EDITORIAL COMMENT

CATCH a Glimpse of the Future*

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Coronary computed tomography angiography (CTA) has excellent diagnostic accuracy for the detection and assessment of coronary artery disease. Its strengths are numerous, but 2 features are particularly noteworthy in the context of patients with suspected unstable coronary heart disease. First, it has a very high negative predictive value that means clinicians can confidently exclude coronary artery disease. This is particularly important in the emergency department, where it can facilitate the rapid discharge of patients from hospital. Second, it can detect both obstructive and nonobstructive coronary artery disease, something that noninvasive stress testing cannot achieve as it relies on the presence of flow limiting disease. This is highly relevant for patients with unstable coronary heart disease because the dynamic ruptured plaque may not consistently cause flow limitation and therefore pass undetected on formal stress testing. Indeed, most patients who present with recurrent myocardial infarction will have a normal stress test at discharge from their index admission with an acute coronary syndrome. On the other hand, the shortcomings of coronary CTA include the absence of a functional assessment of disease and the tendency to overestimate the severity of coronary artery disease, especially in the presence of marked coronary calcification. However, with the advent of modern dynamic volume scanners, follow-on computed tomography perfusion assessments could help to address such deficiencies.

There is currently no definitive evidence for superiority of one diagnostic strategy over another, or indeed that any specific test can influence clinical outcomes in patients with suspected coronary heart disease. Current guidelines provide empirical guidance for selection of the most appropriate diagnostic modality to assess patients with stable or unstable coronary heart disease. Test selection in European guidelines (1) is based on pre-test probabilities and preferences based on local expertise and availability of stress testing modalities. American guidelines (2) reserve coronary CTA for patients who cannot undergo stress imaging and provides an algorithm to select a stress testing modality based on the patient’s ability to exercise, the presence of previous coronary revascularization, and the recording of a normal resting electrocardiogram. Historically, most of the evidence for these imaging assessments has been predicated on the demonstration of improved diagnostic performance, better risk stratification, and avoidance of unnecessary invasive coronary angiography. This, in part, relates to the problem that an imaging strategy can only influence clinical outcome if it has demonstrable effects on downstream decision making by providing a more accurate diagnosis that results in the more appropriate selection of treatments associated with a reduction in cardiovascular events. Such outcome trials have not been conducted for the established and accepted modalities of exercise electrocardiography, stress echocardiography, myocardial scintigraphy, or cardiac magnetic resonance perfusion. The wide range of these existing choices has also led many to question whether we need yet another technique such as coronary CTA in an already crowded diagnostic space. This issue has then raised the bar for coronary CTA to prove its worth in modern clinical practice.

In this issue of iJACC, Linde et al. (3) have presented the findings of the CATCH (CARDiac cT in the treatment of acute CHest pain) trial of 600 patients presenting with symptoms of potentially unstable

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Coronary heart disease to the emergency department. This is an important and major addition to the spectrum of recent trials assessing the impact of coronary CTA in patients with stable and those with unstable coronary heart disease (Figure 1). The major strengths of this study were that all patients underwent coronary CTA (although analysis of coronary CTA was prohibited in the control group until study completion), patient care pathways were transformed into protocols, and follow-up was comprehensive and robust. They report that coronary CTA was associated with better selection of patients for invasive angiography with a lower normal coronary angiogram rate despite greater use of invasive angiography. Coronary CTA led to the increased use of preventative therapies and substantially more percutaneous coronary intervention at the index assessment. Given the modest sample size, the number of subsequent hard events was small but again coronary CTA did appear to be associated with improved outcomes. These findings are consistent with those from the SCOT-HEART (Scottish COmputed Tomography of the HEART Trial) (4) and PROMISE (PROspective Multicenter Imaging Study for Evaluation of Chest Pain) trials (5) of more stable patients. Indeed, these trials also showed that coronary CTA-assisted diagnosis led to better use of invasive angiography, greater use of preventative therapies and increased rates of coronary revascularization. In addition, arguably all 3 trials showed that coronary CTA was associated with reduced rates of subsequent myocardial infarction, although for the PROMISE trial, this was only apparent at 12 months. Finally, all 3 trials demonstrated that coronary CTA does not appear to affect the rate of subsequent readmission to hospital with chest pain. The potential reasons for this are complex, but this is a consistent feature of coronary CTA trials to date.

The CATCH trial evaluated low to intermediate risk patient with unstable symptoms. Three previous trials (6–8) evaluated low-risk patients (event rates of <1%) and principally demonstrated that coronary CTA led to more rapid discharge from the emergency department and was more cost effective. The CATCH trial addressed an apparently higher risk population with more prolonged follow-up and went beyond healthcare resource use to the more important clinical endpoints with which patients and clinicians are concerned. Knowing whether a patient has coronary artery disease from a noninvasive coronary CTA clearly led to better care and outcome. We cannot ascertain from the CATCH trial which therapeutic intervention led to the improvement in clinical outcomes, but given the nature and pathophysiology of this unstable patient group, antiplatelet therapy and coronary revascularization seem the most likely candidates.

Where next with coronary CTA? The CATCH trial has started to explore the utility of coronary CTA in potentially unstable patients, with a focus on patient outcomes. However, what about intermediate-to high-risk patients, such as those with suspected acute coronary syndrome and elevated plasma...
The CATCH trial has added to the increasing consistency of the findings from major coronary CTA trials that have now thrown down the gauntlet to other established imaging modalities. Functional testing still has a place and role as demonstrated by the CATCH trial where further stress testing was needed in a proportion of patients who had undergone coronary CTA. However, the shoe is now on the other foot. Coronary CTA has demonstrated its ability to be cost effective, to have beneficial effects on patient management, and to lead to superior downstream patient outcomes. The guideline committees will now need to re-evaluate the priority and place of coronary CTA which has had to prove its worth more than any other imaging modality to date.

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