Cardio functional stress imaging: a sequential approach with stress echo and cardiovascular magnetic resonance

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Background: Stress echo is widely used for non-invasive diagnosis of coronary artery disease (CAD), but difficult patients and ambiguous responses may be met even with top-level technology and expertise. Cardiovascular Magnetic Resonance (CMR) is a more quantitative and less operator-dependent, but more expensive and less user-friendly. It might ideally complement stress echo in well-selected cases.

Aim: To assess the feasibility and accuracy of an integrated algorithm with stress echo first and second-line stress CMR in selected cases.

Methods: Starting January 1, 2003, 97 in-hospital patients with chest pain and normal baseline function were referred for stress echo (exercise in 64; diprydamole in 33) and coronary angiography. Of those, 25 had a poor acoustic window (n=9), sub-maximal stress (n=2), or ambiguous responses (n=2) and were referred to diprydamole stress CMR on a different day. The only criterion of positivity for both techniques was the presence of regional wall motion abnormalities (from normality to hypo-, or dyskinesis) in at least 2 contiguous segments (17 segment model of the left ventricle). Coronary angiography was performed independently of test results. Significant CAD was identified by a >50% quantitatively assessed stenosis in at least 1 major coronary vessel.

Results: CAD was present in 63 patients. Diagnostic results were good and comparable with the 2 techniques (see figure).

Conclusion: A sequential functional stress imaging algorithm with stress echo first and stress CMR in selected cases is feasible, clinically realistic and allows a highly efficient, radiation-free diagnosis of CAD in almost all patients in whom cardiac stress imaging is clinically indicated.

Dobutamine stress echocardiography in patients with apical left ventricular ballooning syndrome for evaluation of myocardial stunning and dynamic intraventricular obstruction

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Purpose: Left ventricular apical ballooning syndrome (LVABS) is an acute ischemic syndrome mimicking myocardial infarction in the absence of significant coronary disease, characterized by severe but reversible apical wall motion abnormalities (WMA), which have been related to myocardial stunning; dynamic intraventricular obstruction (DYNOB) has been hypothesized as a possible pathogenetic mechanism of the syndrome. The purpose of the study was to evaluate response to dobutamine stress echocardiography (DSE) in pts with LVABS in order to assess the role of myocardial stunning and of DYNOB in its pathogenesis.

Method: 15 pts, all women, aged 71±6 years fulfilling the criteria for LVABS underwent DSE (5-20 mcg/kg/min) at the 14 days from admission. During DSE WMA were evaluated on a 16-segment LV model and a score from 0 normal to 4 dyskinesia was assigned to each segment, development of DYNOB and mitral regurgitation was monitored by Color, PW and CW Doppler.

Results: During DS, heart rate increased from 74±16 to 99±19 b/min (p<0.0002), systolic blood pressure (BP) increased from 137±10 to 140±10 (ns) and diastolic BP from 75±6 to 76±13 mm Hg (ns); end-diastolic and end-systolic volumes decreased from 56.5±30 to 81±16 ml (p=0.05) and from 43.1±6 to 35.1±8 ml (p=0.05) and ejection fraction increased from 56±11 to 64±12% (p=0.05). WM score index improved from 1.37±0.36 to 2.7±0.38 (p=0.09) of the 11 pts with persistant WMA, apical WMA normalized in 5 pts, improved in 3 and did not recover in 1 pt with the most severe WMA; in the 2 pts who developed a severe DYNOB apical WMA worsened after a transient recovery. In the latter 2 pts severe DYNOB (peak gradient 150 and 98 mm Hg) was associated with systolic anterior motion of anterior mitral leaflet and grade 3-4 mitral regurgitation; a moderate DYNOB (88 mm Hg) was observed in 1 pt. All changes returned to baseline after intravenous propafenone. No pt had chest pain or other major symptoms; positivization of negative T waves in the anterior leads occurred in 2/15 pts.

Conclusions: 1) In most pts with LVABS isoropic stimulation with dobutamine reversed apical WMA demonstrating that they are secondary to myocardial stunning; 2) During DSE dynamic intraventricular obstruction elicited by sympathetic stress can be documented in 20% of pts and can play a significant role in the development of severe mitral regurgitation and acute left ventricular failure observed in these patients.

Ergonrive Echocardiography in the pharmacological management of coronary artery spasm

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The Ergonine Stress Echocardiography (EE) is a reliable and safe method for detecting coronary artery spasm.

Aim: To study the usefulness of EE in the pharmacological management of patients with coronary spasm.

Methods: The EE performed in our hospital between September 1999 and April 2005 were reviewed. Ergonine (methylergometrine) was administered intravenously at consecutive doses of 0.5, 0.1, 0.2 and 0.4 mg at 5 minute intervals. Digital images were acquired conventionally at every stage and also after an ultrasonic contrast agent administration in basal and peak stages. The test was systematically repeated in EE positive patients after modulating the vasodilator therapy as many times as required for it to be negative.

Results: 178 EE were performed on 136 hospitalized patients with chest pain and suspected variant angina. Only 2 EE (1%) were ended prematurely due to limiting side effects unrelated to myocardial ischemia. Of 176 full tests, 55 (31%) were positive and all showed regional wall motion abnormalities, 31 (18%) typical chest pain but only in 10 (6%) ECG changes occurred with ST descent <0.1 mV. Control EE were performed on 34 (81%) of the 42 patients with positive tests. Only one control EE was required for 26 patients to give a negative result, 7 needed two and one patient required three. There was one episode of complete atioventricular block and one transient cerebrovascular accident. No other complication occurred.

Conclusion: EE is a safe procedure and can be useful to guide the pharmalogical management of coronary artery spasm.

Prognostic implications of myocardial ischemia in asymptomatic diabetic patients with no history of coronary artery disease

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Aim: To assess the value of dobutamine stress echocardiography (DSE) for the stratification of asymptomatic diabetic patients with no history of coronary artery disease (CAD).

Background: The prognostic significance of myocardial ischemia in asymptomatic diabetic patients with diabetes mellitus is unclear.

Patients and methods: We studied 181 asymptomatic diabetic patients who had no history of previous myocardial infarction or revascularization. Mean age was 62±10 years, 96 men. Patients underwent DSE for evaluation of suspected CAD. Ischemia was defined as new or worsening wall motion abnormalities. End point during follow-up was hard cardiac events (cardiac death and non-fatal myocardial infarction).

Results: Ischemia was detected in 46 (28%) patients. During a median follow-up of 5 years, 40 patients (25%) died (18 cardiac deaths) and 7 patients had non-fatal myocardial infarction (25 hard cardiac events). Survival curves in patients with normal and abnormal DSE are presented in figure. In an incremental multivariate analysis model, clinical predictors of hard cardiac events were age and hypercholesterolemia. Ischemia was incremental to clinical data (risk ratio = 2.5; 95% CI 1.1-6.3).

Conclusion: Myocardial ischemia assessed by DSE is an independent predictor of cardiac events in asymptomatic diabetic patients with no history of CAD.