All you Need to Know : Non Invasive Evaluation for Chest Pain

- Stress Echocardiography -

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Diagnosis and management of coronary artery disease (CAD) represents major challenges to health care system. Until recently, the definitive diagnosis of CAD was possible only through invasive coronary angiography. To avoid the risks of an invasive procedure, stress testing is often employed for an initial assessment of patients with suspected coronary artery disease. Stress testing has been used since the late 1920s as a convenient, non-invasive way to assess for exercise induced myocardial ischemia. Exercise increases myocardial oxygen demand that may not be met in the presence of a coronary artery stenosis, leading to myocardial ischemia with associated ST segment changes on the ECG or echocardiography, as well as symptoms. For patients unable to exercise, dobutamine has been used to elicit an increase of cardiac output, and thus myocardial oxygen demand, similar to that resulting from exercise. The majority of stress testing is being performed using adjunctive imaging, which increases the sensitivity and specificity over that of the ECG. Stress echocardiography combines stress testing with an echocardiogram obtained before and immediately after exercise. Exercise is usually carried out on a treadmill. Alternatively a bicycle (either upright or lying down) may be used to provide the exercise stress. Stress echo may also be useful to evaluate the functional significance and severity of angiographically identified coronary narrowing. Sometimes a medication, dobutamine, is used to accelerate the heart rate in patients who are unable to exercise. Numerous studies and meta-analyses reported the diagnostic accuracy of stress testing to identify patients with obstructive

CAD, defined as 50% diameter or more stenosis by quantitative coronary angiography (QCA). When combined with imaging, pooled sensitivity for stress testing ranges from 80–90% and specificity ranges from 70–80%; however, several caveats need to be considered. Considering limitations, it is unreasonable to assume 80% or greater sensitivity and specificity for stress testing to diagnose CAD in clinical practice, even under the best of circumstances. Thus, at least 20% of stress tests with imaging are either false positive or false negative for the diagnosis of obstructive CAD in patients. When assessing prognosis for patients based on stress testing results, it is important to consider the patient's co-morbidity and risk categorization. A normal stress test in a patient with significant co-morbidity by no means indicates a benign prognosis. An important limitation of stress testing is its inability to detect non-obstructive coronary atherosclerotic plaque, which is capable of triggering events. An overall (exercise and pharmacological stress testing combined) event rate of approximately 1% for myocardial infarction and cardiac death after a normal stress test, while generally considered a low event rate, has substantial implications because of the large numbers of patients affected.