Nuclear Scans Valuable in Emergency Department

BY BETSY BATES
Los Angeles Bureau

LOS ANGELES — Nuclear cardiology scans performed in the emergency department can not only reduce admission rates by ruling out acute coronary syndromes, but also sound the alert on patients who warrant further testing despite normal laboratory tests, ECGs, and even coronary angioplasty.

"You need to detect those unstable anginas. Otherwise, you'll have a lot of potential events walking out your door," Jack A. Ziffer, M.D., medical director of nuclear cardiology for Baptist Cardiac and Vascular Institute, Miami, and Baptist Hospital of Miami, said at a meeting sponsored by the American College of Cardiology.

Other acute coronary syndromes can be missed as well, even by angiography, which misses 3% of MIs and fails to diagnose significant pathology in a third of patients with elevated troponin levels, Dr. Ziffer said at the meeting, cosponsored by the American Society of Nuclear Cardiology and Cedars-Sinai Medical Center.

Spontaneous thrombolysis, prolonged vasospasm, injury location and patient anatomy, and misinterpretation may lead to false-negative test outcomes that might result in a patient being inappropriately discharged. Nuclear cardiology offers a quick, comprehensive look at perfusion and function that can be very helpful in clarifying diagnoses.

Dr. Ziffer described his emergency department (ED) protocol, which has been adopted by Cedars-Sinai and other medical centers. Any patient who presents with symptoms suggestive of a suspected acute coronary syndrome is injected with radionuclide in the ED in preparation for a nuclear scan. A thorough history is taken, laboratory values are assessed, and an ECG and angiogram are performed. Treatment is started based on severity of symptoms and test results. Meanwhile, nuclear imaging is performed after about 30-45 minutes, once some hepatic clearance has been achieved.

Two paradigms direct the myocardial perfusion and function studies ordered for the patient:

▶ **In a patient with ongoing chest pain:** A rest MIBI (^{99m}Tc sestamibi) with gated single-photon emission computed tomography (gSPECT) scan is performed. If this test is normal, along with all other testing, the patient is sent home. If questions are raised, a stress MIBI test is ordered and/or the patient is admitted to the coronary care unit.

▶ **In a patient whose pain has resolved:** A rest thallium SPECT test is performed, and if questions arise, a stress MIBI gSPECT test follows, with results determining whether a patient will be admitted or can go home.

MRI can be helpful, but it cannot determine the age of an infarct and poses a practical challenge, since few MRI units operate in the middle of the night. Nuclear imaging "is straightforward and can be delivered 24/7," Dr. Ziffer said.

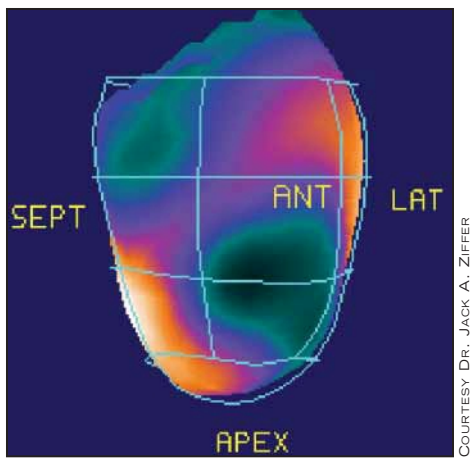
Even an angiogram, which details anatomy, "doesn't necessarily tell you what you need to know," he said. "Coronary arteries can be patent and provide blood to nonviable myocardium. They can be occluded and have perfectly normal myocardium."

Perfusion, ejection fraction, wall motion, and wall thickening are all clues to underlying abnormalities that can be assessed with nuclear studies. Polar maps, for example, quantify wall thickness throughout the heart, which can be helpful when wall motion is not clear. "These are really very powerful tools. When you see 8% thickening and 19%, that's less than normal. You ought to see 30% thickening in normal myocardium, or 40%," he said.

Wall motion is another adjunctive clue within scans performed in the acute setting. "If a defect is present, we ask the question, 'Is wall motion normal or abnormal?' Normal wall motion does not mean that it's an artifact," he said. It may mean the patient has abnormal perfusion, but that the treatment initiated in the ED was effective in treating unstable angina, or that the patient has suffered a small infarct in an area where wall motion cannot be seen.

When wall motion is abnormal, the patient is more likely to have unstable angina and persistent stunning, or an infarct "age unknown; it could be 30 years ago, could be 2 minutes ago, or impending," he said.

Dr. Ziffer stressed that interpretation of nuclear studies requires an understanding of the impact of the delay between injecting and imaging. Perfusion parameters reflect the situation at the time the patient was injected, while cardiac function parameters are assessed in real time, while the patient is under the camera. "Sometimes the perfusion abnormalities we see may not reflect, in patients with resolved pain, for example, the entire jeopardized area."



