New Techniques in Heart Disease Detection: Coronary Artery Calcium Scoring

A 51-year-old man with a strong familial history of coronary artery disease (CAD) and borderline elevated cholesterol saw his primary care physician and expressed concern about his overall cardiovascular risk and CAD prevention. His physician referred the patient to Dr. Salvatore Carbonaro, Cardiologist at Stamford Health Medical Group, for an evaluation. “Based on newly proposed risk algorithms, this asymptomatic patient was at low-to-intermediate risk for cardiovascular disease, and was appropriately concerned given his premature familial CAD risk,” said Dr. Carbonaro. “I recommended he undergo calcium scoring to more precisely assess his risk and to provide him with the best possible recommendations for heart disease prevention.”

Coronary artery calcium scoring is a screening test that uses computed tomography to visualize and quantify calcium deposits in the coronary arteries, which can serve as an indicator of CAD burden. Test results are expressed as an Agatston (composite) score: a score of zero indicating the absence of calcified plaque, a score from 100 – 400 correlating with moderate CAD, and over 400 indicating more extensive CAD.

“It is known that elevated coronary calcium scores independently predict cardiovascular events, and that assessment of calcium burden also adds incremental predictive power to traditional heart disease risk factors like high blood pressure and high cholesterol,” said Dr. Carbonaro. “Calcium scoring can help identify adults who are higher risk patients but are not identified as such based on traditional risk estimation and therefore miss out on potentially very powerful risk reducing interventions, namely statin therapy.”

This patient’s calcium score was 634, which represented the 97th percentile for his age, gender and race cohort. “In this case, the patient’s calcium score enabled us to determine that he is actually at higher risk for heart disease than was otherwise suggested by traditional risk factor algorithms,” explained Dr. Carbonaro. “Based on his calcium score we initiated statin therapy and recommended more aggressive lifestyle changes.”

Armed with this additional knowledge, both Dr. Carbonaro and the patient feel more confident that they are doing all they can to lower his risk for heart disease.

“Calcium scoring is now a recognized and widely accepted tool to identify people who are at potentially higher risk for heart disease and to help inform our treatment decision-making process,” said Dr. Carbonaro. “However, it is not yet known whether identifying individuals at higher risk by their calcium score and treating them based on that score lowers their risk for future events.”

Calcium Scoring Practice Guidelines & Key Information

- A calcium score of zero has a very high negative predictive value for future adverse cardiovascular events. Increasingly positive (non-zero) calcium scores are directly proportional to increased heart event risk, and a calcium score >400, or a score >75th percentile for a patient’s age/gender/risk cohort, indicates higher risk.
- The risks associated with calcium scoring involve some radiation exposure but the amount of radiation is very low with little associated risk.
- Routine serial determination of CAC scores to assess for changes or progression in coronary calcium is currently not recommended.

Sources:
Cardiac computed tomography angiography (CTA) is an innovative, state-of-the-art imaging modality for coronary assessment. Compared to stress tests and cardiac catheterization, which has long been considered the “gold standard” for detecting coronary stenosis, cardiac CTA can more precisely detect earlier signs of arterial disease such as the presence of soft plaque in the arterial wall. Evaluation with cardiac CTA is particularly useful in patients who have equivocal stress tests or for whom symptoms are suggestive but the stress test was normal.

Because cardiac CTA is a relatively new imaging modality, questions remain concerning its application in the clinical setting. Cardiologist Dr. Mark Heiman provided The Pulse with insight into the benefits, appropriate use and controversies surrounding cardiac CTA.

Benefits & Risks
The benefits of cardiac CTA include the avoidance of risks associated with cardiac catheterization such as bleeding, vascular access damage, stroke and arrhythmias. At times it will reveal alternative causes of chest pain that a coronary angiogram would not identify, such as an incidentally discovered pulmonary embolism or a pulmonary mass. It can also detect early and advanced coronary artery disease.

The risks of cardiac CTA that are similar to cardiac catheterization include exposure to contrast agents and exposure to radiation.

Appropriate Use
Patients who are appropriate for cardiac CTA are symptomatic and have an intermediate probability of coronary artery disease. These are patients in which standard stress testing did not answer the question as to the presence of heart disease, but for whom you do not want to submit to the risks of cardiac catheterization.

Conversely, inappropriate patients for cardiac CTA are those with known acute coronary syndrome or those for whom there is a high clinical suspicion that coronary disease is the cause of their chest pain. For these patients, cardiac catheterization is the more appropriate diagnostic approach.

