The following abstract will be presented at the Southern Medical Association Annual Scientific Assembly, October 30-November 1, 2014 in Destin, Florida.

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Objectives

Upon completion of the lecture, attendees should be better prepared to:

1) Understand what is balanced ischemia.
2) Identify and evaluate the clinical presentation.
3) Discuss further cardiac workup indications.

Introduction: Nuclear imaging with stress myocardial perfusion (stress test) is one of the preferred first line investigations for non-invasive evaluation of ischemic heart condition. It is a very reliable test with high sensitivity of about 90%. However, rarely it gives a false negative result which can be explained by the phenomenon termed as “Balanced Ischemia”, wherein due to global myocardial ischemia, the stress test fails to reveal relative perfusion defects in the affected segments.

Case Presentation: A 78 year old Caucasian female with past medical history of hypertension and hypercholesterolemia, presented with typical chest pain for one day. It was accompanied by shortness of breath, palpitations and diaphoresis. By the time she was brought to Emergency room, her pain had resolved. EKG did not show any acute ST or T wave changes. Physical exam was unremarkable. Initial two sets of cardiac enzymes came back negative. Next day early morning, she had chest pain lasting for a minute with diffuse ST segment depressions on EKG. She did not have any caffeine in last twenty four hours and so she underwent a regadenoson stress test with 99mTc-labeled sestamibi tracer which did not reveal any ischemic segments.

Discussion: Approximately 10 million nuclear stress tests are performed each year in the U.S. Candidates for nuclear stress testing include patients who have baseline EKG abnormalities, suspected false-positive or false-negative results from a stress test without imaging, known CAD or previous revascularization, inability to exercise, a pacemaker, or a moderate to high likelihood of a CAD diagnosis. Regadenoson (A2A adenosine receptor agonist) is used as a coronary vasodilator and Technetium (99mTc-labeled sestamibi) isotope is used as a tracer. Because regadenoson increases blood flow in normal coronary arteries with little or no increase in stenotic arteries, it causes relatively less uptake of the tracer in vascular territories supplied by stenotic arteries. Thus perfusion defects that are present both at rest and with stress indicate an area of infarction, whereas defects that appear with stress but not at rest indicate ischemia.

However in our patient, nuclear stress test turned out to be normal without any perfusion defects due to balanced ischemia. When all three major coronary vessels are affected, very rarely the ischemic burden is equally distributed throughout the myocardium. So, during nuclear stress testing, there is no relatively reduced uptake of tracer in any particular region and images appear uniformly lighted. In this patient, due to high suspicion for a coronary event, she underwent a cardiac catheterization the next day that revealed major triple vessel coronary blockages. A quadruple coronary artery bypass graft surgery was performed on her.

Conclusion: False negative EKG stress tests due electrical cancellation of the ischemic vectors is well known, however the phenomenon of Balanced Ischemia is rarely seen in clinical practice. Given the generous volume of nuclear stress tests being done with high reliability, clinicians need to be aware of this entity which can lead to false negative results. Clinical correlation should be made and in case of any equivocality, prompt further investigations, preferably coronary angiography should be undertaken.

Disclosure

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