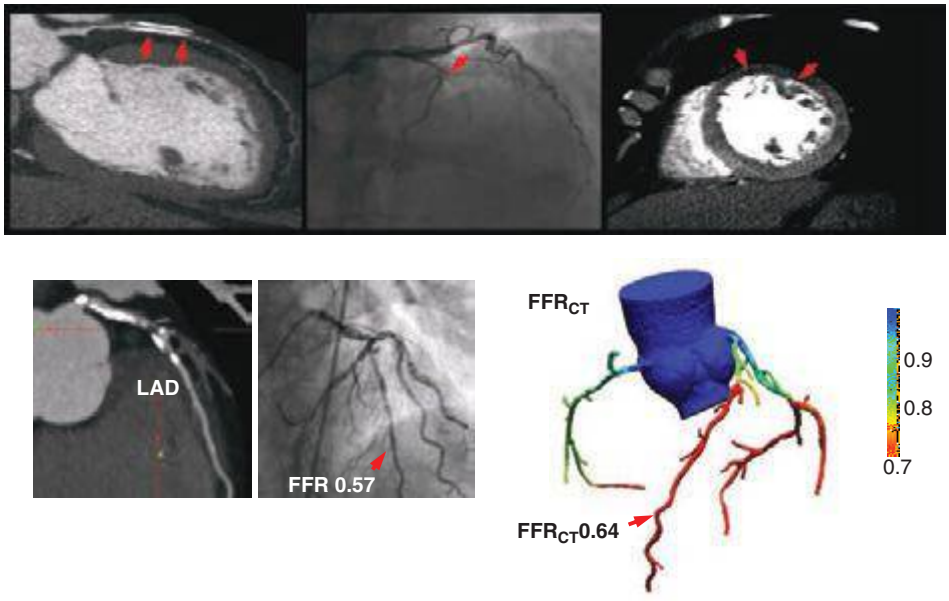

FIGURE 270e-13 Examples of novel approaches to the assessment of flow-limiting coronary artery disease (CAD) with cardiac computed tomography (CT). In the *top panel*, representative views of a coronary CT angiogram (CTA; *left*), coronary angiogram (*middle*), and stress myocardial perfusion CT (*right*) images in a patient with CAD and prior stenting of the left anterior descending coronary artery (LAD) are presented. On the CTA, the stent (*arrows*) is totally occluded as evidenced by the loss of contrast enhancement distal to the stent. The coronary angiogram demonstrates a concordant total occlusion of the LAD. On the perfusion CT images, there is a black rim (*arrows*) involving the anterior and anterolateral walls, indicating the lack of contrast opacification during stress consistent with myocardial ischemia. *(Images courtesy of CORE 320 investigators.)* The *lower panel* illustrates an example of fractional flow reserve (FFR) estimates with coronary CTA (*left*) compared to the reference standard of invasive FFR. The FFR reflects the pressure differential between a coronary segment distal to a stenosis and the aorta. In normal coronary arteries, there is no gradient, and FFR is 1. An FFR <0.80 is consistent with a hemodynamically significant stenosis. *(Images courtesy of Dr. James Min, Cornell University, New York.)*

