Multidetector CT Accurate in 'Real-World' Patients

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WASHINGTON — Multidetector CT angiography appears to be very accurate in diagnosing coronary artery disease even in less-than-ideal patients, according to data presented at the annual meeting of the Society of Cardiovascular Computed Tomography.

While published studies have shown impressive diagnostic sensitivity and specificity for 64-slice CT in the assessment of coronary artery disease (CAD), patients with irregular heartbeats or allergies to β-blockers have tended to be excluded. In addition, patients with histories of coronary disease or those with high calcium scores sometimes were excluded.

"MDCT studies that have been published … have been highly selective of all the patients they have picked to determine diagnostic accuracy of CT," said Dr. Amgad N. Makaryus, a cardiologist at North Shore University Hospital in Manhasset, New York. He and his colleagues evaluated the accuracy of 64-detector scanning compared with coronary angiography in a real-world population, at North Shore University Hospital, a large tertiary care center. The facility is a referral center for hospitals on Long Island. About 10,000 cardiac catheterizations are performed there yearly. In addition, 4,000-5,000 single-photon emission computed tomography myocardial perfusion studies are performed annually.

The study involved 1,818 consecutive patients who underwent coronary CT (64-detector). β-Blockers were used as much as possible. Calcium channel blockers were used in patients who had contraindications to β-blockers. The imaging protocol involved an 8- to 10-second breath hold with a 5- to 7-second image-acquisition time.

Overall, 17% of patients had a history of coronary disease; 10% had a history of atrial fibrillation or flutter. The mean heart rate during CT studies was about 58 beats a minute. Chest pain and abnormal stress test were the most common indications.

Specifically, the researchers assessed those patients who underwent invasive angiography based on their MDCT results. A total of 41 patients were referred for coronary angiography for 164 coronary arteries (410 coronary segments). The mean age was 62 years (range 39-85 years) and the population was almost three-quarters male (73%). Stenosis of greater than 50% was considered significant.

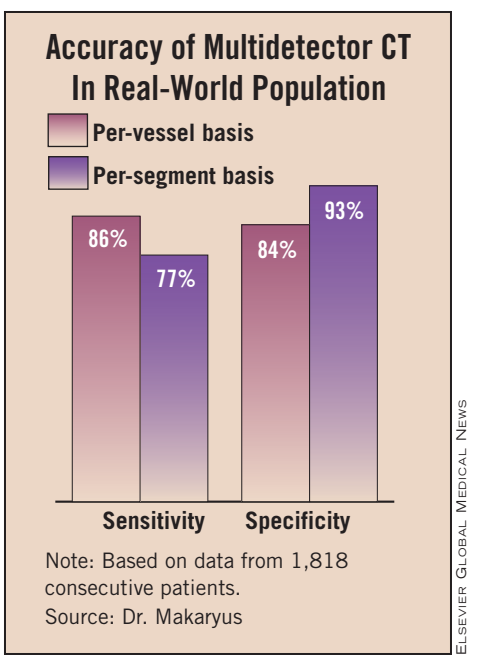
On a per-vessel basis, the sensitivity of MDCT was 86% and specificity was 84%. The positive predictive value was 65%, and the negative predictive value was 85%.

"Still we have this very high negative predictive value as has been seen in many of the prior studies," said Dr. Makaryus. On a per-segment basis, the sensitivity of MDCT was 77% and specificity was 93%. The positive predictive value was 61%, and the negative predictive value was 97%.

Calcium is a particular problem in CT angiography. Calcified plaques appear enlarged (or bloomed) because of partial-volume averaging effects and obscure the adjacent coronary lumen. This effect can lead to false-positive results because the degree of stenosis is overestimated.

The mean calcium score in this group was 789. "More of the patients that had higher calcium scores actually had a disagreement between their CTA result and the invasive coronary angiogram," he said. "Our false positives tended to be those patients who had higher calcium scores and this neared statistical significance."

Dr. Makaryus, who disclosed that he had no significant conflicts of interest, was a postdoctoral clinical cardiovascular imaging fellow at New York–Presbyterian Hospital, New York, during 2006-2007. ■



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Pages 16a—16b