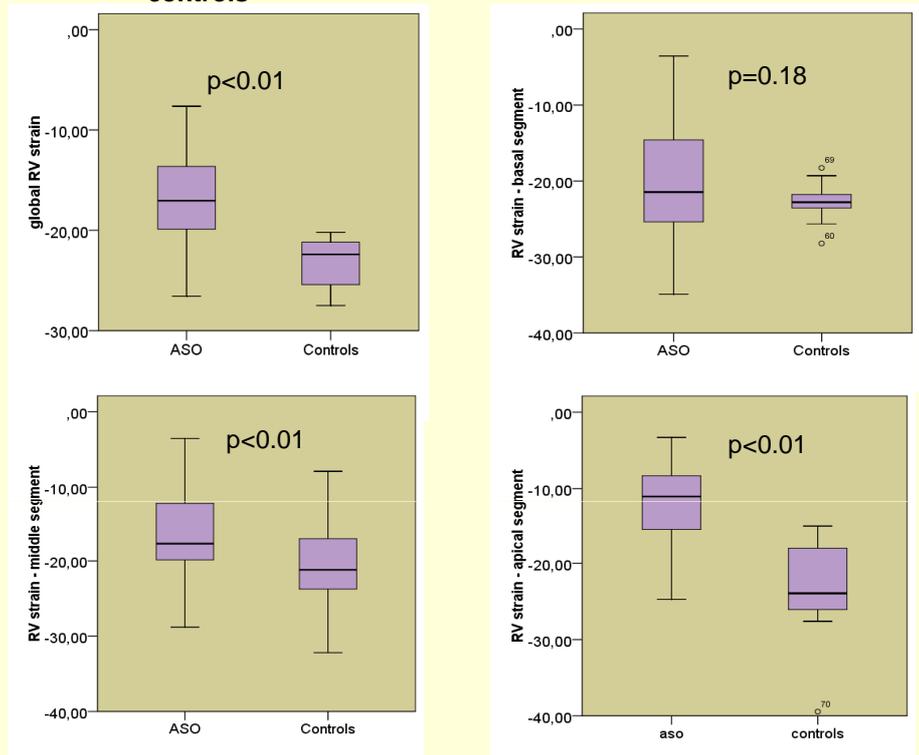
Fig. 1. RV strain and strain rate, determined by speckle tracking echocardiography



- Standard, TDI and Speckle tracking echocardiography measurements were compared between groups with the Student's T-test
- Data presentation: mean±standard deviation. A value of $p \leq 0.05$ was considered significant.

✉ marinov_ra@abv.bg

3.Results: Figure 2. Global peak longitudinal strain and regional peak longitudinal strain of the RV in patients after ASO and in controls



Conclusions:

- Patients after ASO have **diminished global systolic RV function**, revealed by standard, TDI and speckle tracking echocardiography.
- Speckle tracking echocardiography demonstrates **regional systolic dysfunction** in the middle and apical segments of the RV in patients after ASO. This might reflect regional microcirculatory disturbances.

Table 1. Comparison of echocardiography measurements of the RV between patients after ASO and healthy controls

Echocardiography measurements	Patients groups		p
	ASO N = 58	Controls N = 13	
Standard and TDI echocardiography			
RV anterior wall thickness (mm)	3.67±0.67	2.9±0.29	0.00
RV diastolic diameter (mm)	15.1±4.3	12.9±2.17	0.01
Systolic velocity of anterior RV wall from TDI (m/s)	7.0±1.1	11.54±1.4	0.00
TAPSE (mm)	13.7±2.5	20.5±4.5	0.00
Speckle Tracking echocardiography			
RV peak longitudinal strain (%)	-10.03±4.5	-15.5±2.3	0.00
RV peak longitudinal strain rate (1/s)	-1.93±0.85	-2.37±0.28	0.04
RV peak longitudinal strain – basal segment (%)	-20.14±7.36	-22.67±2.38	0.18
RV peak longitudinal strain – middle segment (%)	-16.38±5.47	22.07±5.22	0.00
RV peak longitudinal strain – apical segment (%)	-11.83±5.31	-24.24±6.15	0.00