Cardiac MR a valuable tool for stress testing

Cardiac stress MR at 3.0T provides detailed, non-invasive cardiac images
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Mackay Memorial Hospital (Taipei, Taiwan) is a medical center with more than 1200 beds. Since installation of its Achieva 3.0T in September 2009, the hospital has performed more than 600 cardiac stress MR exams. Along with the hospital’s Chief of Radiology, Fei-Shih Yang, MD, and Chief of Cardiology Jen-Yuan Kuo, MD, clinicians at Mackay are discovering the benefits of cardiac MR stress testing.

According to radiologist Chun-Ho Yun, MD, many people in Taiwan, with and without coronary risk factors, have no cardiac symptoms, but want to know if they have any coronary stenosis. Many of these people undergo MDCT (Multi-Detector CT) because CT is easily accessible in Taiwan. “Unfortunately, over the age of 40, most people have some plaque. So in Taiwan we have many, many people who show significant stenosis on MDCT, without any symptoms,” says Dr. Yun.

Cardiac MR has distinct advantages
In some cases, cardiologists may send the patient to nuclear medicine for further testing, or may perform an intervention like stenting. But at Mackay, cardiologists are beginning to refer patients more often to Dr. Yun for stress MRI instead of CT, or in addition to it.

The reasons for this are many. Citing European Society of Cardiology* and American Heart Association guidelines, Dr. Yun says, “In patients with single vessel blockage, without a significant positive non-invasive stress test, or Fractional Flow Reserve (FFR) of less than 0.8, stenting is of no benefit to the asymptomatic patient.”

Unlike angiography and FFR, however, cardiac MR (CMR) is completely non-invasive. And unlike CT and nuclear medicine.

* See www.escardio.org/guidelines-surveys/
MR avoids x-ray exposure. “A CT study already gives the patient around 10 millisieverts (mSv) of radiation,” says Dr. Yun, “so if the patient has another stress test with nuclear medicine, at about 20-30 mSv, the patient already has received 40 mSv of radiation. But using stress MRI we give the patient no radiation at all.”

**Excellent SNR produces reliable results**

“CMR on Achieva 3.0T provides very good image quality and it’s very clear-cut. At 3.0T, the signal-to-noise ratio is superb, especially with the 32-channel SENSE cardiac coil, which provides excellent image quality.”

**Cardiologists see value in CMR**

“In my opinion, stress cardiac MR has diagnostic value, even in patients with CAD,” says Cheng-Ting Tsai, MD, cardiologist at the hospital. “It could not only help diagnose ischemia but also aids in post-infarction status and in clinical judgment such as doing PCI or not.”

Dr. Tsai orders stress MRI for MVD or high-risk patients with nuclear medicine negative, or borderline results; post-myocardial infarction; and post-CABG status with angina/heart failure equivalent. “I hope to soon bring stress MRI to our first-line examinations,” he says.

“We feel very comfortable about the results from stress MRI, even my cardiologist colleagues. My CMR results really help our cardiologists to diagnose and monitor their patients,” says Dr. Yun. “In our experience, stress CMR could play an excellent role in the diagnostic pathway.”

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**3.0T cardiac MR flow analysis of aortic regurgitation**

46-year-old male with dyspnea in exertion. No CAD risk factor. Moderate aortic regurgitation was diagnosed by cardioechography. Referred to Cardiac MRI for pre-operative evaluation.

In CINE imaging, the regurgitant from aortic root to LVOT is easily seen, consistent with the echo finding of aortic regurgitation. On the Q-flow exam, severe regurgitant volume was present. the post-processing result shows a forward flow volume of 239.9 ml, a backward flow volume of 148.4ml, a regurgitant fraction of 61.9%

Achieva 3.0T with 32-channel SENSE Cardiac coil is used. Qflow done with Venc 250.

Before surgery for cardiac valvular replacement, CMR could aid in most accurate evaluation of flow measurement in aortic regurgitation and aortic stenosis. CMR is much less affected by patient body size and operator dependent than cardiac echography.

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