
RSNA Press Release

Novel MRI Technique Images Dangerous Aortic Lesions Quickly

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OAK BROOK, Ill., March 26, 2002 -- A new magnetic resonance imaging (MRI) method provides fast evaluation when time is critical for patients presenting with signs of an aortic aneurysm threatening to rupture, according to a study published in the April issue of *Radiology*.

Even more life-threatening than aortic aneurysm is a "dissection" in which blood has forced its way between the layers of the aortic wall, drastically weakening it. In either situation, aortic rupture may be fatal in less than an hour. Up to now, the best diagnostic testing that could be done was to perform an x-ray study such as a radiograph or computed tomography (CT). CT imaging is rapid and accurate but requires iodinated contrast material which can have a negative impact on kidney function. Previous MRI methods to evaluate the aorta take a minimum of 10 minutes and as much as 45 minutes to complete.

The new MR imaging method, called TrueFISP MR angiography, requires no contrast material and takes only four minutes on average to precisely gauge the state of the aorta in multiple planes, as reported by F. Scott Pereles, M.D., and colleagues from the Department of Radiology at Northwestern University Medical School in Chicago and the University of Arizona Health Sciences Center in Tucson.

"Our pilot study," says Dr. Pereles, "shows that TrueFISP can be used quickly and accurately to evaluate the aorta for the presence or absence of suspected disease." TrueFISP is a type of pulse sequence. This is the pattern of magnetic signals sent out by an MR unit to return as echoes, which reflect the anatomy of various body tissues and organs to highlight any lesion that may be present. Using the TrueFISP sequence, the signals are balanced in such a way as to provide maximum contrast within the image and reduce artifacts (a common problem with some MR techniques). All MR studies avoid exposing patients to x-rays; TrueFISP imaging also does away with the need to inject a contrast dye intravenously, as required with CT, and eliminates the added cost or possible side effects this may produce, which can include allergic reactions and, in rare cases, kidney damage. Sequential images may be combined to make a TrueFISP "movie" that demonstrates changes in the appearance of the aorta over time.

The machines needed to perform TrueFISP imaging are the same ones used for standard neurological or musculoskeletal examinations with high performance (ultrafast) magnetic gradients. This capability is not yet present at all hospitals. Patients need hold their breath for only 5 to 8 seconds - well within the reach of most patients, even those who are ill. In Dr. Pereles' experience, no more than 15 percent of patients experience claustrophobia during the procedure.

In the reported trial, 29 consecutive patients suspected of having - or known to have - an aortic aneurysm or aortic dissection had both TrueFISP imaging and three-dimensional contrast-enhanced MR angiography. The latter, considered to be the definitive study, is a high-spatial-resolution exam providing detailed anatomical information. With two readers independently examining all the studies, the TrueFISP method detected all 11 aortic dissections and all 7 aneurysms. Equally important, all nine patients with a negative TrueFISP reading also had a normal contrast-enhanced study. MR angiography identified cases of arterosclerosis with ulceration in two patients. A single case of intramural hematoma caused during a cardiac catheter injection study was also demonstrated by TrueFISP. One patient had both a dissection and an aneurysm. Both readers felt extremely confident in making each diagnostic decision.

A very robust technique, TrueFISP MR angiography now is standard practice for all aortic and cardiac examinations at Northwestern University Medical School. Some of the reasons:

- A very rapid and accurate diagnosis of critical aortic lesions, where minutes may make a difference, will save lives by permitting immediate surgical repair.
- TrueFISP MR imaging is highly reliable both in confirming a clinical diagnosis of aortic disease and ruling it out. It also helps to decide whether further aortic imaging is needed.
- Iodinated contrast medium, with its risk of compromising renal function, is avoided.
- There is no x-ray exposure.

In summary, Dr. Pereles believes that "TrueFISP MR angiography has proved extremely useful in evaluating the aorta for disease."

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"Unenhanced TrueFISP MR Angiographic Evaluation for Thoracic Aortic Dissection and Aneurysm in Less than 4 Minutes." Collaborating with Dr. Pereles on this report are Richard M. McCarthy, M.D., Visveshwar Baskaran, BA, James C. Carr, M.D., Vipul Kapoor, M.D., Elizabeth A. Krupinski, Ph.D., and J. Paul Finn, M.D.

