(VI) were evaluated in each zone just before and 20 seconds after LCX occlusion. It was defined that the collateral channels were good when the mean VI of core and border zones were over 20/256 grey level despite complete occlusion of LCX. The flow volume of left anterior descending coronary artery (LAD) was measured by an ultrasonic flowmeter.

Results: It was determined that 7 cases had good collateral channels and 10 other cases had not. The area at risk was gradually but definitely occluded in Good group. Total VI of 3 zones was significantly higher in Good group than those in Poor group (98.4±40.3 vs 12.3±5.4, p<0.001). Even in Good group, the VI of core zone was significantly lower than that of border zone (11.3±11.2 vs. 35.3±17.4, p<0.001). Mean s-WT of 3 zones was significantly higher in Good group than those in Poor group (18.3±8.5 vs. 5.5±3.3, p<0.001). S-WT correlated well with VI in all zones of all cases (r=0.916, p<0.001). The LAD flow volume increased 26.2±13.6% during LCX occlusion, while 1.5±3.3% in Poor group.

Conclusion: It is revealed that real-time MCE demonstrates the recruitment of a small and thin collateral channel appearing soon after coronary occlusion. This finding has not been elucidated so far by other modalities. Real-time MCE can elucidate the mechanism of myocardial salvage after acute coronary obstruction in both clinical and experimental setting.

1189-56 Automated Quantification of Regional Myocardial Perfusion by Analysis of Contrast-Enhanced Echographic Images

Quantitative assessment of myocardial perfusion is currently based on manual tracing and frame-by-frame realignment of regions of interest (ROI). We developed and tested an alternative technique based on automated identification of myocardial ROIs. Methods: Transthoracic power modulation images (SONOQ 5500) were obtained in 13 anesthetized pigs during continuous iv infusion of Definity (DuPont) at baseline, during LAD occlusion and reperfusion. High-energy ultrasound pulses were used to destroy intramyocardial contrast and track its subsequent replenishment. For each frame, endocardial and epicardial contours were detected as boundary pixels of a homogeneous region using the region growing algorithm. The myocardium was defined by expanding the endocardial contour to a preset width, while the epicardium was used as a local constraint. The myocardium was divided into 6 segments and mean pixel intensity was calculated for each ROI, and fitted with an exponential function. Results: Reversable perfusion defects caused by coronary occlusion were visualized in real time and confirmed by a 44±27% decrease in A and a 42±23% decrease in ABC (p<0.05) in the LAD territory, while no changes were observed in non-ischemic segments. With reperfusion, A, B and ABC values were increased above baseline levels (p<0.05). Conclusion: This technique allows objective, automated quantification of regional myocardial perfusion, without the need for manual tracing and realignment of regions of interest.

POSTER SESSION 1189 Advances in Echocardiography: Intracardiac Ultrasound, Integrated Backscatter and New Methods for Assessing Valve Function
Tuesday, March 19, 2002, Noon-2:00 p.m.
Georgia World Congress Center, Hall G
Presentation Hour: 1:00 p.m.-2:00 p.m.

1189-49 A Novel Method to Noninvasively Assess Effective Flow Area for Pediatric Aortic Stenosis Using Contrast Echocardiography Coupled With Second Harmonic Imaging: Comparison With the Doppler Continuity Equation and Laser Flow Visualization
Shaping Ge, Robin Shandas, Luciano Mazzaro, Curt DeGroff, Ole Kruudson, Lillian Vaides-Cruz, The Children's Hospital. Denver, Colorado.

Background: The accurate non-invasive determination of pediatric aortic stenosis (AS) continues to be problematic. Estimation of peak pressure drop using Doppler-measured peak velocity is routinely used. However, this method can be affected by changes in afterload, aortic root compliance and end diastolic volume, factors that do not directly affect AS severity. The effective flow area (EFA) should be the most direct measure of AS, and continues to be problematic. Estimation of peak pressure drop using Doppler-measured flow velocities (VDV), allows objective, automated quantification of regional myocardial perfusion, without the need for direct flow visualization. The accurate non-invasive clinical measurement of EFA is still limited. We have developed a novel method whereby an echocardiogram flow area of the aortic valve can be obtained using echo-contrast coupled with second harmonic imaging (ECI). Such a method provides a clinical equivalent of our in vitro flow visualization technique.

Methods: Pulmonary flow (1.8 - 4.5 L/min) was directed through six orifices of varying sizes (0.78 - 1.77 cm2) and shapes (circular, stilt, Y-shaped - resembling unicommissural, bicommissural and tricommissural aortic stenoses), mounted into an in vitro flow phantom. EFA's were measured using ECI from a short-axis approach. Areas were also obtained from the Doppler continuity equation (DCE) for comparison. Reference EFA's were obtained using a previously validated laser flow visualization technique.

