

Quantitative SPECT Aids Cardiac Risk Assessment

BY ROBERT FINN
San Francisco Bureau

SAN FRANCISCO — Quantitative nuclear cardiology allows for highly sensitive, specific, and reproducible estimates of a patient's risk, and assists in the decision of who should be sent for revascularization, Daniel S. Berman, M.D., said at a cardiovascular imaging conference sponsored by the American College of Cardiology.

When quantitative techniques are used with single proton emission computed tomography (SPECT), the results are operator independent, said Dr. Berman of Cedars-Sinai Medical Center, Los Angeles.

A quantitative SPECT assessment of myocardial perfusion and function reduces the reliance on expert observers, standardizes results from center to center, facilitates serial assessments, and ultimately improves patient outcomes.

The technology produces reliable assessments of a number of important parameters of cardiac function. (See box.) And numerous studies have shown how these parameters relate to cardiac risk.

For example, pooled data from more



than 17,000 patients show that those with a normal stress myocardial perfusion SPECT had only a 0.6% chance of suffering cardiac death or a nonfatal MI over a mean follow-up of 27 months.

This low rate of cardiac events is especially impressive because these were patients with known or suspected coronary artery disease.

This study included patients who were under either exercise or pharmacologic stress. According to another study, a normal

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DR. BERMAN

stress myocardial perfusion SPECT has less prognostic value if the patient fails to reach at least 70% of the predicted maximal heart rate (PMHR) during exercise.

Among more than 5,000 patients, the cardiac event rate for patients who failed to reach 70% PMHR was more than three times that of those who reached 70%-100% PMHR.

Patients who are unable to reach 70% PMHR during exercise need to undergo myocardial perfusion SPECT with pharmacologic stress, Dr. Berman said.

The presence of diabetes is another factor that modifies a patient's risk after myocardial perfusion SPECT. For any given summed stress score (SSS)—an estimate of

the overall size and severity of a perfusion defect during stress—nondiabetics have the lowest level of risk, insulin-dependent diabetics have the highest level of risk, and non-insulin-dependent diabetics have an intermediate risk.

SSS alone isn't enough, however. The summed difference score, which subtracts the summed rest score from the SSS, is a more reliable measure.

Better still is to normalize these scores based on the maximum possible score. This yields measures the percentage of myocardium perfused that are independent of the specific SPECT system employed. When applied to the summed difference score, the percent myocardium perfused is a measure of ischemia. This measure of ischemia is important in deciding whether to refer patients to revascularization or to treat them with medical therapy.

Studies have shown that patients with extensive ischemia have a much lower risk of cardiac death with revascularization than with medical therapy. On the other hand, patients with less than about 10% ischemia have a lower risk of cardiac death with medical therapy.

For any degree of ischemia, the absolute benefit of revascularization compared with medical therapy will vary with several factors, including left ventricular ejection fraction, the extent of viable myocardium, and underlying patient risk. The absolute benefit of revascularization

Measurements Possible With Quantitative Cardiac Perfusion SPECT

- ▶ Percent hypoperfusion
- ▶ Percent reversibility
- ▶ Lung-to-heart ratio
- ▶ Transient ischemic dilatation
- ▶ Left ventricular mass
- ▶ Left ventricular ejection fraction
- ▶ End diastolic volume
- ▶ End systolic volume
- ▶ Wall motion
- ▶ Wall thickening
- ▶ Peak filling rate

Source: Dr. Berman

is better for women than for men, better for diabetics than for nondiabetics, and better for elderly patients than for those who are middle aged, for example.

Despite its value, cardiac perfusion SPECT does have a number of limitations, Dr. Berman said. Because the test detects only hydrodynamically significant lesions, it won't pick up early atherosclerosis. It also won't pick up some of the patients at the very highest risk, those with a balanced reduction in perfusion. And it may underestimate the extent of ischemia and cardiovascular disease as well as the amount of viable myocardium. ■

Contrast Echo Detects Underlying CAD in Heart Failure Patients

BY DIANA MAHONEY
New England Bureau

BOSTON — For acute heart failure patients with neither a history of coronary disease nor evidence of acute MI, myocardial contrast echocardiography can distinguish ischemic from nonischemic etiology, a study has shown.

