

New 80-Lead ECG Can Improve Diagnostic Yield

BY BRUCE JANCIN

NEW ORLEANS — An 80-lead electrocardiographic body-surface mapping system significantly improved detection of acute myocardial infarction and unstable angina, compared with the standard 12-lead ECG.

Use of the 80-lead technology—branded as PRIME ECG—in emergency department patients with chest pain and an

abnormal but nondiagnostic 12-lead ECG should lead to markedly better risk stratification and earlier implementation of appropriate therapy, Dr. James W. Hoekstra said at the annual meeting of the Society for Academic Emergency Medicine.

The 80-lead system includes a single-use disposable vest with 64 embedded anterior and 16 posterior chest leads, along with a computer that enables physicians to view the data as integrated three-di-

mensional color maps. The system also can display each lead individually. The rationale for the FDA-approved 80-lead technology is that the standard 12-lead ECG has major blind spots, most notably in detecting MIs that are posterior, inferior, right-sided, or high lateral, said Dr. Hoekstra, professor and chairman of the emergency medicine department at Wake Forest University, Winston-Salem, N.C.

The OCCULT MI (Optimal Cardio-

vascular Diagnostic Evaluation Enabling Faster Treatment of Myocardial Infarction) trial was a large observational study, in 1,830 patients who presented to a dozen major participating U.S. EDs with chest pain and a history highly suggestive of an ischemic cardiovascular event.

Patients initially received a standard 12-lead ECG. If it showed evidence of an ST-elevation MI, patients were sent to the cardiac catheterization laboratory. If it was nondiagnostic, patients received the 80-lead PRIME ECG. Because the study was observational, physicians remained blinded to the 80-lead ECG findings.

The 12-lead ECG detected STEMI in 88 patients, while the 80-lead ECG increased that yield by 27.5%. But because physicians were unaware of the 80-lead ECG findings, STEMI patients detected by the novel technology were subjected to a conservative and delayed catheterization strategy. As a result of the delay, 30-day mortality in STEMI pa-

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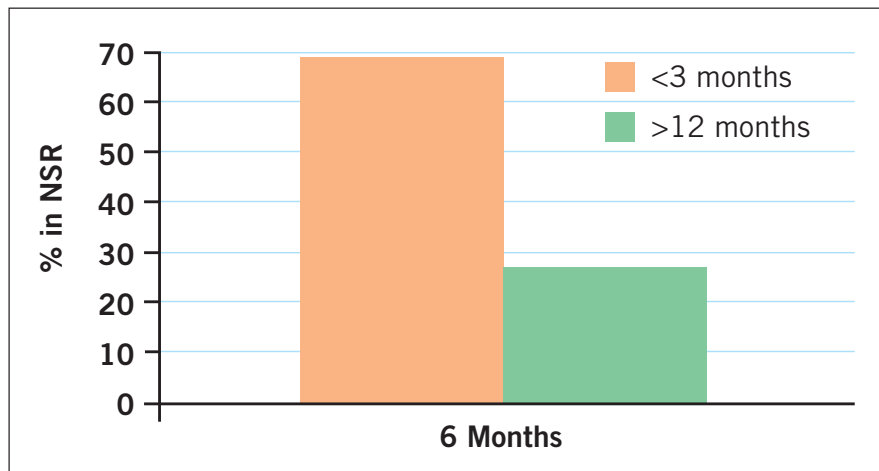


Fig 2. If clinicians do not try to maintain normal sinus rhythm (NSR) promptly, it only gets harder to accomplish over time. Patients converted to NSR within 3 months of developing AF have a 69% chance of maintaining NSR at 6 months compared to only 27% of patients who are in AF for >12 months prior to cardioversion. (Source: Dittrich HC, et al. *Am J Cardiol.* 1989;63:193-197, copyright © 1989 Elsevier.)

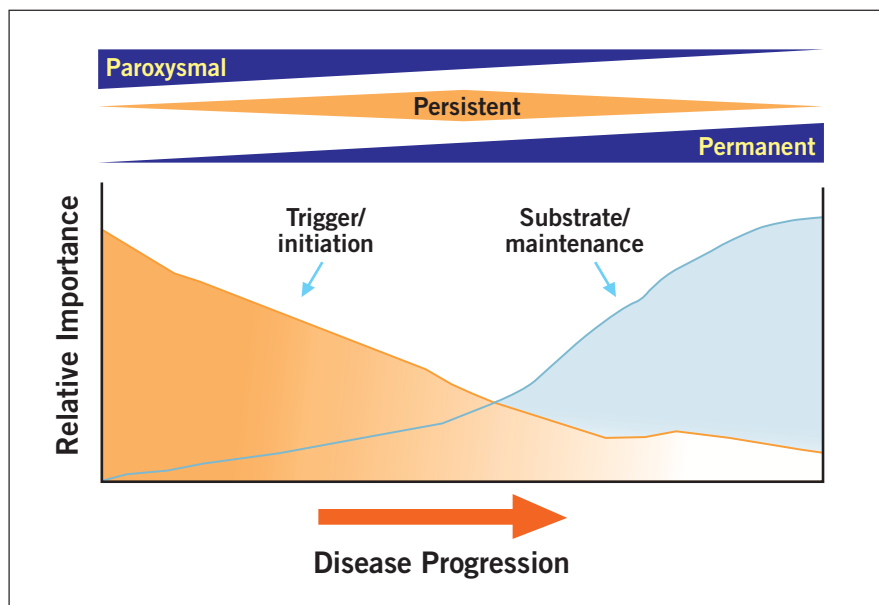


Fig 3. Maintaining sinus rhythm may slow down AF disease progression, including progression to permanent as well as persistent AF. (Courtesy of G.V. Naccarelli, MD.)

