
RSNA Press Release

New Cardiac MRI Pinpoints Closed Arteries Without Surgery

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OAK BROOK, Ill.—A new cardiac magnetic resonance imaging (MRI) technique can noninvasively demonstrate blockage of the coronary arteries with high diagnostic accuracy, according to a study featured in the July issue of Radiology. Researchers at Massachusetts General Hospital (MGH) and Harvard Medical School in Boston and Beneficencia Portuguesa Hospital in Sao Paulo, Brazil compared their new imaging technique against the current diagnostic standard, coronary angiography, which is an invasive procedure. The MRI findings yielded an accuracy of 88 percent.

"We have shown that cardiac MRI can be used reliably as an alternative to other more invasive detection techniques, due to its high diagnostic accuracy, its comprehensive evaluation of cardiac function, perfusion and viability and the lack of radiation exposure," said Ricardo C. Cury, M.D., lead author and director of clinical cardiac MRI at MGH.

More than 13 million Americans have coronary artery disease (CAD); it is the number one killer in the Western hemisphere. Although coronary angiography is the current standard for detecting CAD, it is an invasive procedure that involves running a tube from a blood vessel below the heart up toward the heart itself, and then releasing contrast material into the arteries so they are visible on x-rays. There is a need for a preliminary, noninvasive way to assess the arteries to learn if such invasive investigation is required.

The authors applied a technique called stress first-pass perfusion MRI in combination with a delayed contrast-enhancement technique. This approach is different than the typical MRI sequences used to investigate the coronary arteries. With this combined technique, the researchers injected patients with a contrast material and then performed MRI at timed intervals to see if there was heart muscle ischemia attributable to coronary artery blockage and if there was damage (either tissue death or scarring) that indicated a prior heart attack.

At A Glance

- A new combination of contrast enhancement techniques during cardiac MRI demonstrates coronary arterial blockage with high diagnostic accuracy.
- Cardiac MRI is noninvasive, safe and involves no radiation exposure.
- Coronary artery disease is the number one killer in the Western hemisphere.

In total, 46 patients with chest pain were enrolled in the study. All were scheduled to undergo coronary angiography. The patients were divided into two groups. The first group included 32 patients suspected of having CAD, and the second included 14 patients with prior history of heart attack and suspected new arterial lesions. The MRI protocol included assessment of the left ventricle of the heart and blood flow during medicinally induced cardiac stress and rest and myocardial damage (delayed-enhancement technique). After MRI was completed, coronary angiography was performed for comparison.

Traditional angiography demonstrated significant CAD in 30 of 46 patients (65 percent). Of these 30 patients, MRI demonstrated CAD with an accuracy of 88 percent. In patients with only one diseased vessel, the accuracy of MRI increased to 96 percent. In patients who had previously undergone bypass graft surgery, the accuracy of MRI was 90 percent.

Because of the diagnostic accuracy of this new MRI technique, it can potentially be used to enhance clinical decision-making and guide appropriate disease management; for example, when deciding whether or not to proceed with a more invasive modality like cardiac catheterization or coronary artery bypass surgery.

"In addition to diagnostic accuracy, cardiac MRI is safe," Dr. Cury added. "It can provide information about the anatomy, function, blood flow and damage that the heart has sustained. MRI can also be used to assess the blood vessels in the body."

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"Diagnostic Performance of Stress Perfusion and Delayed-Enhancement MR Imaging in Patients with Coronary Artery Disease." Collaborating with Dr. Cury on this paper were Cesar A. M. Cattani, M.D., Ph.D., Luiz A. G. Gabure, M.D., Douglas J. Racy, M.D., Jose M. de Gois, M.D., Uwe Siebert, M.D., Sergio S. Lima, M.D., and Thomas J. Brady, M.D.