Comparison of regional 2D strain analysis to visual wall motion abnormality assessment in patients with non-ST elevation acute coronary syndrome

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KEYWORDS: regional wall motion assessment, acute coronary syndrome, coronary stenosis localization, regional 2D strain.

CITATION: *Cardiol Croat.* 2017;12(4):119-120. | <https://doi.org/10.15836/ccar2017.119>

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Background: Visual assessment of regional wall motion abnormalities (RWMA) on echocardiography represents the current standard in assessing the impact of coronary artery disease (CAD) induced changes in myocardial contractility. Although it has been proven to predict long-term outcomes it has been hard to rely on in acute situations due to the patient dependent variance in image acquisition quality and interoperator variability.¹⁻⁴ We hypothesized that regional 2DS assessment due to the evaluation of longitudinal shortening that is barely visible to the naked eye could potentially be more sensitive than visual RWMA assessment in detecting ischemia induced loss of contractility in non-ST elevation acute coronary syndrome (NSTEMI-ACS).

Methods: We performed a retrospective analysis of patients admitted through our Emergency Room to the Cardiology Department from January 2013 till December 2015 with the diagnosis of NSTEMI-ACS. Patients who did not undergo coronary angiography, patients with known prior coronary artery disease and patients who did not receive an echo in the 24 hours prior to angiography were excluded, as were the patients with images not adequate for 2D strain analysis. A total of 123 patients fulfilled the criteria and were included in the analysis and 4 different clinicians blinded to laboratory and ECG results performed 2DS analysis of global and regional 2D longitudinal peak systolic strain (LPSS) according to the 18-segment model prior to coronary angiography. Regional wall motion abnormalities (RWMA) as interpreted by the clinician performing the original echo exam were categorized according to the wall motion score guidelines.

Results: RWMA assessment shows good predictive power of coronary artery stenosis location in

TABLE 1. Regional visual wall motion assessment 2D longitudinal peak systolic strain values according to segments and location of coronary stenosis.

Segment	Lesion location	P
APLAX Basal anteroseptum	LAD	0.098
APLAX Mid anteroseptum	LAD	<0.0001
APLAX Apical anteroseptum	LAD	<0.0001
APLAX Apical inferolateral	LCx	<0.0001
APLAX Mid inferolateral	LCx	0.04
APLAX Basal inferolateral	LCx	0.01
A4C Basal inferoseptal	RCA	0.087
A4C Mid inferoseptal	LAD	0.1
A4C Apical inferoseptal	LAD	<0.0001
A4C Apical anterolateral	LAD	0.003
A4C Mid anterolateral	LCx	0.366
A4C Basal anterolateral	LCx	0.015
A2C Basal inferior	RCA	0.133
A2C Mid inferior	RCA	0.722
A2C Apical inferior	LAD	0.15
A2C Apical anterior	LAD	<0.0001
A2C Mid anterior	LAD	0.027
A2C Basal anterior	LAD	0.032

LAD = left anterior descending coronary artery; LCx = left circumflex coronary artery; RCA = right coronary artery; APLAX = Apical long axis view; A4C = Apical four chamber view; A2C = Apical two chamber view.

RECEIVED:
 March 11, 2017

ACCEPTED:
 April 6, 2017

LAD and LCx, but not in RCA (**Table 1**). However, LPSS was significantly more precise overall (mean sensitivity 75.6% vs 39.5%, $P<0.001$). Statistically significant difference was present even after accounting for potentially confounding factors like arterial hypertension, smoking, alcohol, atrial fibrillation, valvular disease, age or prior medical therapy.

Conclusion: We have shown that a decrease in LPSS is significantly more accurate in detecting ischemia-induced loss of myocardial contractility than the visual assessment of RWMA in patients with NSTEMI-ACS. Our findings imply that 2DS should be employed as a supplementary tool during the echo assessment of patients with NSTEMI-ACS.

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