Inappropriate patients also include those with renal insufficiency due to the risk of exposure to the contrast dye; those with irregular heart rhythms including premature ventricular contractions (PVC) and atrial fibrillation; and those with high calcium scores because arterial calcium can obscure the ability to detect the degree of stenosis.

Controversies & the Future Role of Cardiac CTA
The biggest controversy surrounding cardiac CTA is when to use it in place of standard testing techniques as part of a heart disease evaluation. When considering cardiac CTA, physicians must determine if it is truly substituting for another diagnostic test or if it is merely adding another layer of testing, which means it is also adding another layer of cost.

Moreover, the exact role of cardiac CTA in cardiac disease management is not well-specified in terms of when to use it instead of stress testing and cardiac catheterization. Future studies will help us get a better sense of its prognostic benefits over standard testing regarding long-term differences in outcomes.

Ultimately, the decision to use cardiac CTA must be individualized to each patient’s risk characteristics and personal preferences, ensuring that the positives outweigh the negatives associated with this technology. We encourage physicians in the community to refer their patients to the cardiologists here at Stamford Health who can sort out these individual variables to determine the best workup for the patient.
How does the patient case presented in this issue highlight the usefulness of calcium scoring in your practice?

For years, the established approach to heart disease prevention was to identify those at risk using traditional risk algorithms such as the Framingham Risk Score and the recently proposed Pooled Cohort Equations that estimate a patient’s atherosclerotic cardiovascular disease (ASCVD). However, these are not perfect tools, because most large and fatal myocardial infarctions occur as a first event in people who had no prior symptoms and who would have been deemed low risk.

This case illustrates that calcium scoring can be doubly useful in identifying patients who are actually at higher risk for heart disease than traditional risk algorithms would suggest and to identify those who would benefit from more aggressive lowering of LDL through statin therapy.

In the wake of the new cholesterol treatment guidelines that recommend using risk assessment tools rather than actual target cholesterol numbers to guide prescribing, doctors and patients are often left wondering what to do. Calcium scoring helps us determine whether or not we should treat their LDL more aggressively, whether or not to start a statin, and also how low we should drive the LDL.1

Which patients are not appropriate for calcium scoring?

Patients with a history of peripheral artery disease, myocardial infarction, coronary stenting and revascularization, as well as people who are at high risk for heart disease such as smokers and diabetics. For these people, there is no use for calcium scoring because they should be on a statin anyway.

Conversely, patients who should not undergo calcium scoring are those who should not be on a statin, such as those who have low LDL or who are at very low risk for heart disease.

What are the controversies surrounding calcium scoring?

The greatest controversy is whether or not treating people more aggressively based on a calcium score changes their risk of having a future heart event. While most cardiovascular experts believe it does, there are no large-scale studies to prove it yet.

Another concern is radiation exposure, but the amount of radiation is very low. Finally, reimbursement is a concern, as the test is covered by Medicare but is not currently covered by most third-party payers.

Are you noticing physicians’ wider acceptance of calcium scoring in our medical community?

Physicians are recognizing that calcium scoring is helpful to stratify intermediate risk patients into either a higher or lower risk category, which can help determine whether or not to initiate statin therapy.

We encourage primary care physicians in our community to refer their patients to Stamford Health cardiologists so that we can help determine whether or not their patients should have this screening as part of their primary cardiovascular prevention assessment.

Source:
Dr. Joonun (Chris) Choi Elected to President of the American Heart Association (AHA) Fairfield County Board of Directors

Dr. Choi, a non-invasive cardiologist in Stamford since 2008, is passionate about the AHA’s mission of building healthier lives free of cardiovascular disease and stroke. As president of the board, Dr. Choi will serve as the AHA’s volunteer health leader and official spokesperson on science, medical, health and public policy matters in support of the organization’s mission. He will support the recruitment and development of a board that is representative of community demographics, and will provide leadership in community health planning priorities.

The 2016 Westchester-Fairfield Go Red! For Women® Luncheon

As Cause Sponsor of the AHA’s Go Red For Women® campaign, Stamford Health will be co-hosting the 13th Annual Westchester/Fairfield Go Red for Women® Luncheon on Wednesday, May 4th featuring Keynote Speaker David Katz, MD, MPH, internist and preventive medicine specialist and the co-founder and director of the Yale Prevention Research Center. Preceding the luncheon is a health and wellness exhibition where Stamford Health nurses will offer free health screenings and physicians and staff will lead learning sessions.

Wednesday, May 4
10:00 a.m. to 1:30 p.m.
Stamford Marriott Hotel & Spa
243 Tresser Blvd., Stamford, CT

For more information or to register please contact Deena Kaye at 203.295.2941 or deena.kaye@heart.org or go to http://westfairgoredluncheon.heart.org

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