damage and predicts the poor left ventricular functional recovery. The purpose of this study was to investigate whether CFVP obtained by transthoracic color Doppler echocardiography (TTDE) can predict improvement in left ventricular function in patients who have achieved TIMI 3 flow after intervention.

Methods: The study population consisted of 50 consecutive patients with a first anterior acute myocardial infarction successfully treated with percutaneous coronary intervention (angiographic lumen diameter stenosis 50%, TIMI flow 0). Using TTDE, we defined coronary flow velocity in the left anterior descending artery 12 to 48 hours after the infarction. We defined severe microvascular injury as a DDT £ 600ms. Regional wall motion was estimated to analyze anterior wall motion score index (AWMSI) by echocardiography at baseline and 1 month after the infarction.

Results: Using TTDE, coronary flow velocity measurement was possible in 46 of 50 patients (92%); 35 patients with a DDT £ 600ms(Group1) and 11 patients with a DDT > 600ms(Group2). AWMSI was significantly better in Group1 than in Group2 at 1 month (1.6±2.4 vs 2.7±3.0, p=0.05). Although there was no significant difference between the two groups at baseline (2.4±1.4 vs 2.7±3.0, p=0.08). Significant correlation was observed between DDT and 1-month AWMSI (R=0.63, p=0.001).

Conclusion: Patients with a DDT £ 600ms measured by TTDE show poor left ventricular functional recovery 1 month after the infarction. CFVP has achieved 3 flow and CFVP measurement is clinically useful to predict left ventricular functional recovery in patients with acute myocardial infarction.

Detection of Coronary Restenosis by Serial Doppler Echocardiographic Assessment of Coronary Flow Velocity Reserve After Percutaneous Coronary Intervention

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Background: The variability of microcirculatory impairment is the major limitation in assessing coronary stenosis by measurement of coronary flow velocity reserve (CFVR). As follow-up change of CFVR would be caused by change of coronary stenosis after percutaneous coronary intervention (PCI) rather than aggravation of microcirculatory impairment, we hypothesized that serial assessment of CFVR can improve the diagnostic accuracy for coronary restenosis by decreasing influences of variable microcirculatory impairment on PCI. Methods: We prospectively measured CFVR in 36 consecutive patients (age:57±11 years, 23 men), in whom successful PCI of left anterior descending artery (LAD) was performed. Exclusion criteria were previous myocardial infarction, bronchospasm, residual stenosis of LAD after PCI ≤ 30%, and refusal of follow-up coronary angiography (CAG). Coronary flow velocity in the distal LAD was measured by transthoracic doppler echocardiography (TDE), and CFVR was defined as the ratio of hyperemic to basal averaged diastolic peak velocity at baseline and during adenosine infusion (0.14mg/kg/min). The slope of CFVR measurement (CFVRₘ) by TDE was performed on the next day after PCI, and follow-up CFVR measurement (CFVRᵣ) was repeated on the day before 6 month follow-up CAG. The significant decrease of CFVR was defined as (CFVRₘ - CFVRᵣ)/CFVRₘ > 0.1, and LAD restenosis was defined as > 50% diameter stenosis on follow-up quantitative CAG. Results: Adequate TDE studies for CFVR were performed in all patients, and follow-up CAG showed restenosis in 9(25%) patients. The sensitivity and specificity of CFVRᵣ < 0.9 was 59%(56%), 27%(27%) and the sensitivity and specificity of CFVRᵣ < 0.25 was 98%(98%), 27%(27%) for predicting LAD restenosis. The decrease of CFVR had a sensitivity of 89%(90%) and a specificity of 25%(30%) for predicting LAD restenosis. Also in 15 patients with diabetes or left ventricular hypertrophy, the decrease of CFVR was more accurate (15/15, 100%) than CFVRᵣ < 0.25 (11/15, 73%). Conclusions: Regardless of associated microvascular impairment, serial noninvasive assessment of CFVR by TDE can improve the diagnostic accuracy of CFVR for detecting LAD restenosis.

Relation Between Angina Pectoris and Coronary Flow Reserve in Patients With Aortic Stenosis: An Adenosine Transnonthropic Doppler Echocardiographic Study

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Background: Myocardial ischemia in patients with aortic stenosis (AS) can occur in the absence of coronary artery disease. The purpose of this study was to evaluate coronary flow reserve (CFR) in patients with AS using transnonthropic Doppler echocardiography during adenosine infusion (adenosine TDE) and to compare CFR between symptomatic and asymptomatic patients (AP) and group B without AP (19 patients). Results: AVA were smaller in group A than B. Peak AVGPs and LVMI were significantly greater in group A than B. Although there were no significant differences in absolute mean coronary flow velocities during hyperemia between group A and B, those corrected by LVMI were significantly lower in group A than B (33±11 vs 65±27ml/min/100g, p<0.003). As a result, CFVRs were significantly smaller in group A than B (1.5±1.9 vs 5.0±2.0, p=0.027). Conclusion: CFR assessed with adenosine TDE was significantly smaller in patients with AP than in those without AP because of insufficient blood supply to increased left ventricular mass during hyperemia.

