Echo Data Help Predict Chest Pain Outcome

BY DIANA MAHONEY
New England Bureau

BOSTON — A novel risk score, comprising measures of wall motion and myocardial perfusion from contrast echocardiography and clinical variables, is a sensitive predictor of 1-year outcome in patients presenting to the emergency department with chest pain prior to obtaining troponin data, reported William Foster, M.D.

In the risk score development model and a subsequent validation model, the tool proved to be more effective for risk stratification than did the use of cardiac troponin measures and clinical variables without the ultrasound data, said Dr. Foster in a poster presentation at the annual meeting of the American Society of Echocardiography.

Dr. Foster and colleagues at the University of Virginia in Charlottesville developed the risk score using clinical and myocardial imaging data from 973 patients presenting to the emergency department (ED) with chest pain that could not easily be attributed to a noncardiac cause and who did not have ST-segment elevation on their admission ECG.

The risk score stratifies the likelihood of developing primary or secondary events within 1 year of chest pain presentation in the ED. Primary events include all cause mortality and myocardial infarction; secondary events include unstable angina, revascularization, and heart failure.

The clinical predictive factors considered in the risk score include age older than 60 years, the presence of three or more coronary disease risk factors, known coronary luminal diameter narrowing of more than 50%, ST-segment deviation on electrocardiogram, two or more angina events in the previous 24 hours, and aspirin use in the previous 7 days. (See box.)

With respect to echocardiographic variables for risk prediction, regional function was characterized as normal or abnormal using a 14-segment model, including 6 segments in each of the basal and midpapillary muscle levels and 2 segments in the apex. Myocardial perfusion was evaluated using the same segmented model and was deemed abnormal if there was no evidence of maximal opacification within a segment by five cardiac cycles. An echocardiographic study was considered abnormal if at least one segment was abnormal for either regional function or myocardial perfusion, Dr. Foster noted.

Each of these predictors is associated with a score between 0 and 100, based on estimates developed using logistic regression models. "The total risk score is the sum of all of these scores," said Dr. Foster.

Among the 973 patients in the development sample, the model showed "excellent discriminatory capacity," with an 86% probability of correct prediction, said Dr. Foster. Approximately 60% of those with total risk scores of 200 or higher, and 30% of those with scores of 150-199, experienced a primary or secondary cardiac event at 1 year. About 17% of patients with scores of 100-149, 7% of those with scores of 50-99, and 4% of those with scores of 0-49 had events within 1 year.

To validate the sensitivity of the scores as potential prognostic indicators, the investigators applied the risk score model prospectively in 232 patients who were followed for up to 1 year.

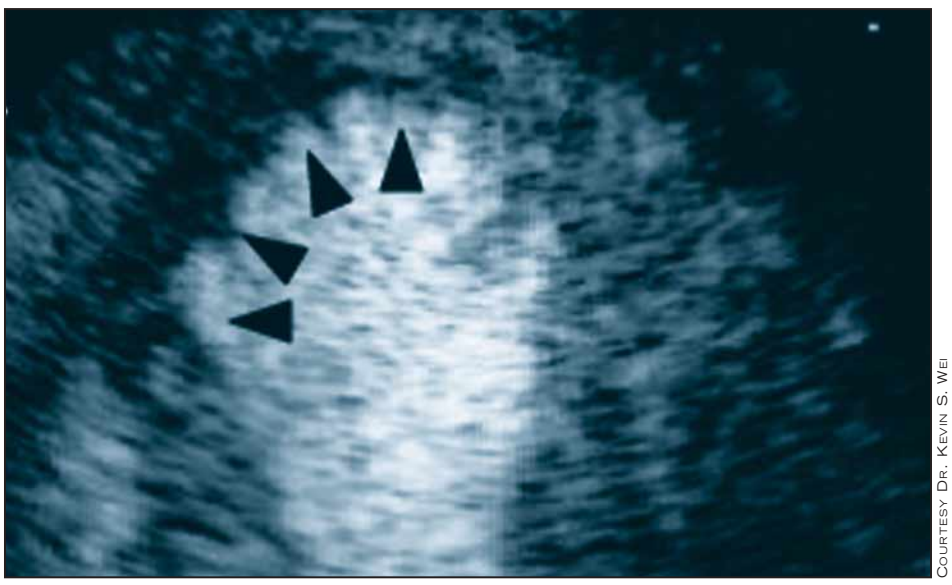
"We saw the same pattern in the validation sample, with a similar prognostic discriminatory capacity between the validation and development samples," said Dr. Foster. In fact, the discriminatory capacity of the risk score "was greater than clinical variables plus serum cardiac troponin," he said.

