Cardiac MRI Beats Echocardiography In Diagnostic Subtleties of Heart Failure

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SAN FRANCISCO — Cardiac MRI with late gadolinium enhancement is the imaging technique of choice when the goal is tissue characterization and infarct detection in heart failure. Christophor M. Kramer, M.D., said at a cardiovascular imaging conference sponsored by the American College of Cardiology. While echocardiography—especially 3-D echocardiography—does have its advantages, cardiac magnetic resonance (CMR) provides outstanding image quality, excellent quantification, and tissue characterization, said Dr. Kramer. Of the University of Virginia, in Charlottesville. Gadolinium contrast, which is easy to use and safe with CMR, also offers the ability to assess intramural function.

On the other hand, CMR devices are not portable, are quite expensive, and not readily available. Physicians need extensive training in the use of CMR and the technique is suitable for patients with implanted metallic devices such as pacemakers and implantable cardioverter-defibrillators. Furthermore, assessment of diastolic function is not routine with CMR.

Echocardiography does have a number of advantages. The devices are portable, relatively inexpensive, and readily available. Generations of cardiologists have established its validity, and all cardiologists days of follow-up, said Dr. Kramer. Contrast can be added to echocardiography, and the assessment of diastolic function has become routine.

But echocardiography is subject to variable image quality and poor windows. Results tend to be qualitative, and quantification can be difficult. Newer 3-D echocardiographic techniques address some of these issues, but these devices are not widely available.

Gadolinium-enhanced CMR has come routine. A smaller group of patients with ischemic heart disease has been investigated, and the disease is more prevalent in women and those with ischemia or Chagas' disease. In one study, 90 patients were divided into groups: 63 with dilated cardiomyopathy and 27 with coronary artery disease. Gadolinium-enhanced CMR has proven to be especially useful in determining whether cardiomyopathy is ischemic or nonischemic. In one study of 90 patients with ischemic cardiomyopathy and 27 with coronary artery disease, patients undergoing CMR showed myocardial hyperenhancement consistent with coronary artery disease, and 28% had wall hyperechogenicity (Circulation 2003;108:54-9).

Enhanced CMR is also useful as a marker of late-stage myocarditis. In a study of 32 patients with myocarditis, investigators noted enhancement in 28 (88%) of them, with the lateral free wall the most common site. Twenty-one of the patients had biopsy in the area of enhancement, and active myocarditis was detected in 19. Of the other 11 patients, only 1 had active disease (Circulation 2004;109:1240-8).

Other studies have shown the value of enhanced CMR in hypertrophic cardiomyopathy, amyloidosis, sarcoidosis, and Chagas disease.

Dr. Kramer concluded that echocardiography is fine for first-line procedures, especially for diastolic function and when "quick and easy" is adequate. CMR, on the other hand, is best for regional systolic function, for differentiating myocarditis and tissue characterization, and whenever quantification is needed and 3-D echo is unavailable.