* P<0.01 vs. normokinesis, †p<0.01 vs. hypokinesis

	Normokinesis	Hypokinesis	Akinesis
RMCI, RV- half	-12.3±2.1	-16.1±3.5*	-19.1±3.7*†
RMCI, LV-half	-13.5±1.7	-16.9±2.4*	-21.4±2.5*†
MBV, RV-half	6.7±3.7	3.3±2.6*	1.7±1.3*†
MBV, LV-half	4.8±2.0	2.4±1.5*	0.9±0.5*†

1017-164   Fourier Phase Analysis Can Be Used to Objectively Analyze Real-Time Myocardial Contrast Echocardiograms

Alexander E. Hansen, Grigorious Korosoglou, Stefan Hardt, David Wolf, Arthur Filusch, Helmut F. Kuecherer, University of Heidelberg, Heidelberg, Germany

Background: Real-time myocardial contrast echo (MCE) is increasingly used to assess myocardial perfusion. However, objective methods for evaluating MCE are not yet widely available. We sought to validate the ability of Fourier analysis applied to MCE to assess serial changes in microvascular perfusion during coronary occlusion and reperfusion.

Methods: Six pigs underwent 45 min of LAD occlusion followed by 120 min of reperfusion. Real time MCE was performed during coronary occlusion and reperfusion. Signal intensities from replenishment curves were fitted to an exponential function to obtain plateau A and the rate of SI rise b. MCE images were mathematically transformed using a first-harmonic Fourier algorithm displaying the sequence of myocardial intensity changes as phase angles in parametric images. The phase difference (PD) of posterior versus anterior region was calculated as an index of myocardial opacification heterogeneity and compared to MCE index of myocardial blood flow Axb.

Results: After initial hyperemia, a progressive reduction in flow was observed during reperfusion. During LAD occlusion signal intensities were significantly reduced in anterior regions (Axb = 0.02±0.01 compared to baseline (1.2±0.34, p<0.01) and approached higher levels post recanalization (Axb = 1.48±0.6) but gradually decreased during 120 min of reperfusion (A=0.51±0.3, p<0.01). Similarly, profiles of phase angles in LAD perfusion territories were consistently modified during reperfusion. The mean PD at baseline was 18±15°, decreased during coronary occlusion to -106±38°, increased to 29±19° post recanalization but decreased to -61±35° after 120 min of reperfusion. PD significantly correlated with A (r = 0.8, p<0.0001) and b (r = 0.73, p<0.0001).

Conclusions: The progressive reduction in postischemic microvascular perfusion was accurately detected by real-time MCE. Fourier phase imaging is feasible to quantify dynamics of myocardial opacification in a simple and objective format and is a promising approach for the clinical interpretation of contrast echocardiograms.

POSTER SESSION

1018   Computed Tomography: Coronary Angiography

Sunday, March 07, 2004, 9:00 a.m.-11:00 a.m.
Morial Convention Center, Hall G
Presentation Hour: 10:00 a.m.-11:00 a.m.

1018-141   Detection of Coronary Anomalies by Submillimeter 16-Slice Spiral Computed Tomography

Michael Schmid, Dieter Ropers, Karsten Pohle, Stephan Achenbach, Werner G. Daniel, University of Erlangen-Nuremberg, Erlangen, Germany

Background: Contrast-enhanced multi-detector row spiral CT (MDCT) with retrospective ECG-gating has been shown to permit visualisation of the coronary arteries. The aim of this study was to investigate the potential of high-resolution submillimeter MDCT for noninvasive evaluation of coronary artery anomalies.

Methods: A total of 20 patients (13 men, 7 women, aged 19 to 75) in whom anomalous coronary arteries had been detected by conventional angiography underwent 16-slice MDCT coronary angiography (Sensation 16, Siemens, Germany). During a single breath hold, a contrast enhanced (100ml, flow rate 5ml/s) volume data set of the heart was acquired (0.75 mm collimation, gantry rotation time 420 ms). Cross-sectional images were reconstructed with a slice thickness of 1.0 mm in 0.5 mm intervals using an ECG-gated half-scan reconstruction algorithm. Two independent observers evaluated the MDCT data sets of the 20 patients as well as of 80 individuals with normal coronary anatomy concerning the origin and course of the coronary arteries in a blinded fashion. Results were compared to invasive coronary angiography.

Results: All patients with coronary arteries anomalies were were correctly identified in MDCT by both observers. The origin of all anomalous arteries and the exact course of 19/20 arteries was correctly classified, including right-sided origin of the left main (n=9), the left circumflex (n=3) or the left anterior descending coronary artery (n=1), left sided origin of the right coronary artery (n=3), origin from the right coronary artery from the pulmonary artery (n=1) and two coronary fistula to the pulmonary artery (one from the left main and one from the right coronary artery). Due to impared image quality, the drainage of one fistula from the circumflex coronary artery to the left atrium was not correctly identified.

Conclusions: High resolution MDCT angiography with retrospective ECG gating and submillimeter collimation permits the noninvasive detection and deliniation of the exact 3-dimensional course of anomalous coronary arteries with excellent image resolution.

