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Simultaneous Transesophageal Doppler Estimation of Coronary Flow Reserve in the Left Descending Artery and Coronary Sinus in the Differentiation of Proximal and Nonproximal Left Descending Artery Stenoses

Alexander V. Vrublevsky, Alla A. Boshchenko, Rostislav S. Karpov, Cardiology Research Institute, Tomsk, Russian Federation

The aim of our study was the differentiation of proximal and non-proximal left descending artery (LDA) stenoses with simultaneous assessment of coronary flow reserve (CFR) in the LDA and coronary sinus (CS) in CAD patients with single-vessel LDA stenosis using multiplane transesophageal echocardiography. Methods: We studied 17 men (mean age 48±7 years) with over 50% single-vessel LDA stenosis, confirmed with quantitative coronary angiography. Nine patients with over 50% single-vessel proximal LDA stenosis were included in group Ia. Eight patients with over 50% stenosis of the LDA mid and/or distal third composed group Ib. The control group (II) consisted of 25 healthy volunteers (men, mean age 35±5 years). Transesophageal Doppler assessment of coronary blood flow in proximal LDA and CS was performed at baseline and after intravenous dipyridamole (0.56 mg/kg for 4 minutes) using ultrasound diagnostic systems HDI 5000 SonoCT and Ultramark 9 HDI CV (Philips-ATL). CFR was calculated as the ratio of hyperemic to baseline peak diastolic velocities in the LDA and CS. Results: The baseline peak diastolic velocities of blood flow in the LDA and CS did not differ significantly in groups Ia, Ib and II, and were 52±27 cm/s, 39±13 cm/s, 37±11 cm/s for the LDA, and 32±11 cm/s, 34±8 cm/s, 32±11 cm/s for the CS, respectively. In group Ia CFR in the LDA was significantly reduced, compared to groups Ib and II, and made 1.87±0.43, 3.23±1.35 and 3.51±0.79, p<0.01, respectively. We revealed a reverse correlation between the LDA stenosis area and CFR in this artery (r=-0.60, p<0.001). CFR in the LDA <2 had a positive predictive accuracy of 83% in the diagnostics of proximal stenoses. A significant diminution of CFR in the CS was determined in CAD patients of both the groups when compared with healthy volunteers and was 1.74±0.53, 1.63±0.30, 2.56±0.87 for groups Ia, Ib, II, respectively (p Ia-II <0.05, p Ib-II <0.05, p Ia-Ib =ns). CFR <2 in the CS had a positive predictive accuracy of 63% in the diagnostics of LDA stenosis of any localization. Thus, reduced CFR in the LDA is a predictor of proximal LDA stenosis. Reduced CFR in the CS is a predictor of stenosis in both the proximal and non-proximal LDA segments.

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Oral Glucose Loading Suppresses Coronary Flow Velocity Reserve on Transthoracic Doppler Echocardiography in Healthy Young Adults

Kohei Fujimoto, Takeshi Hozumi, Hiroyuki Watanabe, Kotaro Tokai, Kenei Shimada, Takashi Muro, Minoru Yoshiyama, Kazuhide Takeuchi, Shunichi Homma, Junichi Yoshikawa, Osaka City University Medical School, Osaka, Japan, Columbia University, New York, NY

Background: Previous studies analyzing flow mediated dilation of brachial artery showed that oral glucose loading suppresses endothelial function in men. However, its effect on coronary microcirculation has not been evaluated. The purpose of this study was to evaluate the effect of oral glucose loading on coronary microcirculation by noninvasive measurement of coronary flow velocity reserve (CFVR) with transthoracic Doppler echocardiography (TTDE). **Methods:** The study population consisted of 10 healthy men without coronary risk factor (mean age, 30±2 years old) in whom diastolic coronary flow velocity (CFV) in the left anterior descending coronary artery was clearly recorded using TTDE (3-6 MHz, Toshiba Aplio). CFVR was calculated as the ratio of hyperemic (intravenous adenosine triphosphate 0.14mg/kg/min for 2 minutes) to basal mean diastolic CFV. We analyzed CFVR before and one hour after oral glucose loading (75g). **Results:** In all subjects, the levels of plasma glucose and serum insulin significantly increased after glucose loading compared with baseline level (92±10mg/dl to 138±21mg/dl, 6±3μU/ml to 49±13μU/ml, respectively, p<0.0001). No difference was observed in mean CFV before and after oral glucose loading (18.4±2.3 vs 18.3±2.6 cm/s). During hyperemia, however, mean CFV significantly decreased after oral glucose loading (80.3±11.0 cm/s vs 69.8±12.6 cm/s, p<0.01). As a result, CFVR was significantly decreased from 4.4±0.7 to 3.8±0.7 (p<0.01) after oral glucose loading. **Conclusion:** TTDE reveals that oral glucose loading suppresses CFVR in young healthy men. This result suggests that oral glucose loading may have unfavorable effects on coronary microcirculation.

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Coronary Flow Reserve and Indices of Aortic Distensibility in Patients With Different Grade of Aortic Atherosclerosis

Attila Nemes, Tamas Forster, Noemi Gruber, Attila Thury, Miklos Csanady, University of Szeged, Szeged, Hungary

Background: Coronary and aortic system are similarly affected by atherosclerosis. The aim of the present study was to evaluate the relationship between coronary flow reserve (CFR), indices of aortic distensibility (Elastic modulus: E(p), Young's modulus: E(s)) and the grade of aortic atherosclerosis (AA) examined by stress transesophageal echocardiography (STEE).

