New Frontiers in Cardiac Computed Tomography

The gold standard for the diagnosis of coronary artery disease (CAD) has been conventional coronary angiography. However, multislice computed tomography (MSCT) has shown promise as a less invasive diagnostic modality. When compared with conventional angiography in patients with suspected CAD, MSCT (4-,16-, and 64-slice) has been associated with a sensitivity of 85-99%, a specificity of 95-97%, a positive predictive value of 76-97%, and a negative predictive value of 97% [Schuijf JD et al. *Am Heart J* 2006]. In addition, the use of MSCT avoids the complications, discomfort, and expense associated with conventional angiography; 64-slice CT has the additional advantage of quick (13 second) imaging that reduces motion artifact and thus further improves accuracy. As such, MSCT has the potential to play an important role in ruling out CAD in a less invasive and more cost-effective manner.

Martine Gilard, MD, Brest University Hospital, Brest Cedex, France, presented the results of a prospective management outcome study to evaluate the safety of ruling out CAD on the basis of normal findings on MSCT. In this study, 200 patients scheduled for conventional coronary angiography were evaluated with MSCT; 141 patients with normal findings on MSCT were followed up for a mean of 14.7 months (range, 6-26 months). The outcomes for these patients were compared with those for patients with normal findings on coronary angiography.

Prof. Gilard reported that there were no deaths, one myocardial infarction (0.7%), and five referrals for conventional angiography (3.5%). These results compare favorably with those reported in the literature with normal conventional angiography [Lichtlen PR et al. *J Am Coll Cardiol* 1995].

Among the five subsequent angiographies, two demonstrated normal results and three showed evidence of significant lesions. Thus, 137 (97.2%) of the 141 patients was clinically event-free, leading Prof. Gilard and colleagues to conclude that for individuals with suspected significant CAD, MSCT can be used alone to safely rule out this diagnosis.

In another presentation, Joanne D. Schuijf, MD, Leiden University Medical Center, the Netherlands, reported on a study in which the severity of CAD as determined by MSCT, quantitative coronary angiography (QCA), and intravascular ultrasound (IVUS), was evaluated in relation to functional assessment with myocardial perfusion imaging (MPI). Prof. Schuijf remarked that MSCT provides evidence of atherosclerosis whereas MPI is designed to detect ischemia, which explains why patients with abnormal findings on MSCT frequently have normal MPI.

Prof. Schuijf reported that there was good agreement among the modalities for patients with advanced CAD (exhibiting ischemia on MPI) but that the findings were frequently discrepant for patients with mild atherosclerosis (Figure 1).

Continued on page 26

Highlights from the
European Society of Cardiology Congress 2007

hospital delay >12 hours (n=5,427), pre-hospital CPR (n=1,719), cardiogenic shock (n=1,192), creatinine >2 mg/dL; (n=1,149), previous stroke/TIA (n=893), and oral anticoagulation with INR >2 (n=198).

Patients often excluded from clinical trials tended to be older, were more likely to be women, and more frequently had existing comorbidities (eg, hypertension, diabetes). These patients received significantly less adjunctive therapy (eg, aspirin, clopidogrel, beta-blockers, ACE-inhibitors, and statins) within 48 hours (each p<0.0001) compared to patients who satisfied typical trial criteria. The rate of reperfusion for excluded patients (42%) was also significantly lower than for included patients (73%; p<0.0001), and was particularly low among patients with a pre-hospital delay >12 hours (30%), those with renal failure (34%) and those aged >75 years or with prior stroke (both 38%).

Overall, hospital mortality was significantly higher in excluded (22%) vs included patients (6%; p<0.0001). However, when data were analyzed based on whether patients had received reperfusion therapy, hospital mortality for patients who received reperfusion therapy was significantly improved in all groups, except those with renal insufficiency (Table 2).

Table 2. Hospital Mortality Within Subgroup.

