Speckle Tracking echocardiography in routine examination of patients after myocardial infarction

E. Kinova, N. Zlatareva, A. Goudev
Cardiology Department, UMHAT “Tsaritsa Yoanna – ISUL”
Sofia, Bulgaria

Background

Recently, speckle tracking echocardiography (STE) has been validated for assessment of left ventricular (LV) deformation and torsion (1). The power of speckle analysis is the ability to examine several planes in a single data set. However, these measurements have been performed using off-line systems (2) and after patient’s examination. STE is not used routinely in clinical practice yet.

Aim

To evaluate LV global peak systolic strain and twist in post-myocardial infarction patients in echocardiographic examination with in-processing 2D-speckle tracking analysis.

Methods

Echocardiographic acoustic window was adequate for analysis in 53 from 61 patients (87%). Twenty one patients with previous myocardial infarction (MI) (62 ± 11 years, 16 males) were evaluated and compared to 13 healthy individuals (50 ± 9 years, 7 males) and 16 hypertensive patients (63 ±13 years, 5 males). Conventional, PW-Tissue Doppler and 2D-speckle tracking echocardiography with Phillips iE33 ultrasound system was performed. The quantitative analyses of echocardiographic data were done immediately after image acquisition on the echocardiographic machine. Tracking was initiated by automatic tracing the myocardium in 6 segmental model in short axis views. Global peak systolic circumferential strain (CSs, Fig. 1) and radial strain (RSs, Fig. 2) were measured using the curve of global strain at basal and mid level. Rotation was measured at basal and apical planes (Fig. 3,4) and LV torsion as the net difference between rotation angles at apex and base was calculated.

Methods

Fig. 1. Circumferential strain at mid level In patient with MI

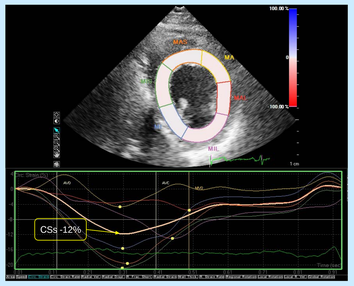


Fig. 2. Radial strain at mid level In patient with MI

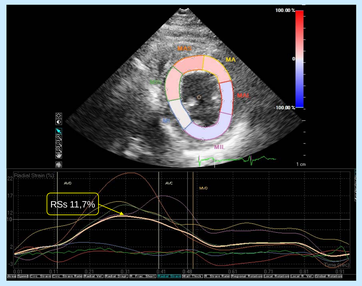


Fig. 3. Basal rotation in patient with MI

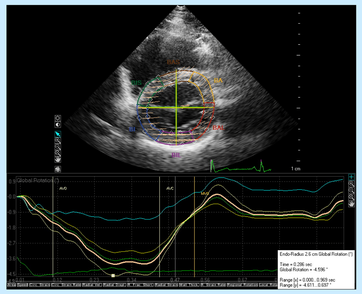
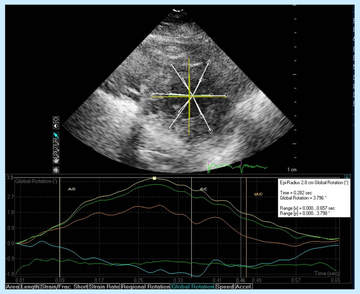


Fig. 4. Apical rotation in patient with MI



Results

The mean time for STE-measurements was 15.8 ± 3.6 min. Evaluated echocardiographic parameters were shown on the Table. No statistically significant differences between groups in rotation and radial strain at basal level were registered. In MI patients global CSs at basal and mid level (Fig. 5), global mid RSs (Fig. 6) and global apical rotation (Fig. 7) and torsion, were significantly reduced, compared to healthy individuals and hypertensive patients.

Results

	Healthy subjects n=13	Hypertensive patients n=19	MI patients n=21	P
EF (%)	63.8 ± 4.7	59.7 ± 7.8	47.9 ± 14.4	**0.001**
E/E’ ratio	8.85 ± 4.04	10.30 ± 2.97	12.30 ± 5.35	**0.05**
CSs basal (%)	-16.99 ± 2.75	-15.26 ± 4.00	-11.78 ± 3.32	**0.001**
RSs basal (%)	21.22 ± 6.66	14.86 ± 9.01	16.47 ± 5.97	NS
Global basal rotation (º)	-2.80 ± 1.73	-2.80 ± 1.32	-2.05 ± 1.52	NS
Endocardial apical rotation (º)	5.69 ± 3.23	7.36 ± 3.15	3.92 ± 3.40	**0.008**
Midwall apical rotation (º)	4.27 ± 2.13	4.86 ± 2.02	2.84 ± 1.70	**0.014**
Epicardial apical rotation (º)	4.00 ± 1.87	4.66 ± 2.14	2.80 ± 1.50	**0.016**
Global torsion (º)	7.88 ± 1.67	8.85 ± 3.02	5.47 ± 2.56	**0.005**

EF – ejection fraction; E/E’m – ratio of early mitral filling E velocity to early diastolic E’m velocity of medial mitral annulus; CSs – circumferential peak systolic strain; RSs – radial peak systolic strain.

Fig. 5. Circumferential strain

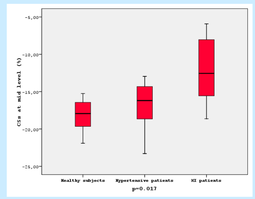


Fig. 6. Radial strain

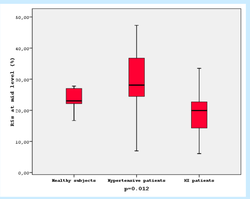
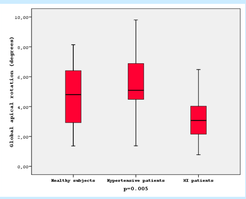


Fig. 7. Apical rotation



Conclusions

STE has a potential to quantify LV in MI patients. Circumferential and radial strain and apical rotation may add useful information to conventional echocardiography and are applicable in routine clinical practice with in-processing analysis.

References
1. Amundsen B et al. Noninvasive myocardial strain measurement by speckle tracking echocardiography. Validation againet sonomicrometry and tagged magnetic resonance imaging. J Am Coll Cardiol 2006;47:789-93.
2. Marwick T et al. Myocardial strain measurement with 2-dimensional speckle-tracking echocardiography. Definition of normal range. J Am Coll Cardiol Img 2009;2:80-84.