Intravenous Glucose Loading Attenuates Coronary Flow Velocity Reserve Due to Increased Healthy Volunteers

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Background: It has been widely reported that hyperglycemia induces dysfunction of coronary microcirculation. Therefore, the impact of intravenous glucose loading on coronary microcirculation has been expected and has been reported in acute hyperglycemia. However, no clinical report has been reported the mechanism of CFVR attenuation. We aimed to evaluate the effect of intravenous glucose loading on coronary microcirculation, using coronary flow velocity reserve (CFVR) measurement with transthoracic doppler echocardiography (TTDE). Methods: 10 healthy men (mean age 26±1 years) were included in this study. Coronary flow velocities in the left anterior descending artery (LAD) were recorded with TTDE at rest and during hyperemia induced by intravenous infusion of adenosine. CFVR was calculated as the ratio of hyperemic to basal mean diastolic velocity (MDV). We continued to visualize the same position of LAD, analyzed CFVR and venous blood samples before and after intravenous 25% dextrose infusion (100ml, 15minutes).

Results: Plasma glucose and insulin levels were increased significantly after dextrose infusion (93±18mg/dl to 234±14mg/dl, p<0.001, 6±3microU/ml to 83±37microU/ml, p<0.001). Although blood pressure and heart rate remained unchanged, both baseline and hyperemic MDV were significantly increased after dextrose infusion (24.8±8.7cm/s to 30.6±10.3cm/s, p<0.01, 92.1±29.3cm/s to 98.6±30.4cm/s, p<0.05, respectively). CFVR after dextrose infusion was decreased consequently (3.8±0.8 to 3.3±0.7, p<0.001). Conclusion: Intravenous glucose loading attenuates CFVR in healthy young men. The difference in change in CFVR after glucose loading seems to be due to change in baseline coronary flow velocity.

Does Sleep Loss Attenuate Coronary Circulation?

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Background: Some epidemiologic studies have reported that sleep loss is related with cardiovascular events. However, it remains unknown how coronary circulation is affected directly with sleep loss. The aim of this study is to assess the effect of sleep loss on coronary circulation using coronary flow reserve (CFR) measurements with transthoracic doppler echocardiography (TTDE).

Methods: We studied 9 healthy male volunteers (28±4 years). CFR was measured in the morning after both sleep loss (less than 4 hours) and good sleep (more than 7 hours) for each day. All examinations were performed in the morning from 7 AM to 8 AM within 1 hour after waking up. Coronary flow velocities in the left anterior descending artery were recorded with TTDE at rest and during hyperemia induced by intravenous adenosine. CFR was calculated as the ratio of hyperemic to basal mean diastolic velocity (MDV), blood pressure, and catecholamine levels were also examined at every CFR measurement.

Results: CFR after sleep loss was significantly less than that of after good sleep (3.41±0.62 versus 4.16±0.76, p<0.05, respectively). Heart rate and blood pressure responses to adenosine infusion, blood sugar, lipid profile, or catecholamine levels did not differ between two CFR measurements after different sleeping duration. Conclusion: Sleep loss reduced CFR independent of hemodynamics or catecholamines. This may be one of the mechanisms by which sleep disturbance is associated with cardiovascular events.

Contrast Echocardiography: Studies Associated With Measurement

Monday, March 08, 2004, 9:00 a.m.-11:00 a.m.
Morial Convention Center, Hall G
Presentation Hour: 10:00 a.m.-11:00 a.m.

Live 3D Echo Contrast Visualization to Enhance Live Right Ventricular and Left Ventricular Cavity Delineation: An In Vivo Animal Study

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Background: Three- and 4-dimensional echocardiography will become the methods of choice for determining ventricular volumes and for delineating dyskinetic wall segments. The potential for enhanced endocardial delineation using contrast agents was assessed in a porcine in vivo animal study.

Methods: Live 3D echo studies were performed on 5 dogs (transnonthropic), 4 rabbits (epicardial), and 4 pigs (epicardial). Intravenous contrast agents (15 injections) were used SonoVue® (dogs) and Definity® (rabbits and pigs). Studies used the 2-4MHz, 3000 element array at 1.2-2.4 MHz harmonic settings on the Philips 7500 Live 3D system, and post processing was done with TomTech® customized software.

Results: Endocardial delineation was improved by post-processing including altering the tissue transparency and thresholds. The ventricular shell could be dissolved out in a maximum intensity projection mode with a resulting contrast shell volume shape, moving in time. Besides precise endocardial delineation in the acute pig studies, intraoperative pathology such as mechanically induced apical thrombi were studied in evolution and their extent could be clearly delineated compared to autopsy pathology.

Conclusions: There is a potential for combining live 3D contrast with unique modes of