

New Pediatric Reference Values for myocardial strain and strain rate using 2D speckle Tracking Echocardiography

Koopman L.P., Gnanam D., Rebel B., Helbing W.A.
 Pediatric Cardiology, Erasmus Medical Center Rotterdam, The Netherlands

Background: strain (ϵ) and strain rate (SR) measurements using speckle tracking echocardiography (STE) have been related to long-term outcome in congenital heart disease, but depend on the ultrasound system (US) and analysis software that is used. No normative data exists for the US iE 33 and QLAB software (Philips). **Study aim:** to provide pediatric normal data for STE-derived ϵ and SR for an US that is widely used in pediatric and adult cardiology. **Methods:** 72 healthy volunteers aged 4-18 years were studied with an iE33 US. Off-line analysis was performed using QLAB version 9.0. Circumferential ϵ (CS) of the left ventricle (LV) was measured from parasternal short axis views at the basal (6 segments), mid (6 segments) and apical (4 segments) levels. Longitudinal systolic ϵ (LS) of the LV (6 segments) and right ventricle (RV, 3 segments) and LV longitudinal systolic SR (LSSR) and early diastolic SR (LEDSR) were measured from the apical 4-chamber view. Global ϵ values were calculated from the average of the segmental values. Differences between age groups were tested using Anova. **Results:** the measurement of ϵ and SR was highly feasible in this population (lowest for RV-LS; 94% and highest for LV-LS and LSSR; 100%).

	4-9 years (n = 24) mean (SD)	10-13 years (n = 28) mean (SD)	14-18 years (n = 20) mean (SD)	Total (n = 72) mean (SD)	p- value
Global CS basal (%)	-23.9 (3.4)	-24.9 (4.0)	-24.1 (3.8)	-24.3 (3.8)	0.61
Global CS mid (%)	-26.0 (3.1)	-26.8 (4.1)	-24.9 (3.2)	-26.0 (3.6)	0.18
Global CS apical (%)	-30.7 (4.1)	-31.7 (6.5)	-31.3 (8.7)	-31.2 (6.4)	0.87
Global LV-LS (%)	-21.3 (3.1)	-19.9 (2.5%)	-19.7 (2.0)	-20.3 (2.7)	0.09
Global RV-LS (%)	-31.1 (4.1)	-28.3 (6.5)	-27.6 (3.6)	-29.0 (5.2)	0.07
Global LV-SSR (1/s)	-1.53 (0.35)	-1.31 (0.17)	-1.22 (0.16)	-1.36 (0.27)	< 0.01
Global LV-EDSR (1/s)	2.29 (0.33)	1.92 (0.32)	1.89 (0.19)	2.04 (0.34)	< 0.01

Conclusions: normal values for the pediatric population are presented for STE using the Philips platform. Higher SR values were found in young children versus older children, while myocardial ϵ values were not related to age.