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A Group Effort

Cardiologists and radiologists collaborate with coronary CT angiography

By Janine Anthes

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Although coronary artery disease (CAD) remains the leading cause of death in the United States, advances in cardiac imaging tools have provided physicians with better weapons to fight heart disease. This has put cardiac imaging front and center to help physicians diagnose and assess the disease early and accurately.

Cardiac imaging has been a hot topic for several decades as the modality continues to evolve. Although the gold standard for detecting CAD is still conventional invasive coronary angiography, the invasive aspect of the procedure, as well as its inability to detect early atherosclerotic disease in patients with low or intermediate risk of CAD, have provided opportunities for better imaging modalities to step in and address those deficiencies.

An advanced noninvasive test, coronary CT angiography, has addressed these limitations. It is the first modality that can quickly and reliably diagnose – and, most importantly, accurately assess – the presence and/or progression of CAD.

In some cases, the modality has heated the relationship between radiologists and cardiologists. However, coronary CT angiography has been proven to better benefit practices, clinics, and patients when the two specialties work together rather than against each other. Collaborations between cardiologists and radiologists are emerging in several hospitals and clinics – an ideal balance of responsibilities that relies on the recognition that both specialties bring expertise to the table.

“Coronary CT angiography is the first major cardiac imaging modality for which there is a general consensus that it’s done better by a collaboration between cardiologists and radiologists than by either one alone,” says Daniel Berman, MD, president of the Society of Cardiovascular Computed Tomography (SCCT). “That’s good news for radiology.”

Berman is the director of cardiac imaging at Cedars-Sinai Medical Center in Los Angeles and a professor of medicine at the David Geffen School of Medicine at University of California – Los Angeles.

All For One

“There is a sudden resurgence in interest by both cardiologists and radiologists due to coronary CT angiography because it allows us to see coronary arteries directly and noninvasively, as opposed to obtaining information that indirectly reflects the status of the arteries – for example, myocardial perfusion SPECT,” says Jack Ziffer, PhD, MD, president-elect of the SCCT.

Ziffer is chief of radiology at Baptist Hospital of Miami and the director of cardiac imaging at the Baptist Cardiac and Vascular Institute in Miami.

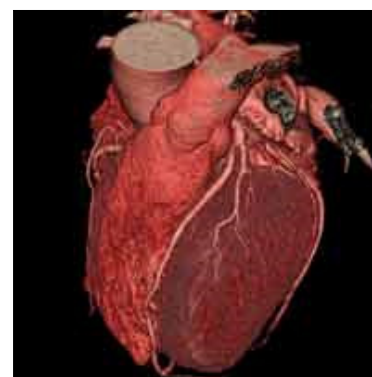
The new modality advancement allows physicians to observe the coronary arteries and the beating heart with high spatial and temporal resolution. Coronary CT angiography has been documented to be the most accurate noninvasive test for the detection of coronary artery disease – a statement not debated. It provides anatomic information about the presence of plaque and narrowing in the coronary arteries at a stage before they would become hemodynamically significant.

“The other imaging methods require an obstructive lesion to be present,” says Ziffer. “All of the other modalities used to detect coronary artery disease rely on the inability of partially obstructed vessels to increase its bloodflow sufficiently with a stress stimulus. That isn’t the case with CT – it can detect plaque earlier.”

Contributing Expertise and Knowledge



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Severe stenosis of the left anterior descending coronary artery in a 53-year-old patient with chest pain. The narrowing is immediately distal to the origin of a large diagonal branch. This is a CT data set after injection of contrast agent and 3-D rendering. (Stephan Achenbach, MD)



Calcification of the coronary arteries depicted by CT without contrast

Radiologists and cardiologists have been involved in the development of coronary CT and the basic research involved. "Both specialties have been instrumental in defining how to perform the studies and in whom the studies would potentially benefit," Ziffer says. "It is the first substantial time in a potentially competitive environment that the largest parent societies for each group, that is the [American College of Radiology] and the [American College of Cardiology], have developed a cooperative relationship."

