4:12 p.m.

827-4 **Effect Of Coronary Stenosis On Adjacent Bed Microvascular Flow Reserve: Assessment Using Myocardial Contrast Echocardiography**

John Pacella, Erxiong Lu, Joan Gretton, David Fischer, Rekhi Varghese, Vijay Ramanath, Flordeliza Villanueva, University of Pittsburgh, Pittsburgh, PA

Background: During coronary artery stenosis (STN), flow reserve in the adjacent non-stenotic bed decreases. Although coronary steal via collaterals originating from the non-stenotic artery has been implicated, the microvascular events in the non-stenotic bed which mediate or accompany this phenomenon are ill-defined. Because myocardial contrast echo (MCE) can uniquely assess microvascular physiology, we used it to relate abnormal flow reserve to capillary (CAP) blood volume and red blood cell (RBC) velocity in the perfusion bed of a coronary artery adjacent to a coronary STN.
Methods: In 7 open chest dogs, flow probes were placed on the left anterior descending (LAD) and circumflex (CX) arteries. Mean arterial and distal LAD pressures were measured. Hyperemia (HYPER) was induced with a selective A2A receptor agonist. A non flow limiting LAD STN was created with an occluder (mean resting gradient 17±3 mmHg). MCE was performed using intravenous lipid microbubbles and ECG-triggered ultraharmonic imaging. Data were collected at: Baseline; HYPER; HYPER + STN. MCE videointensity in the LAD and CX regions were fit to: $y=A(1-e^{-\beta t})$, where 'A' and 'ß' reflect CAP volume and RBC velocity, respectively, and A x ß represents flow.
Results: During HYPER without LAD STN, CX probe flow and CX MCE RBC velocity increased relative to baseline (from 28±5 to 116±20 ml/min, p<0.002; and from 0.53±0.05 to 0.96±0.17 sec^{-1}, p=0.030, respectively); there was no change in MCE CAP volume. Adding LAD STN during HYPER decreased CX probe flow (from 116±20 to 99±14 mL/min, p=0.088), MCE-derived CX bed flow (from 87±16 to 67±17 sec^{-1}, p<0.03), and RBC velocity (from 0.96±0.17 to 0.66±0.18 sec^{-1}, p<0.007). CX CAP volume concurrently increased (from 93±9 to 106±9, p<0.03).
Conclusions: Non critical coronary STN impairs flow reserve in the adjacent bed, where RBC velocity decreases and CAP volume increases. Mechanisms underlying the unexpected increase in CAP volume in this setting may involve compensatory recruitment of adjacent bed CAP and/or CAP anastomotic collateral networks. Our MCE data suggest that the adjacent microcirculation may actively participate in the regulation of collateral flow and requires further study.

4:24 p.m.

827-5 **Comparison of Myocardial Contrast Echocardiography Versus Sestamibi Myocardial Perfusion Imaging in Early Diagnosis of Acute Coronary Syndrome**

Duk-Hyun Kang, Duk-Woo Park, Soo-Jin Kang, Young-Hoon Jeong, Eui-Seock Hwang, Se-Whan Lee, Jong-Min Song, Kee-Jun Choi, Seong-Wook Park, Seung-Jung Park, Asan Medical Center, Seoul, South Korea

We tried to examine the hypothesis that myocardial contrast echocardiography (MCE) would be superior to conventional electrocardiographic (ECG), troponin I level (TI), and myocardial perfusion imaging (MPI) with technetium-99m sestamibi for the diagnosis of acute coronary syndrome(ACS).
Methods: We prospectively enrolled 98 consecutive pts (age; 59±9 yrs, 68 men) presenting to emergency room with suspected ACS. Exclusion criteria were age < 40 yrs, pregnancy, presence of Q wave or ST segment elevation, poor Echo window. MCE was performed to evaluate regional wall motion abnormality and myocardial perfusion using continuous infusion of PESDA during intermittent power doppler harmonic imaging. Rest sestamibi MPI was performed immediately after MCE. MCE and MPI studies were blindly interpreted by different reviewers, and myocardial perfusion defects present in at least 1 coronary territory were considered positive. TI elevation was defined as an initial TI > 1.5 ng/ml, and ST depression > 0.05 mV.
Results: There were 32 patients with acute myocardial infarction (MI) and 35 patients with unstable angina requiring urgent revascularization. MCE showed the similar specificity and better sensitivity than ECG, TI and MPI criteria for diagnosis of MI and ACS as shown in table. On multiple logistic regression analysis, positive MCE was the only independent predictor for ACS (p<0.001).
Conclusions: Compared with currently used TI, ECG criteria and even MPI, MCE is more sensitive for the diagnosis of ACS.