Group/Subgroup	No. Patients	Reperfusion <48 hours	No Reperfusion <48 hours	p value*
Age ≥75 Years	9213	21.1% (736/3486)	28.3% (1620/5727)	<0.0001
Pre-hospital delay >12 hrs	5288	8.7% (141/1612)	12.3% (452/3676)	<0.001
Cardiogenic shock	2187	42.7% (551/1291)	67.1% (601/896)	<0.0001
Pre-hospital CPR	1756	33.6% (364/1083)	58.5% (394/673)	<0.0001
Creatinine >2mg/dl	1130	33.8% (128/379)	38.6% (290/751)	0.11
Previous stroke/TIA	894	15.0% (51/339)	32.8% (182/555)	<0.0001
Oral anticoagulants (INR >2)	198	6.8% (7/103)	26.3% (25/95)	<0.001

*univariate

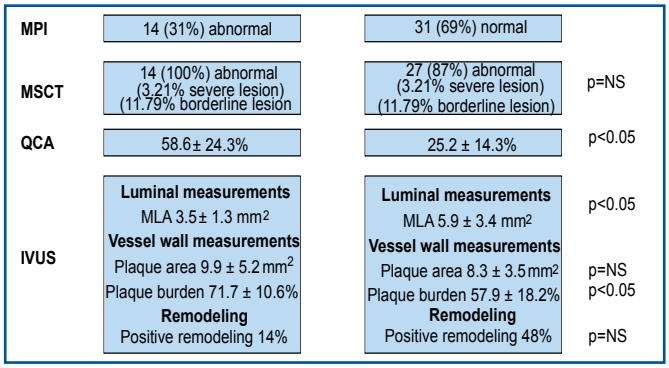
These results suggest that adherence to guideline therapy, particularly, early reperfusion therapy, may significantly reduce hospital mortality in STEMI patients with characteristics that would usually exclude them from randomized clinical trials.

In clinical practice adherence to guideline-recommended therapies results in improved outcome in STEMI patients, even in those who are not representative of patients enrolled in the randomized clinical trials from which those guidelines are derived.

Important limitations of these registry analyses include the lack of randomization and the difficulty in fully adjusting for differences in patient characteristics and other clinical issues (eg, patient preference) that may have impacted on the care delivered and clinical outcomes.

Continued from page 19

Figure 1. MPI vs MSCT vs QCA vs IVUS.



For example, some patients had no ischemia according to MPI and no significant stenosis on QCA but had evidence of atherosclerosis on MSCT and intravascular ultrasound. Prof. Schuijf concluded that the complementary nature of MPI and MSCT may allow for improved characterization of CAD. She added that more evidence is needed before it can be determined whether the combined use of the two modalities will result in improved management and outcome.

Continued from page 21

reduction in stent area suggesting late stent recoil. Overall the in-stent volume obstruction was 5.5±8.5%. In 11 patients there was no detectable neointimal hyperplasia; some degree of neointimal hyperplasia was detected in 13 patients. In 13 patients with both late recoil and neointimal hyperplasia, the in-stent volume obstruction was 10.2±9.2%. The rate of major adverse cardiac events was low (3.3%).

Table 1. IVUS Results (24 Patients).

	Post-PCI	Follow-Up	% Difference	p-value
Vessel area (mm^2)	13.55	13.49	-0.4	NS
EEM-Stent area (mm^2)	7.47	8.08	+8.2	0.003
Stent area (mm^2)	6.08	5.37	-11.7	<0.001
Neointimal hyperplasia area (mm^2)	0	0.30	NA	NA
Lumen area (mm^2)	6.08	5.07	-16.6	<0.001
Stent area obstruction (%)	0	5.54	NA	NA

"The encouraging results from the first 30 patients of ABSORB suggest that drug-eluting bioabsorbable stent technologies may be a promising future therapy option for physicians treating patients with heart disease," said Prof. Serruys, co-principal investigator of the study. "A drug-eluting stent that would eventually disappear after restoring blood flow is an exciting concept that we look forward to further exploring."