The cornerstone of collaboration between radiologists and cardiologists is education. In order for the relationship to work, physicians must pair their knowledge of cross-sectional cardiac anatomy with an understanding of cardiac disease. The philosophy behind an effective partnership is to allow the individual with the most expertise in the portion of the body to interpret the study.

According to Berman, radiologists may be better suited to detect problematic conditions in other structures that may appear in the CT scan. In addition, radiologists might be most likely to have more knowledge regarding the mechanisms of CT. Cardiologists, on the other hand, have greater expertise in coronary anatomy and can better contribute knowledge from a clinical perspective.

"There is a lot of overlap with the fund of knowledge. Cardiologists may have greater expertise in defining a treatment recommendation for a patient, and a radiologist may help identify important incidental findings," says Ziffer. "Putting a team together to approach the process creates a synergy, where both are contributing different perspectives."

Different Teams in Different Settings

"In general, radiologists will be thinking of cardiac imaging in two major applications," Berman says. "One of them is in the emergency department, and the other one is in an outpatient setting where patients present with chest pain."

Individual environments, like the emergency room, or settings where outpatients are electively scheduled might require a different team of professional expertise in order to optimize patient care. To create the team, several questions should be answered: Who in the particular facility is more qualified to determine what patients should receive beta-blockers and what dose? Who better understands the instrumentation? Who better understands the anatomy?

In the emergency room, coronary CT angiography can be used to simultaneously rule out significant CAD, pulmonary embolism, and thoracic aortic dissection. This is known as "triple rule-out," a method used to obtain rapid, adequate diagnostic information necessary for the management of patients presenting with acute chest pain.

"It's almost a shotgun approach to determine if the patient has conditions such as pulmonary emboli dissection, pneumonia, a broken rib, or coronary disease, for example. You clearly need radiology expertise," Ziffer says.

In this situation, two bodies looking at the same study may unnecessarily increase costs as well as the intensity of effort. However, in elective scheduling patients, a different team or specialists may be required.

In a setting where outpatients are electively scheduled, patients undergoing evaluation of coronary artery disease might benefit more from a team of radiologists and cardiologists to accurately assess the condition.

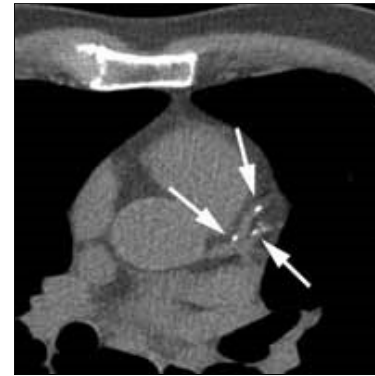
Cost-Effective and Efficient in the ED

The use of coronary CT in the emergency department has been proven to be as effective as nuclear imaging and stress testing. However, it is faster than these conventional imaging techniques. It provides physicians with an effective and safe test that will lead to more rapid patient discharge, which not only benefits the patients but also reduces hospital costs.

Additionally, if a coronary CT angiography reveals that the patient is normal and healthy – which is frequently the case in patients who have a relatively low risk of coronary disease – they not only can be discharged more rapidly, but findings also allow their physicians to pursue other medical conditions that may be causing the chest pain. This may decrease unnecessary emergency room visits in the future.

Berman explains that in the outpatient setting, coronary CT can detect the disease early enough to affect the medical management

enhancement (Stephan Achenbach, MD)



Calcification of the coronary arteries depicted by CT without contrast enhancement (Stephan Achenbach, MD)

Cost-Effectiveness of CT Angiography

A recent study published in the *Journal of Neuroimaging* has found that CT angiography may be an effective, cost-saving alternative to standard catheter angiography testing to accurately verify the presence of internal carotid artery (ICA) occlusions.

Although CT angiography provides similar effectiveness to catheter angiography for confirmation of a suspected ICA occlusion, this is the first study that has evaluated the cost-effectiveness of the modality compared to invasive coronary angiography – a technique that carries with it greater risk due to its invasive nature as well as its risk for stroke.