terminating. Over time these paroxysms become more frequent, longer, and eventually persistent, requiring medical or direct current cardioversion to terminate the arrhythmia. Eventually, if things continue to progress, the patients will have what we call the ‘permanent’ form of AF—that is, they are in AF all the time.”

In Dr Naccarelli’s view, such progression is related to the concept of remodeling. “There is electrical remodeling that occurs early on, but ultimately there can be contractile and

structural and other forms of remodeling that may progress the disease,” he said. “Basically, there are a lot of data to show that AF begets AF—so there are some theories that sinus rhythm begets sinus rhythm.”

In general, are physicians, including cardiologists, really focused on the progressive aspect of the disease, Dr Naccarelli was asked. “I think physicians sometimes get faked out about the morbidity and mortality because many people will live for decades and be minimally symptomatic, with mini-

mal drugs, and the AF is just a ‘nuisance,’” he said, relating the mindset of some clinicians. “But when you really look at epidemiologic studies, there’s a pretty consistent impairment in the quality of life, there’s a definite increased risk of death, and there’s a risk of worsening heart failure and tachycardia-induced cardiomyopathy. And the biggest concern is thromboembolism and stroke—AF accounts for up to 75,000 strokes a year in the United States alone. I think people are becoming more attuned to the morbidity associated with AF, especially the concern over the association with stroke.”

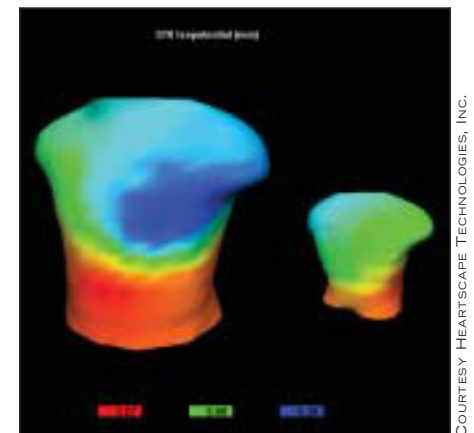
Coping With Comorbidities in Redefining Treatment Success

In terms of comorbid conditions such as stroke and heart failure, just as AF begets AF, Dr Naccarelli emphasized, some observers have argued that congestive heart failure (CHF) begets AF and AF begets CHF. Clinicians need to keep in mind that about 80% of patients they see with AF have structural disease, he added, and that most of them have had such conditions as coronary artery disease, myocardial infarction, ischemic cardiomyopathy, dilated cardiomyopathy, valvular heart disease, and diastolic dysfunction or systolic dysfunction from hypertension. Given such potential changes and in view of AF being a progressive disease, Dr Naccarelli was asked whether that scenario argues for intervening early—and whether the prospect for early intervention, in essence, can redefine treatment success.

“Yes, one of the arguments that we often use is that, even if the patient is minimally symptomatic, if we can maintain sinus rhythm in a patient that can slow the ‘train’ down and hopefully slow the progression of the disease, some of that may have some importance for giving the patient a chance down the road,” he concluded (Fig 3). **R&R**

References

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The mapping system creates full-color images of the heart's electrical activity.

tients detected by 12-lead ECG was 8.0%, compared with 12.5% in those identified by 80-lead ECG.

The study implication is that if physicians had access to the 80-lead ECG findings—as in real-world clinical practice—the patients with occult STEMI would have been diagnosed and revascularized more expeditiously, with correspondingly better outcomes, said Dr. Hoekstra.

OCCULT MI included 202 patients with unstable angina and 206 with non-ST-elevation MI. The sensitivity of 12-lead ECG for detection of NSTEMI was 10.7%, compared with 19.4% for the 80-lead ECG. The 80-lead system identified an additional 18 NSTEMI patients not detected by 12-lead ECG.

The 12-lead ECG had 7.1% sensitivity for detection of unstable angina, compared with 12.3% for the 80-lead system. That represented a 73% improvement over the 12-lead ECG. The 80-lead system identified an additional 21 unstable angina patients. Specificity for ACS was high with both types of ECG, but favored the 12-lead ECG, which had 96.4% specificity for NSTEMI, compared with 93.9% for the 80-lead ECG, a statistically significant difference.

Dr. Hoekstra disclosed that he serves as a consultant to HeartScape Technologies, Inc., which funded OCCULT MI and markets the PRIME ECG. ■