Functional Correlates and Prognostic Value of Coronary Flow Velocity Reserve by Vasodilator Stress Echocardiography in Hypertrophic Cardiomyopathy

Quirino Ciampi1,2, Lauro Cortigiani3, Milorad Tšic4, Branko Beleslin4, Fausto Rigo5, Ana Djorjievic-Dikic4, Rosa Sicari2, Eugenio Picano5
On behalf of Stress-echo 2020 study group
1 Fatebenefratelli Hospital, Benevento, Italy 2 Institute of Clinical Physiology, CNR, Pisa Italy 3 Civil Hospital, Lucca, 4 Clinical Center of Serbia, Belgrade, Serbia, 5 Dell’Angelo Hospital, Mestre-Venice, Italy.

Background: A reduction in coronary flow velocity reserve (CFVR) related to coronary microvascular dysfunction is a major mechanism for ischemia in hypertrophic cardiomyopathy (HCM).

Purpose: to assess the functional correlates and prognostic value of CFVR during vasodilator stress echocardiography (SE) in a multicenter study in HCM.

Methods: We initially enrolled 116 HCM patients (age 53±15 years, 62 male) studied with dipyridamole (n =68) or adenosine (n=48) SE and CFVR assessment using pulsed wave Doppler sampling on left anterior descending coronary artery. We excluded 3 patients with inducible regional wall motion abnormalities, and in the final population of 113 HCM patients we defined SE positivity as reduction of CFVR (<2.0) All patients completed the clinical follow-up.

Results: Positive SE for reduction in CFVR occurred in 41/113 patients (36%). CFVR was not related to either maximal wall thickness (r=-.150 p=.113) or resting left ventricular outflow tract obstruction (r=-.223, p=.124). During a median follow-up of 27 months, 34 events occurred: 3 deaths, 14 acute heart failure, 2 sustained ventricular tachycardias and 15 atrial fibrillations.

Events occurred in 26/41 patients with abnormal and in 8/72 of those with normal CFVR (63 vs 11% p<.0001), with a relative risk of 5.71 (CI: 2.85-11.4). The prognostic separation was striking with CFVR-based criterion (X2: 32.018, p<0.0001). When sequential chi-square models for the prediction of events were used, SE CFVR-related criteria showed significant incremental prognostic value over clinical (such as family history for sudden death) and resting echocardiography (such as maximal wall thickness) parameters (+53%, Figure, left panel). When the CFVR response was titrated as a continuous rather than binary variable, patients in the lowest tertile showed the worse prognosis (Figure, right panel).

Conclusions: In HCM patients, vasodilator SE positivity with reduction in CFVR occurs in about 1 out of 3 patients, is unrelated to resting left ventricular outflow tract gradient or maximal wall thickness, and is associated to a clearly worse outcome. The prognostic value of reduced CFVR is additive over standard clinical and echocardiographic predictors. The spectrum of prognostic stratification is expanded if the response is titrated according to a continuous scale rather than artificially dichotomized.