A research team from the University of Michigan's Stroke Program, Ann Arbor, led by Devin L. Brown, MD, MS, compared the cost benefits of catheter angiography versus CT angiography on a hypothetical group of symptomatic patients with a screening examination consistent with an ICA occlusion. Based on standard Medicare reimbursement statistics, the two-year cost in the CTA scenario was \$9,178, and for catheter angiography, \$11,531 – demonstrating an overall net savings of a \$2,353 for CTA.

Additionally, the effectiveness of CT angiography compared to catheter angiography was measured in quality-adjusted life years; researchers found that CT angiography resulted in an additional 1.83 quality-adjusted life years compared to 1.82 quality-adjusted life years accumulated by catheter angiography.

The screening assessment suggests that CT angiography can be used as a less expensive alternative to catheter angiography for confirmation testing of ICA occlusion.

– J.A.

strategies, such as use of statin drugs and diet and exercise programs. "This may appear as a normal reading on the stress test, and physicians wouldn't have known that the patient needed such aggressive treatment," he adds.

Furthermore, a normal study with a coronary CT angiography performed in a setting where outpatients are electively scheduled may decrease downstream testing costs. Physicians do not have to repeat testing in the future when patients periodically return due to chest pain. "If their reading was completely normal on a CT coronary angiogram, the modality's accuracy ensures there is no need for repeat testing at that time," says Berman.

Society of Cardiovascular Computed Tomography

The SCCT is a professional medical membership organization that addresses all issues pertaining to the field of cardiovascular CT. It represents physicians, scientists, and technologists advocating for research, education, and clinical excellence in the use of cardiovascular CT.

"This is the first time I've really seen a multidisciplinary specialty work at the highest level of cooperation from two different specialties – we're both trying to engage the other and draw from each other's wisdom, knowledge, and passion," says Ziffer.

Part of the mission statement of the SCCT is to cultivate close working relationships with other societies in the fields of cardiology, radiology, vascular surgery, and vascular disease. The society currently is made up of between 20 percent and 30 percent radiologist members and 70 percent cardiologists, with the hope that it will one day be 50/50.

In addition, the SCCT greatly supports coordinated research efforts to promote further development and applications of cardiovascular CT as well as investigate accuracy, effectiveness, and efficiency in cardiovascular diagnosis.

There is clearly a learning curve for both specialists to acquire adequate experience using coronary CT angiography and determine who should or shouldn't have the test. "In capable and trained hands, [coronary CT angiography] performs exceptionally well as the best diagnostic test for coronary artery disease, best noninvasive test for coronary artery disease that there is," says Ziffer.

A major proponent of CCT education, the SCCT offers several education and training courses to healthcare professionals in an effort to foster optimal clinical effectiveness, enhance patient care, and improve the quality of cardiovascular medical practice.

Obstacles for Coronary CT Angiography

Currently, coronary CT angiography is paid for by Medicare but not by many private carriers. Berman estimates that around half of private carriers cover coronary CT angiography while the other half requires more evidence of the modality's efficacy.

Reimbursement issues hinder physicians' decisions whether or not to use coronary CT angiography. "That lack of certainty about coverage – this challenge is holding the field back quite significantly," says Berman.

According to Berman, payment is not currently available for both a cardiology and radiology reading, and the reimbursement for these studies will most likely be very low in the current environment.

"We're not sure how that's going to be handled. Perhaps one way would be, in a hospital setting if cardiology is doing the procedures to have the radiology part covered [by the] hospital," Berman says. "But that may not catch on. Somehow it will have to be handled practically."

Regardless of future obstacles, the advancement of coronary CT angiography is an opportunity for growth in radiology in the area of cardiac imaging. Nationwide, most cardiac imaging has been in the hands of cardiologists – even within hospitals in cardiac catheterization, coronary angiography, echocardiography, and the majority of the nuclear cardiology and cardiac MRI, for example.

"The advancements in coronary CT angiography have created an area where radiology has a tremendous opportunity in the area of cardiac CT to play a significant role in the development of a new field," Berman says.

– Janine Anthes is a New Jersey-based freelance writer. Direct all questions and comments to editorial@rt-image.com.

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