Patients and methods: Dipyridamole STEE was performed on 138 patients (98 men and 40 women; mean age: 57±12 years). CFR was calculated by the ratio of average peak diastolic flow velocity (APV) during hyperemia to resting APV. Mean CFR was calculated by the ratio of average mean diastolic flow velocity (AMV) during hyperemia to resting AMV. During STEE, the grades of AA were also evaluated using a five-grade scale-list. E(p) and E(s) were evaluated from echocardiographic parameters of the descending aorta and blood pressure data. All patients underwent coronary angiography. The ratio of patients with different result of coronary angiogram was similar in patient groups.

Results are presented on the table (*p<0.05 vs grade 0 cases)

Conclusions: In case of aortic plaque (grade 2-3 AA), E(p) was significantly higher com-

pared to grade 0 cases. E(s) increased parallel with the aortic grades. The CFR and the mean CFR were significantly higher in patients with grade 1 AA, but there was no further decrease in case of grade 2-3 AA.

Data of groups

Aortic grades	E(p)	E(s)	CFR	meanCFR
Grade 0 (30 cases)	0.54±0.33	6.16±4.34	2.51±0.79	2.32±0.79
Grade 1 (50 cases)	0.7±0.5	7.53±6.3	1.96±0.62*	1.91±0.67*
Grade 2-3 (58 cases)	0.97±0.51*	8.41±5.92	2.03±0.81*	1.9±0.78*

POSTER SESSION

1092 Stress Echocardiography: Potpourri

Monday, March 31, 2003, 9:00 a.m.-11:00 a.m.

McCormick Place, Hall A

Presentation Hour: 10:00 a.m.-11:00 a.m.

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Evidence for Significant Ischemic Right Ventricular Dysfunction During Dobutamine Stress Echocardiography in Patients With Coronary Artery Disease

Christine A. O'Sullivan, Caroline Daly, Alison Duncan, Qi Ming Chen, Wei Li, Michael Henein, Royal Brompton Hospital, London, United Kingdom

Background: in clinical practice the concern is always focused on the effect of coronary artery disease on the left ventricle, even during stress.

Aim: To assess right ventricular (RV) behavior in addition to that of the left ventricle during stress echocardiography in order to identify markers of dysfunction that may contribute to the patient's symptoms.

Subjects: We studied 33 patients (mean age 58+/-5yrs, 30 males) with triple vessel coronary artery disease using conventional Dobutamine stress Echocardiography, starting with 5mcg/kg/min with similar incremental doses every three minutes for eight stages. RV function was assessed by M-mode recording of the right free wall amplitude of motion and spectral Tissue Doppler (TD) for systolic and diastolic velocities. RV filling velocities were also measured from the pulsed wave Doppler recordings. The findings were compared with those from 15 normal controls (mean age 58+/-11yrs, 10 males).

Results: At rest - RV size was normal, inlet diameter < 3.5cm, and free wall amplitude, shortening (systolic) and lengthening (diastolic) velocities were not different from controls. RV filling velocities were slightly reduced in patients but the E/A ratio was similar to normals.

At peak stress - The RV free wall amplitude failed to increase compared to controls. (2.3+/-0.6 vs 3.0+/-0.5cm, p< 0.001). The peak TD systolic velocity increased as in controls suggesting maintained RV inotropic function. In contrast to normal behavior, early diastolic TD velocity failed to increase (11.+/-4.0 vs 14.0+/-3.5cm/s, p< 0.001) and 8/33 patients developed significant post ejection shortening (P< 0.001). This contributed to the fall in RV E/A ratio from 1.1+/-0.3 at rest to 0.76+/-0.4 at peak stress (p< 0.001).

Conclusion: In patients with multivessel coronary artery disease, the right ventricular free wall may demonstrate ischemic disturbances, with stress similar to those seen in the left ventricle. These may contribute to the patient's symptoms and exercise intolerance known in coronary artery disease.

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Increased Interleukin 6 and Tissue Factor Production During Dobutamine Stress Echocardiography Is Associated With Ischemia and Left Ventricular Dysfunction

Ignatios Ikonomidis, George Athanassopoulos, John Lekakis, Kiriaki Venetsanou, Margarita Marinou, Petros Nihoyannopoulos, Dennis Cokkinos, Stamatios Stamatelopoulos, University of Athens, Alexandra Hospital, Athens, Greece, Onassis Cardiac Surgery Center, Athens, Greece

Interleukin 6 (IL6) has a negative inotropic action and mediates the ischemia-reperfusion myocardial injury. We investigated whether reversible ischemia induces cytokine production leading to a) increased tissue factor (TF) expression and b) persistence of regional wall motion abnormalities (RWMA) during recovery (Rec) after dobutamine stress echocardiography (DSE).

Methods: Eighty patients with angiographically documented CAD underwent DSE. Samples were obtained at rest, peak stress and 20min after cessation of dobutamine infusion (Rec) for measurement (median, 25th-75th percentile) of macrophage colony stimulating factor (MCSF), IL6 and TF plasma levels (pg/ml). New or worsening RWMA at peak stress and their duration in Rec were noted.

Results: IL6 and TF increased at peak stress and Rec compared to rest in ischemic but not in non-ischemic patients (Table, p<0.05). MCSF levels were similar during DSE. Among those with ischemia, patients with RWMA lasting >5 min in Rec (n=20) had higher IL6 at peak stress and Rec than those with RWMA lasting <5 min (stress: 3.3 (2.4-4.6) vs 2.0 (1.5-2.7), Rec : 2.7 (2.3-4.3) vs 1.9 (1.4-2.7), p<0.01). High MCSF was related with high TF in ischemic patients in Rec (r=0.61, p<0.01).

Conclusion: Reversible ischemia induces an increase of IL6 and TF levels at peak stress and Rec after DSE. MCSF is related to TF only after ischemia. High IL6 levels throughout Rec may explain the persistent left ventricular dysfunction after DSE since this cytokine has a negative inotropic action