THE ROLE OF MYOCARDIAL PERFUSION IMAGING IN ACUTE CHEST PAIN SYNDROMES: WHEN IS 'NORMAL' NOT NORMAL?

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CASE REPORT

A 57-year-old female presented to The Methodist Hospital's emergency department (ED) with chest pain. Her symptoms had progressed throughout the previous three weeks - from exertional chest discomfort to intermittent short episodes of substernal chest pressure at rest with radiation to the jaw and left arm. ln route to the ED the day of admission, her pain was promptly relieved with sublingual nitrogl$_{y\,c}$erin. Her risk factors for coronary artery disease included diet-controlled Type II diabetes mellitus and premature coronary artery disease in her father, who had a myocardial infarction at age thirty-five. Of note, she had a normal stress test four years earlier and a normal coronary arteriogram when she had similar complaints of chest pain rwo years prior œ this admission. Her medicines included levothyroxine for hypothyroidism and hormone replacement therapy. There was no history of alcohol, tobacco or illicit drug use.

In the ED, her blood pressure was 142/70 mmHg, pulse 80 bears/minute, respirations 18 and she had 97% oxygen saturation on room air. Her body mass index was 36.7 and her physical examination was unremarkable. Her laboratory data was as follows: creatinine 1.3; glucose 208; and serial creatine kinase, creatine kinase-MB and troponin levels were all within normal limits. The resting 12-lead electrocardiogram was entirely normal. Based on the above clinical information, this patient had a very low TIMI risk score.

After being admitted to the chest pain unit (CPU) for further observation and evaluation, the patient underwent myocardial perfusion tomography (SPECT). Her initial resting SPECT images were normal,

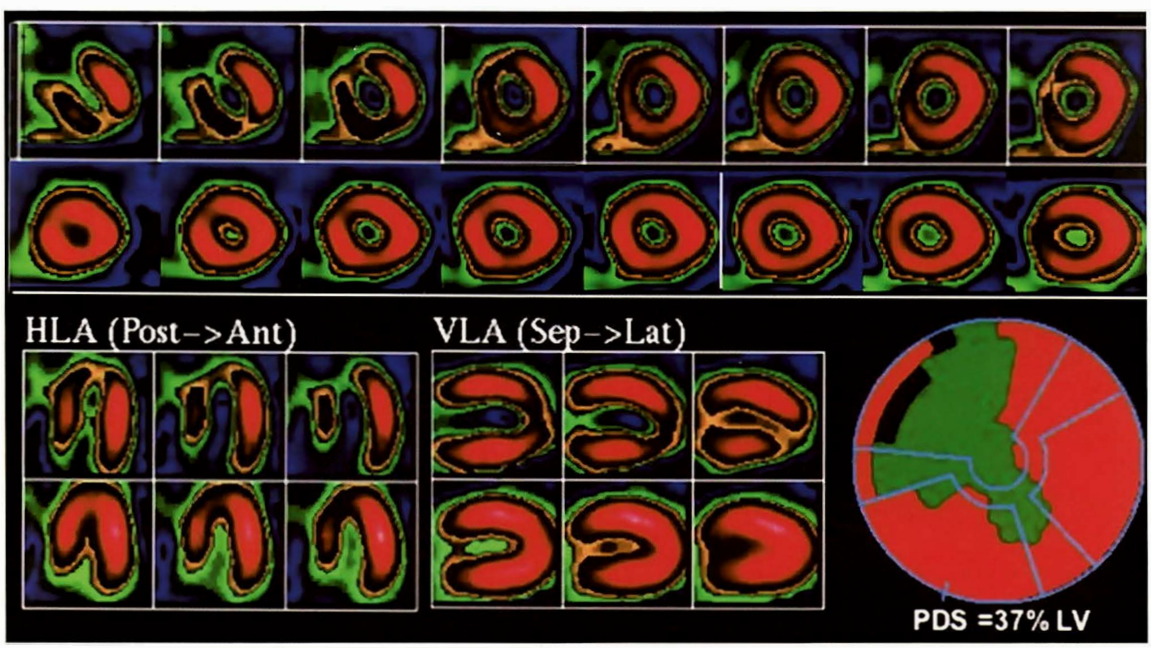

Figure 1.
Evaluating patients with acute chest pain. Adenosine myocardial perfusion SPECT.

as were the left ventricular ejection fraction and regional wall motion by gated SPECT. As is routine for CPU patients, rest imaging was followed by stress imaging with adenosine. Although the rest images were normal, the stress images revealed a large 37% perfusion defect within the left anterior descending (LAD) vascular territory, indicating significant myocardial ischemia (Figure 1). Based on the results of her SPECT study, the patient was admitted to the CCU with a diagnosis of an acute coronary syndrome. She was treated with aspirin, metropolol, IV nitroglycerin, IV heparin, simvastatin and enalapril.

That evening, the patient again developed chest pain of 7/10 severity with radiation to the neck and shortness of breath. While the ECG demonstrated peaked T-waves as compared to the admission ECG, her cardiac enzymes remained normal. Due to persistent chest pain, she underwent emergent coronary angiography, which demonstrated 100% occlusion of the mid-left anterior descending (LAD) artery with apparent fresh thrombus. Percutaneous coronary intervention was performed with balloon angioplasty and placement of a drug-eluting stent in the LAD. A follow-up ECG revealed biphasic T-waves across the precordium. Her cardiac enzymes subsequently rose approximately seven hours after the onset of symptoms. Her remaining hospitalization was otherwise unremarkable, and her left ventricular ejection fraction one month later was 65% with normal wall motion.

Many chest pain units with high patient turnover have developed protocols based on rest myocardial perfusion imaging to expedite the evaluation and triage of patients presenting with chest pain. Rest imaging alone is highly sensitive (>95%) for detecting myocardial infarction, and a normal study virtually excludes the diagnosis in more than 99.5% of patients. However, as exemplified by this case, stress imaging is generally necessary to detect myocardial ischemia in patients who have an acute coronary syndrome not associated with infarction. In light of chis patient's very low TIMI risk score, her easily relieved symptoms, and her normal coronary angiogram two years earlier, she would have been appropriately classified as low risk. A decision based on rest imaging alone in this patient would have led to premature hospital discharge. For this reason, stress adenosine SPECT imaging is routinely performed at the Methodist DeBakey Heart Center since it is a safe and reliable method to exclude both myocardial infarction and underlying ischemia in the heterogeneous group of patients who present to our ED with chest pain.