of survival and a reduced incidence of myocardial infarction in those patients surgically treated compared to a similar group given optimal non-surgical therapy, including programmed exercise. Such a study would need to be prospective, large-scale, properly controlled and randomized. These physicians state that for 25 years many different kinds of cardiac operations have been promoted for the immediate saving of lives and relief of symptoms. These have ranged from irritation of the pericardium with t alc, through ligation, and more latterly implantation of the internal mammary arteries. The fact that many of these procedures have since been discarded points out the need for more careful analysis of results and appropriate follow up. They cite data recently presented by Morris\(^1\) showing that the prognosis of those patients without risk factors of atherosclerosis who survive acute myocardial infarction is excellent, and that the hazard of aorto-coronary operation in this group likely would exceed that of no operation. They suggest that there may be other, so far unidentified subgroups of patients with coronary artery disease, in which such procedures might be similarly detrimental, and that therefore blanket recommendations for these operations are presently unjustified.

There is a clear and pressing need for these two groups to sit down and talk with each other. In view of their potential impact, these operations must be evaluated properly, and some general agreement as to their place in the prevention and treatment of coronary artery disease must be reached. In medicine there should always be room for many different views; nevertheless, widely disparate and conflicting opinions on this subject do a great disservice to the practicing physician and ultimately to his patients.

Means by which some consensus could be reached must be explored. Perhaps a national conference should be held in which the most vigorous and articulate exponents of these different views would participate. The goal of such a meeting would be to identify mutually agreeable ways to determine the role of these operations at this time. In reaching this objective, some of the following topics should be considered:

1. An assessment of the available information which exists about the natural history of coronary artery disease in general, and any of its subgroupings in particular.
2. An evaluation of the evidence that aorto-coronary bypass operations improve ventricular function.
3. A decision as to whether a prospective, controlled, comparative study of surgical and non-surgical therapy is now both efficacious and ethical.

Such a meeting would require a general cooling of rhetoric and a commitment from those who participate to be rational, logical, and courteous.

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Reference


Problems of Exercise Testing

The electrocardiographic diagnosis of ischemic heart disease by exercise testing procedures has proved both useful and important. Single-stage submaximal exercise tests, such as the Master two-step test, have been widely used and accepted in medical practice. The two-step test has for years been a broadly recognized, valuable, standardized procedure. Of late, more sophisticated concepts have arisen in exercise testing. Multistage tests, usually performed with bicycle ergometer or treadmill, have been introduced. Criticism has been voiced against single-stage submaximal tests. The controversy is based mainly upon the fact that these tests in which the given work load is adjusted to weight, sex and age, does not take into consideration the examinee’s physical condition, occupation, training and leisure time habits. Thus, it may appear that the standardized work load may be too low in order to produce any change, or too high, which means that electrocardiographic changes may appear in exertions which are lower by 25 percent, 50 percent or even more, than the standardized work load. Some examinees who do not suffer from anginal pain during exertion will develop severe ischemic changes on electrocardiogram during and after a low work load performance.

Although the electrocardiographic diagnosis of coronary heart disease is the most important objective of a single-stage submaximal step test, this test has been used also for the assessment of the individual’s physical work capacity. The usefulness of these tests for the assessment of the physical working capability is doubtful. The reason for this is the exceedingly short period of performance which
in the single Master test is one and one-half minutes and in the double is three minutes. Such short exertions do not permit the examinee to reach steady state conditions of physiologic parameters, such as heart rate, oxygen consumption and ventilation. Thus, no conclusions can be drawn as to the maximal oxygen uptake and to the physical working capacity of the examinee.

The disadvantage of the single-stage standardized testing procedure lies in its "rigidity." On the other hand, the advantages of the multi-stage test are that they represent qualitative, as well as quantitative measurement and as such will be more effective in establishing an individual's physical working capacity, while at the same time also serve for diagnostic purposes. It should be pointed out, however, that the disadvantage of the multistage test is that it is time consuming and requires a greater technical staff and more equipment.

We concur with all those who believe that an exercise test should be technically simple, safe and economical in time. So far it has not been possible to determine how the advantages of both above mentioned procedures (the single-stage and the multistage) could be combined and used for the development of an exercise test which would prove satisfactory for the general practitioner, the cardiologist, the physiologist, as well as the people who prepare the budget.

In our opinion, clinical centers, institutes of cardiology and especially units dealing with work assessment and the rehabilitation of cardiac patients should use a multistage procedure. We believe that a clinical impression can be more important than the use of laboratory procedures; nevertheless, we all look for verification of our clinical judgement, and therefore, for the justification of treatment.

The use of exercise tests is indicated in cardiac patients where the establishment of the physical working capacity is of importance. Furthermore, the test can be used as an objective measurement of the benefits of a physical conditioning program used in the rehabilitation of coronary patients; in the pre- and postoperative follow-up of patients suffering from valvular and congenital heart disease and in those patients in whom vocational rehabilitation is considered. Symptomatology is based on the patient's statements. The multistage exercise test can, in some cases, be of assistance to us in the verification and clarification of these statements.

Finally, exercise stress testing is indicated in the early detection of ischemic heart disease. For the latter objective, the test should reach 80-85 percent of the maximal heart rate, as it has been clearly shown that the frequency of appearance of pathologic ST changes is much higher in maximal or near maximal testing procedures.

We think, however, that maximal and supramaximal testing should not be used in older individuals and, of course, not in cardiac patients. In our institute, we use a multistage submaximal test with identical procedures for the healthy as well as for the cardiac, which makes it possible to compare our results in the different groups of examinees.

Our heart rate criterion represents approximately 80 percent of a maximal heart rate (heart rate 170 up to the age of 40; heart rate 150 between the ages of 40-60; and heart rate 130 above the age of 60). In some cases, a single-stage test, with individually adjusted work loads is added.

Working groups of the World Health Organization, the Scientific Council on Rehabilitation of Cardiac Patients of the International Society of Cardiology, the International Biological Program, and others, have stressed the need for a standardization of exercise stress testing procedures. There is a wide variety of procedures, methods, physiologic parameters and criteria used in exercise testing throughout the world.

We strongly believe that ample international cooperative research is needed in order to develop a valuable exercise test which could satisfy all requirements.

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Frequency and Time of Occurrence of Pain during the Master Two-step Test: "Impending Angina"

In this editorial, I am concerned with chest or arm discomfort, be it pain or a feeling of pressure, squeezing, heaviness or the like, that appears either during or upon completion of the Master two-step test.

We have reviewed the records of our last 300 successive patients with angina pectoris in order to study the frequency and time of occurrence of chest discomfort which occurred while performing the two-step exercise or immediately thereafter. We used a questionnaire which was filled in by all patients who experienced chest pressure, pain or other discomfort either during the actual performance of the two-step test or after lying down at its termination. In these patients, monitoring of the post-exercise electrocardiogram was continued while they moved from the steps to the adjoining