Sensitivity and specificity for the diagnosis of MI and ACS

		Positive MCE	Positive MPI	ST change	TI elevation
MI	Sensitivity	27/32 (84%)	24/32 (75%)	13/32 (41%)	17/32 (53%)
	Specificity	50/66 (76%)	59/66 (89%)	60/66 (91%)	63/66 (95%)
ACS	Sensitivity	48/67 (72%)	37/67 (55%)	15/67 (22%)	17/67 (25%)
	Specificity	31/31 (100%)	29/31 (94%)	27/31 (87%)	28/31 (90%)

4:36 p.m.

827-6 **The Use of Contrast Improves Positive Predictive Value and Result Determinability in Routine Dobutamine Stress Echocardiography**

Atul R. Chugh, Justin C. Lee, Philip R. Liebson, Steven B. Feinstein, Rush University Medical Center, Chicago, IL

Background: Dobutamine stress echocardiography (DSE) is subject to potential inconsistency due to operator and patient-specific variables. Studies show use of Optison® in DSE enhances wall segment definition and image quality, resulting in improved confidence of interpretation. Limited data exists on whether contrast agent confers benefit in positive predictive value (PPV) and result determinability.
Methods: Data was collected from 2 academic institutions. From one, 155 positive contrast DSE using Optison® (cDSE) were collected from a database of 4,865 patients. 74 positive non-contrast DSE (ncDSE) were consecutively collected from another institution. Regional wall motion abnormalities consistent with ischemia, infarction or viability in 1 or more well-visualized left ventricular segments constituted a positive stress study. Data from patients with indeterminate DSE who underwent subsequent cardiac catheterization were collected in both groups. Results of the studies were correlated with coronary angiography performed less than 1 month from DSE. Angiographic criteria of >50% lesion severity in 1 or more native and/or graft vessels were utilized. Baseline characteristics, PPV and indeterminate call rate (ICR) were compared using Fisher exact test. Regression analysis was performed to evaluate result variability over time.
Results: Baseline characteristic differences in ncDSE and cDSE groups for age [ncDSE: Mean=58 ± 10 vs. cDSE: Mean=60 ± 11 years] and sex [Male (%): ncDSE:=59.1% vs cDSE=62.0%; p=0.40] were not significant. Angiographic characteristics in both groups for single-vessel disease [ncDSE=16.6% vs. cDSE=18.7%; p=0.40] and multivessel disease [ncDSE=57.6% vs. cDSE=59.4%; p=0.46] were not statistically different. The PPV was significantly greater in cDSE vs. ncDSE [85.2% vs.74.2% respectively; p=0.043]. The ICR was higher in the non-contrast group [ncDSE=12.1% vs. cDSE=1.3%; p=0.002]. Linear regression analysis of PPV data in both groups did not demonstrate significant variability in PPV over 33 months and 23 months, respectively.
Conclusions: Use of contrast resulted in a significant improvement in overall PPV and substantial decrease in ICR of routine DSE.

ORAL CONTRIBUTIONS

828

Exercise Testing: Modern Diagnostic and Prognostic Markers

Monday, March 13, 2006, 4:00 p.m.-5:00 p.m.
Georgia World Congress Center Room, B405

4:00 p.m.

828-3 **Incremental Diagnostic Value of High-Frequency QRS Analysis for Identifying Stress-Induced Ischemia**

Tali Sharir, Konstantine Merzon, Iren Kruchin, Andre Boyko, Haim Silber, Procardia - Maccabi Healthcare Services, Tel-Aviv, Israel, Maccabi Healthcare Services, Tel Aviv, Israel

Clinical data together with ST changes during stress test are commonly used to detect myocardial ischemia, yet with limited accuracy. A new technology, which quantifies changes in the depolarization phase, measured using high frequency QRS components, was recently reported to better identify stress-induced ischemia. Our aim was to determine the incremental diagnostic value of this technique. **Methods.** Exercise myocardial perfusion SPECT (MPS) was performed in 885 consecutive pts (643 male) and used as the gold standard for ischemia. Conventional exercise ECG recording was combined with high resolution ECG acquisition, which was digitized and analyzed using the HyperQ™ System (BSP, Israel). The relative intensity change of high frequency QRS components (HyperQ™) during exercise was used as an index of ischemia. Logistic regression was used to assess incremental diagnostic value of HyperQ data over conventional ECG. **Results.** Moderate to severe MPS ischemia was found in 36 pts. The HyperQ index of ischemia was more sensitive than conventional analysis (78% vs 56%, p<0.01) with similar specificity (74% vs 78%, p=ns). The HyperQ index offered a significant incremental diagnostic value over clinical and stress test data (figure). **Conclusions.** HyperQ analysis presents a significant improvement to current stress ECG in detecting ischemia and may thus aid in enhancing the non-invasive diagnosis of ischemic heart disease.