Since 2002 a new scanner generation using a 16-slice detector technology is available, which also offers a non-invasive look at distal vessel segments and side branches.

The aim of the present ongoing study was to evaluate the diagnostic accuracy in detecting coronary lesions using this new technology.

Methods: 54 patients (pts) were examined with new 16-slice MDCT technology (Sensation 16™, Siemens, Forchheim, Germany). Parameter settings are: 0.75 mm collimation, 2.0 mm table feed per rotation, cranio-caudal scan direction, 0.625 mm collimation with a high pitch injection protocol. 15 vessel segments were assessed in each pt with respect to image quality and presence of coronary artery lesions. Results were compared to conventional coronary angiography (CCA).

Results: 745/810 (92%) of all vessel segments showed diagnostic image quality and could be evaluated for the presence of atherosclerotic plaques. Sensitivity in the detection of coronary lesions was calculated as 90%, and specificity as 95%. The clinically leading stenosis, as determined by CCA, could be detected by MDCT in 48/54 (91%) cases.

Conclusions: Our initial clinical data indicate that image quality could be further improved significantly by the introduction of 16-slice scanners. Our results hold promise that MDCT may become important in the non-invasive determination of CAD in the near future. Prospective, randomized, multi-center studies are now required to evaluate its diagnostic accuracy in clinical practice.

8:45 a.m.

Noninvasive Coronary Angiography by Retrospectively Electrocardiographically-Gated, Thin-Slice Multidetector-Array Computed Tomography


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Background: Multidetector-array computed tomography (MDCT) with intravenous contrast injection is an established technique for noninvasive coronary visualization. Limited spatial resolution, however, and motion artifacts frequently prevented adequate visualization of coronary segments. We analyzed the accuracy of a new 16-slice MDCT scanner with improved spatial resolution for detection of coronary artery stenoses.

Methods: A total of 77 consecutive patients (50 men and 27 women, mean weight, 82 ± 16 kg, mean age, 58 ± 14 years) referred for invasive angiography due to suspected coronary disease were studied by MDCT (12 x 0.75-mm sections, 420 ms gantry rotation time, table feed 2.8 mm/rotation, 100 ml contrast agent i.v. at 5 ml/s). Patients received 50 mg atenolol 60 minutes prior to the scan if the heart rate was above 60/min. In the axial MDCT images and multiplanar reconstructions, all coronary artery segments with a diameter of 1.5 mm or more were assessed concerning the presence of occlusions or stenoses exceeding 50% diameter reduction. Results were compared to quantitative coronary angiography.

Results: The mean heart rate was lowered from 69/min (range 51 to 92/min) before to 62/min (range 43 to 97/min) during the scan. 270 of 306 coronary arteries (left main, left anterior descending, left circumflex and right coronary artery, including their respective side branches in 77 patients) could be evaluated (88%). In evaluable arteries, 5/65 significant lesions were detected and absence of occlusion or stenosis exceeding 50% diameter reduction was correctly identified in 191/205 arteries (sensitivity 86%, specificity 93%). In those 34 patients with a heart rate below 60/min, 96% (150/154) of the coronary artery lesions could be detected (sensitivity 91% (303/333) and a specificity of 90% (87/97)) was found for evaluable coronary arteries.

Conclusion: MDCT scanning with improved spatial resolution and routine premedication with oral beta blockade permits high-resolution imaging of the coronary arteries in the majority of patients and detection of coronary artery occlusions and significant stenoses with high sensitivity and specificity.

9:00 a.m.

Libman-Sacks Vegetations Are Associated With Cerebrovascular Disease in Patients With Systemic Lupus Erythematosus

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Background: Cerebrovascular disease in patients with systemic lupus erythematous (SLE) is believed to be due to cerebritis, vasculitis, or hypercoagulability rather than to cardioembolism. The lack of association of valve disease and cerebrovascular disease in SLE patients volume flow and velocity parameters were measured. The duration of one volume flow analysis was 25.9 ± 4.3 min.; one velocity analysis took 11.1 ± 2.2 min. Highly significant correlations were found between volume flow and velocity parameters (for all parameters, p < 0.01). Comparisons of ROC areas under the curve of both analyis revealed no significant difference for detection of stenoses >70%. In single vein grafts the sensitivity/specificty/diagnostic accuracy for the volume flow were 91%/98%/96% and for the velocity parameters 96%/92%/99%, respectively. Conclusion: In the analysis of MR velocity maps in bypass grafts four-pixel velocity analysis is at least as accurate as volume flow analysis and significantly less time consuming. Therefore, velocity analysis may be considered the preferential approach in the analysis of MR velocity maps of bypass grafts.

9:30 a.m.

Four-Pixel Velocity Analysis is the Preferential Approach in Evaluating Magnetic Resonance Velocity Maps of Coronary Artery Bypass Grafts

Leisbeth P. Salm, Susan E. Langraber, Hubert W. Vliegen, Wouter Jukema, Jeroen J. Bax, Aelko H. Zwijnderman, Ernst E. van der Wall, Albert de Roos, Hidko J. Lamb, Leiden University Medical Center; Leiden, The Netherlands, University Medical Center of the Netherlands, Utrecht, The Netherlands

Background: Phase-contrast Magnetic Resonance (MR) velocity maps can be evaluated by measuring volume flow or velocity, the workload of both methods differs considerably. Whether their accuracy differs is unknown. We hypothesized that both approaches may give comparable results in the analysis of coronary artery bypass grafts in terms of velocity sensitivity, anatomic coverage, and scan protocol. In order to address these issues, we developed an adaptive real-time architecture (ART). The ART dynamically reconfigures pulse sequences and instantaneously selects the desired element on a single 1.5-Tesla MR scanner, and its performance is constantly being improved by experienced observers. Results. On MRI, 5 pts (23%) had recent or old cerebral infarct; 10 (45%) had peripheral white matter abnormalities; and 9 (35%) had deep white matter abnormalities. In TEE, 11 pts (50%) had 14 Libman-Sacks vegetations (12 on the mitral and 7 on the aortic valve). Of clinical relevance, more pts with MRI abnormalities had Libman-Sacks vegetations (p=0.31, 0.19, and 1.0, respectively). In a stepwise logistic regression analysis adjusted for age, Libman-Sacks vegetations by TEE are common (50%) and Libman-Sacks vegetations are more prevalent in pts with cerebrovascular disease than in those without it. Therefore, cardioembolism from Libman-Sacks vegetations should be considered in SLE pts with cerebrovascular disease. However, these findings need to be confirmed in a larger population.

9:45 a.m.

Adaptive Real-Time Architecture in Magnetic Resonance Coronary Angiography: Clinical Study

Patrick K. Nguyen, Juan Santos, Greg Scott, Jan Engwall, Graham Wright, Michael McConnell, Craig Meyer, Dwight Nishimura, John Pauly, Bob Hou, Phillip C. Yang, Stanford Medical Center, Palo Alto, CA

Introduction: The clinical utility of MR coronary angiography (MCCA) is currently limited by image quality, anatomic coverage, and scan protocol. In order to address these issues, we developed an adaptive real-time architecture (ART). The ART dynamically reconfigures pulse sequences and instantaneously selects the desired element on a single 1.5-Tesla MR scanner, and its performance is constantly being improved by experienced observers.