1018-142   Is Computed Tomography-Based Coronary Angiography Ready for Prime Time? A Meta-Analysis

Udo Hoffmann, Hossein Jadvar, Edward J. Dunn, Bertrand Janne d'Othee, Harvard School of Public Health, Boston, MA

Background: Both electron beam computed tomography (EBCT) and multidetector CT (MDCT) have been shown feasible to detect significant coronary artery disease. However, these methods have not gained widespread acceptance among clinicians. We systematically reviewed the published data to estimate the diagnostic accuracy.

Methods: Studies were included if they (1) used contrast-enhanced CT as a diagnostic test, (2) reported absolute numbers, (3) used catheter based coronary angiography (CCA) as a reference standard. We analyzed patient population, study methodology and quality. Pooled estimates of sensitivity and specificity to detect significant coronary artery disease (CAD) using both the fixed and the random effects models were calculated. Analysis was performed separately for EBCT, and four and sixteen slice MDCT with and without exclusion of assessable segments/vessels. In a subanalysis, pooled NPV and PPV for the detection of any significant coronary artery disease was determined.

Results: 25 published studies (13 EBCT, 12 MDCT) with 1,439 patients were analyzed. The study population consisted mostly of caucasian middle aged males at high risk for CAD referred for an invasive angiogram (79 % males, mean age : 59 ± 3.6 years, prevalence of CAD: 63 ± 20%). For assessable segments/vessels, pooled sensitivity for EBCT, 4-slice MDCT and 16-slice MDCT was 84%, 74% and 92%, respectively and pooled specificity was 87%, 82% and 93%, respectively. All vessels/segments included pooled sensitivity and specificity were 54% and 53% for EBCT, 64% and 64% for 4-slice MDCT and 83% and 85% for 16-slice MDCT. In a subgroup of 522 patients from 12 studies, PPV and NPV for the detection of any significant CAD per patient were 66% and 82%, respectively.

Conclusion: The diagnostic accuracy of EBCT and four slice MDCT coronary angiography is limited with moderate PPV and NPV for the detection of any significant CAD. In contrast, intial data indicate the potential of sixteen slice MDCT to serve as a confirmatory test for CAD prior to CCA. However, generalizability of available data is limited due to selection bias. Further studies of well defined patients cohorts with low to intermediate risk for CAD are warranted.

1018-143   Comparison of 16-Slice Submillimeter Multidetector Spiral Computed Tomography With Conventional Angiography for Diagnosis of Coronary Artery Disease

David E. Bush, Julie M. Miller, Joao C. Lima, Edward P. Shapiro, Johns Hopkins Bayview Medical Center, Baltimore, MD, Johns Hopkins University School of Medicine, Baltimore, MD

CT is an evolving technology. The latest 16 slice multi-detector CT (MDCT) scanners with rotation times of 400 ms can image slices as thin as 0.5 mm with temporal resolution of less than 100 milliseconds. We compared CT coronary angiography (CTA) with conventional coronary angiography (cath) in the detection of cononary stenoses .Methods. Nineteen pts aged 64+15, 63% male with known or suspected coronary artery disease underwent CTA within 30 days of cath. Pts with resting heart rate >70 received 5-10 mg of IV metoprolol. CTA was performed during a 20 second breath hold using 150 ml of IV iodixanol, triggered automatically when the contrast bolus was detected in the aorta. The major epicardial coronary arteries were analyzed by dividing each into proximal, mid and distal segments. Two blinded observers independently evaluated each arterial segment for adequacy of visualization. Evaluable segments were graded by degree of stenosis evident; stenoses greater than 50% were considered significant. Analysis by artery and by segment was performed.

Results

	Evaluable	Sensitivity	Specificity	Positive Likelihood Ratio	Positive Predictive Value
All Arteries	48/57 (82)	88.0%	91.3%	7.7	91.6%
LAD	19/19 (100)	100%	77.8%	4.5	100%
LCX	12/19 (63.2)	80.0%	100%	-	80.0%
RCA	17/19 (89.5)	88.9%	87.5%	7.1	88.8%
All Segments	137/170 (88.1)	80.1%	89.5%	7.7	80.1%

Conclusion. Current MDCT provides CTA that is diagnostic in most patients. This should allow both accurate diagnosis of CAD, and triage toward appropriate management strategies.

1018-144   Assessment of Coronary Atherosclerotic Plaque Composition by Multidetector Computed Tomography: Comparison to Intravascular Ultrasound

Stephan Achenbach, Fabian Moselewski, Dieter Ropers, Karsten Pohle, Udo Hoffmann, Maros Ferencik, Suhny Abbara, Ricardo Cury, Ray Chan, Ik-kyung Jang, Tom Brady, Werner G. Daniel, Massachussetts General Hospital, Boston, MA, University of Erlangen, Erlangen, Germany

Background: We assessed the ability of MDCT to differentiate the composition of non-calcified coronary atherosclerotic plaque in comparison to intravascular ultrasound (IVUS).