
The authors reply:
To the Editor:

We thank Dr. Rifkin for his comments relating multiple lead exercise stress testing to likelihood ratios derived from Bayes’ theorem.8,9 We agree that the predictive implications of an exercise test result should be tailored to the group of patients being studied. Our population of 100 men with a normal resting ECG were symptomatic as stated in our paper; 70 had a history compatible with angina pectoris. In this group of patients with a disease prevalence of 0.66, 14 ECG leads increased sensitivity from 0.56 to 0.88, with only a slight drop in the predictive value of a positive test result (0.95 to 0.91), compared to a single V5 lead. Although the likelihood ratio associated with a positive test decreased from 9.33 to 4.89 (table 1 above) the net decrease in posterior probability of disease was small (4%), as Dr. Rifkin has stated. The use of 14 leads in conjunction with the treadmill work time at which significant ST segment depression occurred and the pressure-rate product at the time ischemia first appeared gave further information relating to the severity and extent of coronary disease. In addition, absence of significant ST segment depression (horizontal or downsloping ST segment depressed ≥1 mm or a slow upsloping ST segment depressed ≥2 mm, 0.08 sec after the J point) in any of the 14 leads predicted the absence of coronary disease in 78% of patients, vs only 52% using V5 alone (P < 0.05). Application of the likelihood ratios associated with a negative test for 14 leads (0.15) vs V5 alone (0.47) to the family of curves less than unity in figure 1 (above) show the advantage of using multiple leads vs a single lead in excluding the possibility of coronary disease in this group of patients. The vertical rise in these curves is greatest when disease prevalence exceeds 0.6.

In populations with a lower pretest risk (asymptomatic patients, women with atypical angina, etc.), multiple lead exercise testing would likely result in more false positive results (fig. 1 above) than a V5 lead alone. However, a negative result using 14 leads in this group of patients would carry more weight in ruling out coronary disease than a negative test using V5 alone. In fact, when disease prevalence is low (e.g., 0.2), a negative test with 14 leads would rule out coronary disease 97% of the time, compared with 90% using V5 alone, a difference which could be important for an individual patient. Ancillary techniques using radioactive thallium-201 and displacement cardiography (DCG) during exercise may help sort out the diseased patients from the false positive ECG result in this group of patients. However, both of these noninvasive tests require further study in populations with a low disease prevalence.

In evaluating any patient for coronary disease, age, sex and quality of chest pain are important factors in determining the pretest risk. The physician must use this information in addition to the physiologic and electrocardiographic results of the exercise test to make appropriate management decisions. In symptomatic patients we feel that the use of multiple leads offers important additional information since the increase in sensitivity is more offset by the slight drop in the posterior probability of disease and the ECG results when used in conjunction with the physiologic responses to exercise provide useful information on the extent and severity of coronary disease.

A final note of caution should be expressed on the use of the above family of curves. An implicit assumption is made that the pretest risk (P) is accurately estimated by most clinicians. This is true for patients with typical angina where the disease prevalence is 0.85 or greater. The physician’s dilemma occurs when angina is atypical or the patient complains of nonspecific chest pain but has a strong family history of sudden death from coronary disease and several other risk factors. In these patients, P could easily range from 0.05 to 0.6. In addition, the curves are based solely on electrocardiographic results and do not take into consideration other physiologic parameters monitored during exercise. However, the curves do provide an important perspective in which to analyze exercise test results in diverse patient populations.

References

SAM and IVG Without ASH

To the Editor:

In a recent paper, Mintz et al present a series of patients with systolic anterior motion of the mitral valve (SAM) and intraventricular pressure gradients (IVG) in the absence of asymmetric septal hypertrophy (ASH). This finding confirms previous observations that an IVG could occur in the absence of ASH.

An IVG can also occur in the absence of both ASH and SAM.

The authors state that angiography in the four patients with IVG showed left ventricular cavity obliteration. Since this phenomenon per se can produce an IVG, it may be convenient, but not correct, to attribute the IVG to “outflow obstruction.” Hence, the conclusion that “dynamic left ventricular outflow obstruction can exist in the absence of echocardiographic ASH” cannot be based on the data presented. Nevertheless, this study importantly illustrates the heterogeneity of patients presenting with clinical, hemodynamic or echocardiographic features of IHSS.

Considering the clinical, echocardiographic, hemodynamic and angiographic findings presented, some of these patients seem to fit within the spectrum of hypertrophic cardiomyopathy. Thirty percent of their patients with SAM alone had left ventricular hypertrophy by ECG. Also, analysis of the echocardiographic figures presented suggests that they may be underestimated the septal and posterior wall thickness. In addition, their own measured thickness of 1.2 cm in figure 6 does not appear in table 1, where the highest value for the septum is 1.0 and posterior wall 1.1. Assuming that some of these patients had no hypertrophy, but clinical and hemodynamic findings of IHSS, one may still wonder if these patients do not represent an early stage of hypertrophic cardiomyopathy. Follow-up data should be of value to determine whether or not they develop significant hypertrophic changes.

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Sam and IVG without ASH.
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