The ability to formulate prognoses prior to obtaining troponin data could streamline the management of chest pain patients in the ED, Dr. Foster concluded. ■

Risk Calculator for Chest Pain Patients

Risk Variable	Score
Age >60 years	13
≥3 Cardiac risk factors	10
Aspirin use	21
≥2 Episodes of chest pain in 24 hours	73
Known coronary artery disease	44
ST-segment change	50
Abnormal regional function	100
Abnormal myocardial perfusion	37

Source: Dr. Foster



COURTESY DR. KEVIN S. WEI

In this contrast-enhanced image from the apical four-chamber view, arrows show a resting perfusion defect in the mid- and distal septum of a patient with chest pain.

Echo-Based Measure of Left Atrial Function Predicts CAD Outcomes

BY DIANA MAHONEY
New England Bureau

BOSTON — Left atrial function is a sensitive predictor of cardiovascular outcome in patients with stable coronary heart disease, a prospective study has shown.

Of 989 patients with heart disease recruited for the ongoing Heart and Soul Study at the San Francisco Veterans' Affairs Medical Center and the University of California at San Francisco, 8.5% of the 247 patients whose left atrial function index was in the lowest quartile had a cardiac event during the 1-year follow-up period, compared with 4% of the 742 whose indices fell into the upper three quartiles, as reported Pamela Y.F. Hsu, M.D., in a poster presentation at the annual meeting of the American Society of Echocardiography.

"The association between a low index and cardiovascular outcomes persisted after adjusting for smoking, congestive heart failure, other comorbid illnesses, medication use, and left ventricular ejection fraction," said Dr. Hsu of the Mayo Clinic in Scottsdale, Ariz.

To determine the left atrial function index (LAFI), the investigators calculated the time-velocity integral for the left ventricular outflow tract, the left atrial end systolic volume (LAESV) and end diastolic volume (LAEDV), and the LAESV index measurements by using transthoracic echocardiography.

They also measured biplane left atrial volumes and calculated the left atrial ejection fraction (LAESV/LAEDV). The LAFI represents the left ventricular outflow tract time-velocity integral multiplied by the left atrial ejection fraction over the LAESV index, with the whole multiplied by 10 log 4. Using logistic regression, the investigators evaluated the association between the lowest LAFI quartile and cardiovascular outcomes—including myocardial infarction, hospitalization for congestive heart failure, and coronary disease death—and adjusted for potential confounding variables.

In the lowest quartile, the age-adjusted odds ratio for having any cardiac event within 1 year was 3.3, while the specific odds ratios for myocardial infarction, heart failure, and coronary disease death were 3.3, 4.8, and 4.2, respectively.

In the multivariable adjusted model, the odds ratio for any cardiac event was 2.6 and the respective odds ratios for myocardial infarction, heart failure, and coronary disease death were 3.0, 3.3, and 2.2. All of the associations were statistically significant, Dr. Hsu said.

The findings indicate that the LAFI "is a simple, powerful, and clinically useful tool" for predicting 1-year cardiovascular outcomes in coronary heart disease patients, said Dr. Hsu. ■

Neurostimulators Pose Danger During MRI Procedures

Reports of comas and other serious injuries in people with implanted neurologic stimulators incurred during MRI procedures have spurred the Food and Drug Administration to issue a reminder about these risks.

The agency has received "several" reports of coma, permanent neurologic impairment, and other serious injuries in patients who had deep brain stimulators and vagus nerve stimulators in place when they underwent MRI. "Similar injuries could be caused by any type of implanted neurologic stimulator," such as spinal cord, peripheral nerve, and neuromuscular stimulators, according to the warning, issued by the FDA's Center for Devices and Radiological Health.

These injuries probably result when the electrodes at the end of the lead wires heat up, injuring the surrounding tissue, the statement said.

The FDA is recommending that physicians who implant or monitor neurologic stimulators explain to patients about MRI procedures, and stress that they must ask their monitoring physician, before having any MRI, whether it can be performed safely.

The notification includes a list of recommendations for radiologists and health care professionals who use MRI equipment. They include consulting with the referring physician and either reviewing the label or contacting the manufacturer of the specific model of implanted neurologic stimulator to learn the types and/or strengths of MRI equipment tested for the interaction with the device.

The notification also advises that patients be carefully screened for implanted devices before MRI procedures are performed, even if the device has been turned off, and should be asked about devices that have been removed, since some leads or portions of leads can remain in the body after removal and "may act as an antenna and become heated" during the MRI exam.

—Elizabeth Mechcatie