Results: EFA's measured by ECI agreed well with LVF measurements within moderate overestimation (mean error = 18.7 ± 12.5%), while DCE areas significantly underestimated actual EFA (mean error = -31.3 ± 6.4%). DCE areas increased with increasing flow rate (mean increase 24.2% for flow increase from 30 to 90 ccroret) while ECI areas remained flow independent (p>0.5).

Conclusion: ECI is a novel, clinically useful method that provides both a qualitative appreciation and an accurate quantitative measure of the ventricular area for pediatric AS.

1189-50 Validation Study of a New 3-D Computation of Flow Convergence Region Using Multithreshold Velocity: An In Vitro Study Using a Dynamically Changing Orifice Mimicking Mitral Regurgitation
Xiaokui Li, Xiang-Ning Li, Duy Ha, Suthep Wanitkun, Andrew J. Rosenthal, Shannon E. Hicks, David J. Sahn, Oregon Health & Science University, Portland, Oregon, ATL Ultrasound, Bothell, Washington.

Background: Our new PC based program allows us to directly visualize and compute flow convergence region (FCR) using 3D reconstructions from digital color Doppler raw scanline velocity data at any threshold velocity surface regardless of geometry. Methods: An irregular, dynamically expandable "smile shaped" latex orifice (length = 1 cm) was mounted in a cylindrical flow model between the inlet and outlet chambers of a pulmonary phantom to mimic MR. Nine stroke volumes (15-55 ml, maximum flow rates 45-180 ml/sec) were studied. A 7 MHz ATL multilane TEE ultrasound probe was used to perform rotational 3D color Doppler acquisition. Digital scanline data was transferred to a PC program that allows 3D reconstruction and projection of FCF surface area on parallel slices at any selected velocity threshold (Nyquist limit 14-48 cm/sec). FC arc lengths and slice spacing distance were added to yield 3D FC surface area automatically. We measured 3 instantaneous flow rates for each flow sequence including peak flow rate, compared to measurements from an ultrasonic flow meter. Results: There was very good correlation between the 3D calculated flow rates and reference data (r=0.98, SEE=7.98 ml/sec).

Conclusions: Our new PC based method provides simple 3D FC measurement and accurately predicts flow rate from direct FC isovelocity surface measurements despite temporal variability of FC shape.

1189-51 A Study of Pulmonary Veins: Comparison of Intracardiac Echocardiograph With Other Imaging Modalities and Postmortem Data

Increased interest in imaging the left atrium (LA) stems from the desire to improve radiofrequency ablation (RFA) techniques for the treatment of atrial fibrillation (AF). Anatomical studies of patients undergoing RFA have been obtained, using different techniques. The purpose of this study is to compare various imaging techniques for measuring PV size in patients with atrial fibrillation. Sixteen pts, undergoing RFA, 5 focal and 11 linear; for treatment of AF were studied with a 10F, steerable, phased array, intracardiac echocardiography (ICE) transducer. PV ostial diameters were measured before and after RFA. The accurate non-invasive determination of pediatric aortic stenosis (AS) continues to be problematic. Estimation of peak pressure drop using Doppler-measured peak velocity is routinely used. However, this method can be affected by changes in afterload, aortic root compliance and end diastolic volume, factors that do not directly affect AS severity. The effective flow area (EFA) should be the most direct measure of AS, and continues to be problematic. Estimation of peak pressure drop using Doppler-measured flow velocities (VDV), allows objective, automated quantification of regional myocardial perfusion, without the need for manual tracing and realignment of regions of interest.

Methods: Pulmonary flow (1.8 - 4.5 L/min) was directed through six orifices of varying sizes (0.78 - 1.77 cm2) and shapes (circular, stilt, Y-shaped - resembling unicommissural, bicommissural and tricommissural aortic stenoses), mounted into an in vitro flow phantom. EFA's were measured using ECI from a short-axis approach. Areas were also obtained from the Doppler continuity equation (DCE) for comparison. Reference EFA's were obtained using a previously validated laser flow visualization technique.

Results: EFA's measured by ECI agreed well with LVF measurements with moderate overestimation (mean error = 18.7 ± 12.5%), while DCE areas significantly underestimated actual EFA (mean error = -31.3 ± 6.4%). DCE areas increased with increasing flow rate (mean increase 24.2% for flow increase from 30 to 90 ccroret) while ECI areas remained flow independent (p>0.5).

Conclusion: ECI is a novel, clinically useful method that provides both a qualitative appreciation and an accurate quantitative measure of the ventricular area for pediatric AS.