Prediction of Left Ventricular Ejection Fraction Using Wall Motion Score Index: Validation in a Large Patient Population in Clinical Practice

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Background and Objective:

Wall motion score index (WMSI), a quantitative measure of left ventricular (LV) segmental dysfunction, is inversely related to LV ejection fraction (LVEF). The objective of our study was to determine whether WMSI can be used to predict LVEF in clinical practice.

Methods:

Using the echocardiographic laboratory database, 2000 consecutive transthoracic echocardiographic examinations with a diagnosis of segmental LV dysfunction were selected (age: 67±13 yrs; 74% male; LVEF: 45.9±13.4; WMSI: 1.70±0.43). A multivariate regression equation relating WMSI and other parameters with visually-estimated LVEF was developed in an initial group of 1000 patients (test group). Subsequently, this equation was used to predict LVEF in a second group of 1000 patients (validation group). The difference between the predicted LVEF and LVEF was determined.

Results:

Univariately (test group):

1) WMSI*, LV size* (LV end-diastolic diameter and qualitative "eyeball" assessment of LV size), and WMA territory (left anterior descending artery [LAD], non-LAD, or multi-vessel distribution) were strongly associated with LVEF ($R^2>0.25$, $P<0.001$ for all) (* = negative association);

2) Male gender*, heart rate*, and severe mitral regurgitation were weakly associated with LVEF ($R^2<0.05$, $P<0.05$);

3) Age and LV wall thickness were not associated with LVEF. By multivariate linear regression analysis, WMSI and qualitative LV size were independently negatively associated with LVEF (P values <0.001). Using the regression equation derived from the test group: LVEF = 94.9 – (26.9*WMSI) – (2.0*LV size) (1=normal, 2=mild, 3=moderate-severe LV enlargement), LVEF was predicted in the validation group. Predicted LVEF showed an excellent correlation with LVEF ($R^2= 0.85$; $P<0.001$). The median difference between predicted LVEF and LVEF was 0.3% (interquartile range: -2.7, 3.9%); in 95.1% of subjects the absolute difference was <10%.

Conclusions:

Based on clinical experience in a large patient population, WMSI can be used to predict LVEF with good accuracy.