

sound system. Recent developed real time compound imaging, Sono CT, which suppresses the artifacts and reinforces real structures by scanning from different angles and averaging these independent frames, may detect IMT and calcified lesions noninvasively. **Methods:** We tried to measure IMT and evaluate calcified lesions of distal LAD using Sono CT after guiding usual TTDE (HDI 5000, Philips medical systems) in 33 patients (65.7±9.3 years old) in whom IVUS catheter could be delivered to distal LAD area near Sono CT probe position on coronary intervention therapy for proximal LAD lesions. According to the usual TTDE probe position where the distal LAD flow was detected, we put the Sono CT probe, and tried to find coronary artery and to measure IMT and evaluate calcified lesions of the coronary artery. We confirmed Sono CT probe position was same as the location where we evaluated using IVUS in the catheter laboratory. Two independent echocardiographic experts analyzed whether IMT and calcified lesions could be detected or not.

Results: In all the patients, anterior and posterior coronary artery wall could be detected, and in 21 (64%) among these 33 patients we could measure IMT using Sono CT. IMT of the anterior and posterior wall of the distal LAD were 0.5 ± 0.1 mm and 0.4 ± 0.1 mm, respectively. There were significant correlation between IMT that were measured by Sono CT and those by IVUS ($y = 0.71x + 0.24$, $r = 0.52$, $P < 0.05$). Using Sono CT, the calcified lesions could be found in 3 patients in whom IVUS validated calcified lesion at the same portion of coronary arteries, however, usual TTDE could not detect all these three calcified lesions.

Conclusion: IMT and calcified lesions of distal LAD can be assessed noninvasively and accurately using Sono CT.

1073-142 Transthoracic Doppler Echocardiography as a Noninvasive Tool to Assess Coronary Artery Stenoses: A Comparison With Quantitative Coronary Angiography

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Background: Transthoracic Doppler echocardiography (TTE) has been recently introduced to detect restenoses of left anterior descending artery (LAD) after coronary angioplasty. We sought to test the diagnostic accuracy of Doppler TTE in the whole coronary arterial tree in patients with suspected coronary artery disease.

Methods: We prospectively studied 84 patients aged 59 ± 11 years (M=50, F=34) who were referred for a diagnostic quantitative coronary angiography (QCA) because of an intermediate probability of significant coronary artery disease. Patients with unstable angina or previous myocardial infarction were excluded. The TTE was performed one day before the QCA. A coronary artery stenosis was identified with colour Doppler as local spot of aliasing and turbulence. The flow velocity was measured using pulsed wave Doppler or colour Doppler rescaling and the ratio of maximal blood flow velocity at the site of the stenosis to the pre-stenotic blood flow velocity (M/P ratio) was calculated.

Results: QCA showed significant stenoses (diameter reduction >50%) in 33 (39%) of the subjects. In a blinded analysis, an abnormal M/P ratio >2.0 in subtotal stenoses, or the detection of collateral blood flow in the absence of normal antegrade flow in the case of total occlusion (N=6), resulted in overall sensitivity of 82% and specificity of 92% with negative predictive value of 89%. In detail, the sensitivity, specificity and negative predictive value for left main artery or LAD stenoses were 78%, 92% and 92%, for right coronary artery stenoses 63%, 96% and 87%, and for left circumflex artery stenoses 38%, 99% and 94%, respectively.

Conclusions: Coronary Doppler TTE is a promising technique to diagnose and especially exclude significant coronary artery disease. As a noninvasive, inexpensive and less time consuming technique than QCA, it may reduce the need of diagnostic coronary angiographies.

1073-143 Physiological Assessment of Coronary Artery Stenosis Using Transthoracic Doppler Echocardiography at Rest: Comparison of Flow Velocity Pattern Analysis With Exercise Thallium SPECT

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Background. Noninvasive assessment of the diastolic-to-systolic flow velocity ratio (DSVR) at rest by transthoracic Doppler echocardiography (TTDE) has been reported to be useful for detecting angiographical severe left anterior descending coronary artery (LAD) stenosis. However, discrepancies exist between angiographic and physiological estimates of coronary lesion severity. We evaluated the value of DSVR determined by TTDE for physiological assessment of coronary artery stenosis severity compared with exercise thallium single photon emission computed tomography (TI-SPECT).

Methods. We studied 99 patients suspected to have coronary artery disease. Doppler spectral tracings of flow velocity in the distal LAD were obtained with TTDE at rest. The mean and peak DSVR values were calculated as the ratio of mean and peak diastolic to systolic flow velocity. DSVR measurements by TTDE were compared with the results of TI-SPECT.

Results. Complete TTDE data were acquired for 81 of 99 study patients (81.8%). Of these 81 patients, TI-SPECT confirmed reversible perfusion defects in the LAD territories in 32 patients. There were significant differences in mean DSVR and peak DSVR between the patients with abnormal perfusion and those with normal perfusion in the LAD territories (1.4 ± 0.4 vs 1.9 ± 0.6 , and 1.5 ± 0.4 vs 2.0 ± 0.5 , respectively; $p < 0.0001$). For predicting reversible perfusion defects in TI-SPECT, the best cut-off points were 1.5 for mean DSVR (sensitivity 81.3%, specificity 85.4%) and 1.6 for peak DSVR (sensitivity

75.0%, specificity 83.6%).