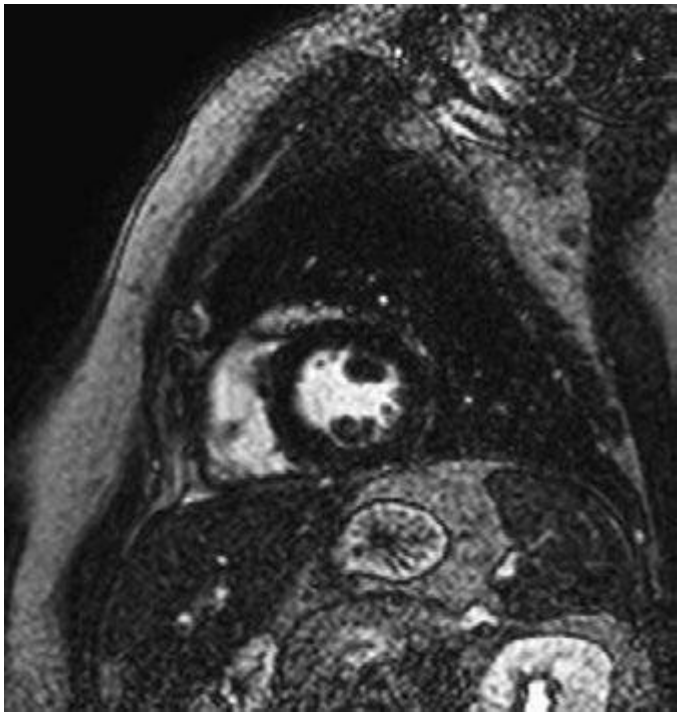

FIGURE 270e-14 The image shows the late gadolinium enhancement image of a mid short-axis view. There is no evidence of infarction in the anterior wall, which would be seen as bright white areas, indicating that the stress perfusion defect primarily represents myocardial ischemia. This patient had a significant stenosis of the left anterior descending coronary artery.

environment of the magnetic resonance scanner. It occurs rarely (~5%), and most cases can be prevented with proper monitoring of vital signs and regional cine function. The advantage of stress perfusion CMR over SPECT is its clearly higher spatial resolution, allowing detection of subendocardial defects that may be missed by SPECT. The addition of the information from LGE imaging allows differentiation of hypoperfused (potentially ischemic) from infarcted myocardium and characterizes the extent of myocardial ischemia.

As with other imaging modalities, there is evidence that ischemia measurements derived from stress CMR studies also have prognostic value. In line with the nuclear and echocardiography literature, a normal CMR study is associated with a good prognosis. Conversely, the presence of new wall motion abnormalities, regional perfusion defects, the combination of wall motion abnormalities and perfusion defects, and the presence of LGE are all predictors of adverse events.

Selecting a Testing Strategy in Patients without Known CAD As discussed above, there are many options for the evaluation of a patient with suspected CAD presenting with chest pain symptoms. The critical questions to be answered by a testing strategy include the following: (1) Does the chest pain reflect obstructive CAD? (2) What are the short- and long-term risks? (3) Does the patient need to be considered for revascularization?

For symptomatic patients without a prior history of CAD and a normal or nearly normal resting ECG who are able to exercise, the American Colloge of Cardiology/American Heart Association guidelines recommend standard exercise treadmill testing (ETT) as the initial testing strategy. The guidelines further suggest that patients who are categorized as low risk by ETT (e.g., those achieving >10 metabolic equivalents [METS] without chest pain or ECG changes) be treated initially with medical therapy, and those with high-risk ETT findings (i.e., typical angina with >2 mm ST-segment depression in multiple leads, ST elevation during exercise, drop in blood pressure, or sustained ventricular arrhtyhmias) be referred for coronary angiography.

The use of exercise testing in women presents difficulties that are not seen in men, reflecting the differences in the lower prevalence of obstructive CAD in women and the different accuracy of exercise testing in men and women. Compared with men, the lower pretest probability of disease in women means that more test results are false positive. In some of these patients, a positive ETT may reflect true myocardial ischemia caused my microvascular coronary artery dysfunction (so-called *microvascular disease*). In addition, the inability of many women to exercise to maximum aerobic capacity, the greater prevalence of mitral valve prolapse and microvascular disease in women, and possibly other reasons may contribute to the differences with men as well. The difficulties of using exercise testing for diagnosing obstructive CAD in women have led to speculation that stress imaging may be preferred over standard stress testing. However, recent data from the WOMEN study suggests that in symptomatic, low-risk women who are able to exercise, standard ETT is a very effective initial diagnostic strategy as compared to stress radionuclide imaging. Women included in the study were randomized to standard ETT or exercise radionuclide perfusion imaging. The primary endpoint was the 2-year incidence of major adverse cardiac