COURTESY DR. JACK A. ZIFFER

Discrete perfusion defects in a 67-year-old man with atypical epicardial pain.

He described the case of an obese 63-year-old woman with hypertension, with now-resolved chest pain, whose resting scan was normal. Her ejection fraction was 78% and her wall motion parameters were in the normal range. Interpretation of her stress test was complicated by "tremendous breast attenuation" that obscured a significant portion of the heart. The scan should have been repeated with the patient in the prone position, but the patient was discharged. She arrived back in the ER 3 days later with a very large infarct. ■

CPR Often Done Incorrectly, Both In and Out of Hospital

BY TIMOTHY F. KIRN
Sacramento Bureau

Cardiopulmonary resuscitation is often done improperly by rescuers who give too few chest compressions and the wrong amount of ventilation.

Those are the findings of two new studies that are among the first to precisely measure the performance of CPR in real-life situations, both inside and outside the hospital.

CPR has been around for about 50 years, and CPR guidelines are frequently revised. But until now, there has not been a reliable, objective way to measure how well it is being performed, said Lance B. Becker, M.D., a coauthor of the in-hospital study and a professor of emergency medicine and director of the Emergency Resuscitation Research Center at the University of Chicago.

"Now we find that CPR is not being done very well," he said.

The two studies' investigators used a new monitor/defibrillator device that can count how often compressions are given and how much pressure is exerted with each compression. The device, developed by a Norwegian company, also records the rate of volume of ventilations.

In the in-hospital study, Dr. Becker and his colleagues examined the use of the device in 67 cardiac arrest cases. All the rescuers had received proper training in CPR. Guidelines call for 100 compressions per minute and 12-16 ventilations per minute, but in 28% of the cases, the average compression rate was less than 90 compressions per minute during the first 5 minutes of resuscitation. In 61% of the 30-second segments studied, the ventilation rate was more than 20 ventilations per minute. Moreover, 37% of the compressions were too shallow (JAMA 2005;293:305-10).

CPR and advanced cardiac life support training need to be simplified to focus on treating cardiac arrest and to emphasize compression over ventilation.

The out-of-hospital study looked at use of the device in 176 patients who went into cardiac arrest in three European cities and were attended by paramedics or by a nurse anesthetist.

The researchers found that 48% of the times that the rescuers were performing resuscitation, they were not actually giving compressions. When they did perform compressions during the CPR episode, they gave compressions at a rate of 121 per minute—close to the study's target values of 100-120 compressions per minute. But the average number of compressions delivered in a minute was only 64. Rescuers gave an average of 11 ventilations per minute (JAMA 2005;293:299-304).

Neither study was able to look precisely at whether poor performance of the CPR affected patient survival, because neither had enough patients to make that determination. However, in the study performed by Dr. Becker and his colleagues, the investigators did note that patients who had longer intervals without chest compression had worse resuscitation results.

Speaking at the 2004 American College of Emergency Physicians Scientific Assembly, Dr. Becker noted that he and his colleagues have performed another study, of 100 patients, in which the compression rate was counted and recorded by a trained nurse at the scene. In that study, he said, those patients who received 80-100 compressions a minute were significantly more likely to survive than those who did not.

The results of the in-hospital and out-of-hospital CPR studies are not surprising, noted an editorial that accompanied the studies (JAMA 2005;293:363-5). Prior studies have shown low chest compression rates and high ventilations rates, and they have also shown that CPR training is poorly retained, said Arthur B. Sanders, M.D., in the editorial.

The studies suggest that CPR and advanced cardiac life support (ACLS) training need to be simplified to stress managing cardiac arrest and to emphasize compression over breathing, said Dr. Sanders of the department of emergency medicine at the University of Arizona, Tucson.

ACLS training has become more and more complicated over time so that it now includes instruction on stroke and shock and even managing electrolyte imbalances and asthma, he said.

Both the American Heart Association and the International Liaison Committee on Resuscitation are due to update their CPR and emergency cardiovascular care guidelines in the coming year, Dr. Sanders noted. He called on the groups to simplify their guidelines, and to "return to the core mission" in ACLS training.

"It is time to simplify the CPR guidelines and educational programs so that all patients who sustain cardiac arrest can receive optimal treatment," Dr. Sanders said.

Dr. Becker said the device used in his study could also be a major aid in improving resuscitation efforts because it can tell someone administering CPR when they need to speed up their compressions and when they need to slow down their breathing.

Dr. Becker disclosed financial relationships with a series of companies involved in developing the device and is a paid consultant to two of them. ■