Abstract 82280

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Title: The diagnostic value of triple imaging stress echocardiography with regional wall motion, coronary flow velocity reserve and left ventricular contractile reserve.

Topic: 3.1.10 - Stress Echocardiography

Category: Bedside

Option: Young Investigator Award (YIA) Basic Science

On Behalf: Stress Echo 2020


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Background: Regional wall motion abnormalities (RWMA), left anterior descending artery coronary flow velocity reserve (CFVR) and left ventricular contractile reserve (LVCR) can be combined in a single stress echocardiography (SE) test.

Purpose: To investigate the feasibility and diagnostic value of combined triple evaluation of RWMA, CFVR and LVCR in patients with known or suspected coronary artery disease (CAD).

Methods: In a prospective multicenter effectiveness study networking 18 quality-controlled centers from 6 countries, we recruited 1708 patients (age 63±11 years; 502 with previous myocardial infarction and 678 with previous coronary revascularization) who underwent exercise (n=710), vasodilator (n=921; dipyridamole, n= 914 or adenosine, n=7) or dobutamine (n=77) SE with triple assessment of: 1- RWMA (17-segment model); 2- CFVR of left anterior descending artery (abnormal value <2.0); 3- LVCR (calculated as stress/rest ratio of LV force: systolic blood pressure/ end-systolic volume, with biplane modified or apical single plane or linear Teichholz for end-systolic volume calculation; abnormal value <1.1 for dipyridamole and adenosine, <2.0 for dobutamine and exercise). Eighty-four patients underwent coronary angiography within 6 months of testing (significant CAD: visually assessed stenosis ≥ 50% in at least one major coronary vessel).

Results: SE was positive for RWMA in 355 patients (21%), CFVR in 484 (28%), LVCR in 643 (38%). Triple negativity was found in 892 (52%), triple positivity in 222 (13%) patients. Of the 84 patients with coronary angiography and on anti-ischemic therapy at the time of SE, 29 patients had 1-, 20 had 2-, and 17 had 3-vessel CAD, whereas, 18 patients showed no CAD. Sensitivity was 58% for RWMA, 54% for CFVR (63% if only left anterior descending artery disease was considered) and 77% for LVCR. Specificity was 85 % for RWMA, 77% for CFVR and 39% for LVCR (see figure). The positive predictive value (true positives/true positives+false positives) was 95% for RWMA alone, 93% for CFVR, 86% for LVCR and 93% in patients with triple positivity (RWMA+CFVR+LVCR). The negative predictive value (true negatives/true negatives+false negatives) was 27% for RWMA and 24% for CFVR, 20 % for LVCR and rose to 39% in patients with triple negativity. Diagnostic accuracy was 62% with RWMA, 60% with dual (RWMA and/or CFVR), 79% with triple (RWMA and/or CFVR and/or LVCR) assessment.

Conclusions: Triple assessment of RWMA, CFVR and LVCR is feasible during exercise and pharmacological SE. The positivity rate progressively increases from single to dual and triple imaging. For noninvasive detection of CAD, RWMA show the highest specificity and LVCR the highest sensitivity, with CFVR showing intermediate values.

Diagnostic accuracy of Triple Imaging for CAD

![Graph showing diagnostic accuracy of Triple Imaging for CAD]

- Sensitivity
- Specificity

0 10 20 30 40 50 60 70 80 90

%