Myocardial Infarction Complicating Cardiovascular Stress Testing with Normal Coronary Arteriography*

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A patient with normal coronary arteriography who experienced a non-Q myocardial infarction is described. The temporal relationship of ischemic symptoms, ECG changes, and rise in creatine phosphokinase (CPK) support a relationship to an exercise treadmill test.

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It is estimated that over 500,000 cardiovascular stress tests are performed annually in this country.† Complications

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Figure 1. Coronary angiograms obtained 22 h following exercise testing. A (upper) normal right coronary artery in the RAO projection. B (lower) normal left anterior descending and left circumflex coronary arteries in the LAO projection.
of physical examination showed blood pressure of 120/100 mm Hg, but otherwise unremarkable. An ECG was within normal limits. An exercise test was performed using the standard Bruce protocol, without discontinuation of his current medications, in which he exercised for 10 min to a heart rate of 151 bpm and blood pressure of 152/110 mm Hg. He experienced fatigue but no chest pain. At peak exercise there were 2 mm of upsloping ST depression in leads 2, 3, and aVF, and a 1-mm slowly upsloping ST depression in V4. At 5 min into recovery, these changes became horizontal to downsloping, and he complained of substernal chest tightness. The ECG changes and chest pain resolved over 19 min after treatment with 2 sublingual nitroglycerin tablets (0.4 mg).

Cardiac isoenzymes were abnormal, the CPK peaking at 227 (nl 38-125) and an 8 percent MB fraction 12 h after the exercise test. Serial ECGs showed no change from the resting normal tracing. Cardiac catheterization performed 22 h after the exercise test showed normal coronary arteries (Fig 1) and normal left ventriculography. As part of the catheterization procedure, graduated doses of ergonovine (0.05, 0.1, 0.2, and 0.2 mg) were serially administered IV and resulted in no symptoms or ECG changes. A technetium-pyrophosphate infarct scan showed uptake in the anterolateral area at 72 h after the exercise test (Fig 2). An M-mode and 2D echocardiogram showed normal chamber dimensions, normal LV contraction, borderline LV wall thickness (12 mm septum and posterior) and normal valves.

**COMMENTS**

To our knowledge, this is the first reported case of myocardial infarction complicating exercise stress testing in a patient with normal coronary arteriography. Despite the absence of large vessel coronary artery disease, our patient experienced myocardial ischemia severe enough to cause myocardial injury, as documented by the rise in CPK-MB and uptake of pyrophosphate.

Brown et al. described a patient who experienced an acute inferior myocardial infarction after completion of an exercise treadmill test in which the patient experienced chest pain without ST segment changes. Coronary arteriography performed three months later showed a 40 percent proximal narrowing of the left circumflex artery and a 40 percent lesion in the midportion of a dominant right coronary artery.

Possible mechanisms for the myocardial infarction in our patient include flush occlusion of a branch vessel not visualized by angiography and thrombosis with spontaneous thrombolysis. In addition, the negative response to ergonovine administration does not exclude the possibility of coronary spasm. The temporal relationship of the CPK peak to the symptoms and ECG changes observed during the exercise test implicates this procedure as the probable inciting event. During the exercise test, there was an abnormal blood pressure response and elevation of the diastolic blood pressure with exertion. This finding suggests an abnormality of the normal vasodilation that occurs in the peripheral vasculature in response to exercise. Such an abnormality in the coronary circulation could result in myocardial ischemia, as has been suggested by the studies of Cannon et al. in patients with chest pain, normal coronary arteriography, and abnormal vasodilator reserve.

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**REFERENCES**


**Computed Tomographic Detection of Cavitary Lung Lesion Complicating Use of Flow-Directed Balloon-Tipped Catheter**

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A classic case of Swan-Ganz catheter-induced pulmonary infection was studied with both conventional chest radiography and computed tomography (CT). Chest radiography initially showed a fan-shaped opacity in the right middle lobe which later became somewhat rounded with no discernible cavitation. However, a cavitary lung lesion with a bull’s-eye appearance was clearly demonstrated by CT. We speculate that such a cavitary lung lesion might be quite common in catheter-induced pulmonary infarction when CT is widely applied to such cases. (Chest 1989; 96:432-34)

**The use of the flow-directed balloon-tipped (Swan-Ganz) catheter for measurement of pulmonary artery and capillary wedge pressure is generally considered safe.** However, complications associated with its use do occur.

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CT Detection of Cavitary Lung Lesion (Shin, Reeves, Ho)