Conclusion. Noninvasive measurement of DSVR by TTDE at rest provides physiological estimation of the severity of LAD stenosis, compared with TI-SPECT

1073-144 Transthoracic Doppler Echocardiographic Recordings of Coronary Flow Velocity and Reserve: Feasibility in American Versus Japanese Patients

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Transthoracic Doppler assessment of coronary flow velocity (CFV) and reserve (CFVR) has been validated in Asia and Europe, but has not gained acceptability in the US due to the bias that it might be difficult in obese pts with poor acoustic windows. The aims of this study were to 1) determine the feasibility of measuring CFV and CFVR in non-selected American (Am) pts; 2) compare the results with a group of Japanese (Jp) pts. **Methods:** CFV was recorded by a single investigator (S12 or S8, SONOS 5500, Philips) in 67 Am and 85 Jp unselected pts. Distal LAD flow was recorded using pulsed Doppler from the low parasternal long-axis view. In a subset of pts (38/67 Am, 85 Jp), CFV recordings were repeated with adenosine (140 µg/kg/min i.v.) to calculate CFVR, defined as the ratio of peak diastolic velocity (PDV) with and without adenosine. **Results:** CFV and CFVR evaluation was possible in the majority of pts (table). In the Am pts, body mass index (BMI) was higher and baseline PDV lower than in the Jp pts (table, * $p < 0.05$) due to the differences in body habitus, which affects the angle of incidence of the ultrasound beam. Contrast enhancement (Optison/Definity) was used in 6/67 Am pts (9%) because Doppler signal was inadequate for velocity measurements. Intra-observer and inter-observer variability was 4.7% and 6.2%, respectively. **Conclusions:** The non-invasive measurement of CFV and CFVR of the LAD is highly feasible in unselected American pts, and has the potential to provide useful physiological information on the coronary circulation.

	BMI (kg/m ²)	Feasibility (%) of CFV / CFVR	Baseline PDV (cm/s)	Adenosine PDV (cm/s)	CFVR
American pts	30±6	90 / 92	20.2±7.4	59.5±21.9	3.2±1.3
Japanese pts	23±4	99 / 99	25.8±9.5*	57.8±20.2	2.4±0.8*

1073-145 Noninvasive Assessment of Right Gastroepiploic Artery Graft Patency Using Transcutaneous Doppler Echocardiography

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Background: At present, patency of coronary artery bypass grafts (CABG) is usually assessed using invasive techniques, such as selective angiography. On the other hand, in a recent study, we showed that transcutaneous Doppler echocardiography (TCDE) can be used for a noninvasive evaluation of the right gastroepiploic artery (RGEA) graft blood flow. The aim of this study was to clarify whether it is possible to assess RGEA graft patency using TCDE by comparing such assessment with the results of selective angiography.

Methods: In 61 patients(pts) who underwent postoperative cardiac angiographic studies, flow velocity in the RGEA graft was measured using TCDE. All pts had undergone CABG surgery using the RGEA on the right coronary artery or the left anterior descending artery. Doppler signals were recorded in the RGEA graft at rest condition. The systolic and diastolic peak velocities and systolic and diastolic time-velocity integrals were measured with on-line calipers. The diastolic/systolic peak velocity ratio (D/S) and diastolic fraction of the time-velocity integral (D-fraction) were calculated.

Results: Adequate Doppler recordings of the graft flow in the RGEA were obtained in 56 pts (92%). According to the selective angiographic data, the pts were assigned to three study groups: group A (43 pts) with a normal RGEA (<50% stenosis), group B (6 pts) with intermediate (50% to 75%) graft stenosis and group C (7 pts) with severe (>75% stenosis) graft stenosis. The D/S was smaller in group C than in groups A and B ($p < 0.05$), but there were no significant differences between groups A and B. A D/S of < 0.60 predicted severe RGEA graft stenosis (>75% stenosis angiographically) with a sensitivity and specificity of 100% and 90%, respectively. The D-fraction was smaller in group C than in groups A and B ($p < 0.05$), but there was no significant difference between groups A and B. A D-fraction of <0.50 predicted significant RGEA graft stenosis (>75% stenosis angiographically) with a sensitivity and specificity of 86% and 100%, respectively.

Conclusion: Noninvasive measurement of D/S and D-fraction in the RGEA graft using TCDE accurately reflects the RGEA graft degree of patency assessed by invasive methods.

1073-146 Prediction of Left Ventricular Functional Recovery in Patients With Thrombolysis in Myocardial Infarction 3 Flow: Analysis Using Transthoracic Color Doppler Echocardiography

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Background: The Thrombolysis In Myocardial Infarction (TIMI) grading scale after coronary reperfusion yields important prognostic information in patients with acute myocardial infarction. Whether we can attain TIMI 3 flow is quite important for patients' outcomes. However, many patients with angiographic TIMI 3 flow had persistent, severe abnormalities of tissue perfusion. Our recent studies have shown that coronary flow velocity pattern (CFVP) with a rapid diastolic deceleration (DDT) implies the advanced microvascular