Abstract: 41

The relative prognostic value of different indices of global left ventricular function during stress echocardiography: the bright side of the force

Authors:
T Bombardini¹, D Morrone², A Huqi³, Q Ciampi⁴, MF Costantino⁵, E Picano¹, ¹Institute of Clinical Physiology, CNR - Pisa - Italy, ²University of Pisa, Department of Surgical, Medical and Molecular Pathology and Critic Area - Pisa - Italy, ³Ospedale Versilia - Viareggio - Italy, ⁴Fatebenefratelli Hospital of Benevento - Benevento - Italy, ⁵San Carlo Hospital, Heart and Great Vessels Department - Potenza - Italy,

On behalf: Stress Echo 2020 study group

Topic(s):
Stress Echocardiography

Citation:
European Heart Journal - Cardiovascular Imaging (2019) 20 (Supplement 1), i4

Background: Global left ventricular (LV) function is a major prognostic determinant during stress echocardiography (SE), and several indices of increasing complexity have been proposed: ejection fraction (EF), wall motion score Index (WMSI), LV Force and LV contractile reserve (LVCR).

Aim: To assess the relative prognostic value of different indices of LV function in predicting prognosis during exercise or dobutamine SE

Methods: We enrolled 467 patients (354 male; mean age 63±12 years) evaluated in 5 accredited laboratories with exercise (n=184) or dobutamine (n=283) SE for known or suspected coronary artery disease (n= 261) or heart failure (n=206). In addition to regional wall motion abnormalities (RWMA), global LV function was assessed with 4 different indices at rest and peak stress: 1- EF (with Simpson's method to calculate end-diastolic volume, EDV, and end-systolic volume, ESV); 2- Wall Motion Score Index (WMSI, 17-segment model, each segment from 1= normal to 4, dyskinetic); 3- LV Force, calculated as the ratio between Systolic Blood Pressure (SBP) by cuff sphygmomanometer and ESV; 4- LVCR (Force stress/ rest). All patients were followed-up for a median of 12 (Interquartile Range 6-27) months.

Results: During follow-up, 115 patients experienced events: 21 all-cause deaths and 94 adverse events (including 51 new hospital admissions, 43 revascularizations, 28 PCI, 15 CABG). A positive SE for RWMA was observed in 58 patients (11%). ROC analysis identified cut-off values for (stress-rest variation) ?EF (5%), ?WMSI (0.06), peak Force (2.2 mmHg/ml) and LVCR (<1.6). The best separation for event-free survival was achieved with peak Force (245/270, 91% vs 107/197, 54%, p=.001), the worse with ?EF (244/301, 81% vs 108/166, 65%, p =.004): see figure. At multivariate analysis resting EF (HR, 0.971; 95% CI, 0.948-0.995, p =.017), ?WMSI (HR, 1.781; 95% CI, 1.008–3.147; p =.047), LVCR (HR, 0.577; 95% CI, 0.344–0.966; p =.036), and peak Force (HR, 0.770; 95% CI, 0.627–0.944; p = .012), were independent predictors of events.

Conclusion. The assessment of global LV function during exercise or dobutamine SE adds prognostic value to resting EF and RWMA. Among different stress indices, Force and LVCR outperform EF and WMSI. The strong conceptual foundation of Force, less dependent than EF from load and heart rate changes, translates into better prognostic yield, unraveling the bright prognostic side of the Force
Abstract:
The relative prognostic value of different indices of global left ventricular function during stress echocardiography: the bright side of the force

Authors:
T Bombardini, D Morrone, A Huqi, Q Ciampi, MF Costantino, E Picano

Institute of Clinical Physiology, CNR – Pisa – Italy,
University of Pisa, Department of Surgical, Medical and Molecular Pathology and Critic Area – Pisa – Italy,
Ospedale Versilia – Viareggio – Italy,
Fatebenefratelli Hospital of Benevento – Benevento – Italy,
San Carlo Hospital, Heart and Great Vessels Department – Potenza – Italy,

On behalf:
Stress Echo 2020 study group

Topic(s):
Stress Echocardiography

Citation:
European Heart Journal – Cardiovascular Imaging (2019) 20 (Supplement 1), i4

Background: Global left ventricular (LV) function is a major prognostic determinant during stress echocardiography (SE), and several indices of increasing complexity have been proposed: ejection fraction (EF), wall motion score Index (WMSI), LV Force and LV contractile reserve (LVCR).

Aim: To assess the relative prognostic value of different indices of LV function in predicting prognosis during exercise or dobutamine SE

Methods: We enrolled 467 patients (354 male; mean age 63±12 years) evaluated in 5 accredited laboratories with exercise (n=184) or dobutamine (n=283) SE for known or suspected coronary artery disease (n= 261) or heart failure (n=206). In addition to regional wall motion abnormalities (RWMA), global LV function was assessed with 4 different indices at rest and peak stress: 1­ EF (with Simpson’s method to calculate end­diastolic volume, EDV, and end­systolic volume, ESV); 2­ Wall Motion Score Index (WMSI, 17­segment model, each segment from 1= normal to 4, dyskinetic); 3­ LV Force, calculated as the ratio between Systolic Blood Pressure (SBP) by cuff sphygmomanometer and ESV; 4­ LVCR (Force stress/rest). All patients were followed­up for a median of 12 (Interquartile Range 6­27) months.

Results: During follow­up, 115 patients experienced events: 21 all­cause deaths and 94 adverse events (including 51 new hospital admissions, 43 revascularizations, 28 PCI, 15 CABG). A positive SE for RWMA was observed in 58 patients (11%). ROC analysis identified cut­off values for (stress­rest variation) ?EF (5%), ?WMSI (0.06), peak Force (2.2 mmHg/ml) and LVCR (<1.6). The best separation for event­free survival was achieved with peak Force (245/270, 91% vs 107/197, 54%, p<.001), the worse with ?EF (244/301, 81% vs 108/166, 65%, p = .004): see figure. At multivariate analysis resting EF (HR, 0.971; 95% CI, 0.948–0.995, p = .017), ?WMSI (HR, 1.781; 95% CI, 1.008–3.147; p = .047), LVCR (HR, 0.577; 95% CI, 0.344–0.966; p = .036), and peak Force (HR, 0.770; 95% CI, 0.627–0.944; p = .012), were independent predictors of events.

Conclusion. The assessment of global LV function during exercise or dobutamine SE adds prognostic value to resting EF and RWMA. Among different stress indices, Force and LVCR outperform EF and WMSI. The strong conceptual foundation of Force, less dependent than EF from load and heart rate changes, translates into better prognostic yield, unraveling the bright prognostic side of the Force.