The Untalked About Problem of False Positive Test Results

The problems associated with false positive test results are legendary. Such problems are likely to continue because it is apparently unrealistic to dream of a test that, when positive, *always* signifies that the patient has the condition for which the test was ordered. I wish to point out another variation on the theme. To do so I will use the exercise electrocardiographic stress test as an example.

The ST segment in the electrocardiogram may become displaced secondary to exercise-induced myocardial ischemia in patients with obstructive coronary atherosclerosis. The sensitivity and specificity of the abnormal ST segment shift depend on the criteria used to determine whether the response is truly abnormal. This point is, however, not the purpose of this communication.

There are nonischemic causes of an abnormal ST segment shift in the electrocardiogram during exercise. This point is, however, also not the purpose of this communication.

The point of this communication is that there is a small percent of men who have a false positive ST segment shift during exercise that suggests the possibility of myocardial ischemia regardless of the criteria used and for which no explanation is known. This occurs in perhaps 10% of exercise tests; in women, the figure approaches 40%. We do not fully understand the cause of such an ST segment shift or how to know it is a false positive test for myocardial ischemia without other testing.

Now suppose a patient with a false positive test gradually develops coronary atherosclerosis. Suppose the patient and physician do not know about this test result when the coronary arteriogram is performed. Then suppose the patient has 30% cross-sectional narrowing of several coronary arteries on arteriography. I suspect that, under these circumstances, it would be considered that the patient had myocardial ischemia with effort, as suggested by the exercise electrocardiogram, rather than that there was a possibility of a preexisting false positive exercise electrocardiogram and nonobstructive coronary disease.

I have wondered about this problem in the following clinical setting. Suppose a patient has unstable angina, severe triple vessel coronary artery disease and a positive exercise electrocardiogram and positive exercise thallium scan. Suppose the patient has successful coronary bypass surgery and, after surgery, has no angina, a negative exercise thallium scan and a positive electrocardiogram. Are the changes in the exercise electrocardiogram due to myocardial ischemia even though the other markers for ischemia are negative or is this a patient who has an unexplained ST segment displacement after exercise (that is, a false positive exercise electrocardiogram)?

We do not understand all of the nonischemic causes of a false positive ST segment shift during exercise or how common this response is in the population at large. Until these questions are answered, it follows that there will be an occasional error in the interpretation of the significance of an abnormal ST segment shift in a patient with arteriographic signs of coronary disease. In other words, the presence of coronary atherosclerosis in the coronary arteriogram does not always *explain* why the ST segment shifts with exercise.

One could argue that this source of error is uncommon. It probably is, but that should not deter us from determining the size of the error and being forewarned of its existence.

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Exercise and Incomplete Right Bundle Branch Block

Liao and colleagues (1) report a valuable study of the characteristics and prognosis of incomplete right bundle branch block. Wayne, Bishop and I (2) reported a series of 16 patients who developed new bundle branch block during exercise testing, some of the results of which may complement the work of Liao and colleagues. Four of our 16 patients had baseline incomplete right bundle branch block and 3 of them had progression to complete right bundle branch block and 1 to left bundle branch block during exercise (the patient who developed exercise left bundle branch block did not have left axis deviation although one of the others did). All were shown to have coronary artery disease. These support the authors' contention that at least some, if not most, such patients have a latent progressive conduction abnormality. In this connection, it would be interesting and perhaps valuable to exercise a population composed entirely of individuals with incomplete right bundle branch block.

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References

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Electrocardiogram in Right Atrial Enlargement

Surawicz (1) has reviewed electrocardiographic diagnosis of chamber enlargement. He states "there are no published studies about the correlations of the echocardiogram with the electrocardiogram in the diagnosis of right atrial enlargement." There are publications in which two-dimensional echocardiographic assessment of electrocardiographic criteria for right atrial enlargement has been evaluated (2) and discussed (3). In the initial investigation (2), the electrocardiographic criteria of "P pulmonale," a qR pattern in lead V_1, diminished QRS amplitude in lead V_1 and increased amplitude of the P wave in lead V_1 were correlated with right atrial size derived from two-dimensional echocardiography. Only 2 of 11 patients with "P pulmonale" had right atrial enlargement (predictive value 18%); all 8 patients with a qR pattern had right atrial enlargement (predictive value 100%). Thirteen of 28 patients