The ability to identify underlying coronary artery disease in such patients has therapeutic and prognostic implications, reported Rajesh Janardhanan, M.D., in a poster presentation at the annual meeting of the American Society of Echocardiography.

A noninvasive bedside technique for evaluating acute coronary syndromes, myocardial contrast echocardiography (MCE) provides a simultaneous assessment of regional wall motion and myocardial perfusion using microbubble contrast agents.

To assess the sensitivity

and specificity of the imaging tool in the evaluation of acute heart failure, Dr. Janardhanan of Brigham and Women's Hospital in Boston, and investigators at Northwick Park Hospital in Harrow, England, reviewed the imaging results from 52 consecutive patients with acute

Myocardial contrast echocardiography provides a simultaneous assessment of regional wall motion and myocardial perfusion using microbubble contrast agents.

heart failure with no prior history of coronary artery disease (CAD) and no clinical evidence of acute MI on hospital admission.

All the patients in the study underwent echocardiography and MCE at rest and following dipyridamole stress.

Additionally, all patients underwent coronary arteriography prior to hospital discharge.

On coronary arteriography, 22 of the 52 patients had evidence of CAD, defined as

more than 50% luminal diameter narrowing, Dr. Janardhanan said.

The sensitivity and specificity of MCE for detecting CAD in the 22 patients was 82% and 97%, respectively, with a positive predictive value of 95% and a negative predictive value of 88%.

Among the various markers of CAD, including MCE, clinical variables, ECG, biochemical measures, and resting echocardiographic results, MCE "was the only [statistically significant] independent predictor of CAD," said Dr. Janardhanan.

Both myocardial blood flow reserve and myocardial blood velocity reserve decreased relative to increasing CAD severity, suggesting quantitative MCE data might be an effective tool for stratifying risk in patients with acute heart failure, Dr. Janardhanan concluded. ■

Anemia Portends Poor Long-Term Survival in MI Patients

BY BETSY BATES
Los Angeles Bureau

SAN DIEGO — Anemia is an independent risk factor for long-term mortality after myocardial infarction in both diabetic and nondiabetic patients, a large Canadian study has found.

Researchers at Queen Elizabeth II Health Sciences Centre, Dalhousie University, in Halifax, N.S., studied outcomes in 7,466 patients admitted with acute MI.

Of these, 1,431 had anemia but no diabetes, 1,646 had diabetes but no anemia, and 964 had diabetes and anemia. The remaining 3,425 patients had neither diabetes nor anemia.

Patients fared worse if they had both anemia and diabetes, with greater than 25% mortality at 1 month post admission, and greater than 35% mortality within 30 months, S. Ali Imran, M.B., of the division of endocrinology at the university, reported in a poster displayed at the annual meeting of the Endocrine Society.

Diabetes was a strong independent risk factor for both 30-day and long-term (31 days to 30 months) mortality.

Anemia, defined as a hemoglobin

level of less than 120 g/L in females and 140 g/L in males, did not independently predict short-term mortality, but that may have been because mild degrees of anemia were included.

However, "any degree of anemia has an adverse effect on long-term mortality post myocardial infarction," with each lower quintile of hemoglobin at the time of an MI admission associated with an increased risk of death, noted Dr. Imran.

Long-term mortality in patients with anemia approached 30%, compared with about 13% in patients who did not have anemia or diabetes at admission.

The authors pointed out that patients with anemia tended to be older and male and had worse renal function than other MI patients.

"Since anemia is a marker of an underlying disorder, the etiology of the anemia may explain an increased risk of mortality," they wrote.

The primary cause of death for all patients, including the group with anemia, was cardiovascular.

"Further research examining the potential of correcting anemia is needed in the hopes of reducing long-term mortality," the researchers concluded. ■