THE QUEST OF A HEART FUNCTION TEST

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Early in the war, Sir James Mackenzie¹ proposed that in the examination of the hearts of applicants for military service more stress be laid on how the heart responds to effort. He says that if the applicant can undergo severe bodily exertion without distress, it is fairly safe to assume that any irregularity or systolic murmur present is without significance. This is not new, but it lends great emphasis to the examination of the circulatory apparatus as a whole and to judging a heart by the circulation it can maintain. Heretofore, cardiac examination has concerned itself principally with detecting imperfect valves, sclerotic arteries, and dilated or hypertrophied myocardium. The function tests were developed to detect inefficiency of the heart in maintaining the circulation and impending heart failure.

In 1915, Swan² reviewed the heart function tests proposed up to that time. Tigerstedt, Stone, Goodman and Howell, and many others have sought to arrive at a formula from the interrelation of different phases of the blood pressure reading that would give an index of the cardiac efficiency.

The tests that seem to offer most promise are those based on the reaction of the heart to bodily exertion. Exertion in the presence of a markedly inefficient heart brings on palpitation, dyspnea and distress. The search has been for any sign or signs brought out on exertion which would indicate minor degrees of cardiac inefficiency. According to Circular 21 of the Surgeon-General's Office, the rapidity of the pulse and respiration persisting two minutes after hopping a hundred times on one foot should be viewed with suspicion. However, according to Mackenzie³ and the observations of Barringer,⁴ it is only in an extremely limited number of cases that the pulse rate after exercise is of value in determining cardiac efficiency. Following Gräupner,⁵ Barringer⁶ has sought from the blood pressure curve following exertion to determine what he calls the "cardiac reserve." The rise of blood pressure after exercise normally takes place in thirty seconds. If the heart's capacity has been exceeded during the exercise, the height of the blood pressure is not reached for sixty or seventy seconds. The amount of exercise measured in foot pounds that can be undergone without this delayed rise is the index of cardiac reserve. It seems to make no difference which group of muscles is employed in the exercise. The work which the average man between 20 and 30 years can perform without showing a delayed rise is from 6,000 to 12,000 foot pounds. In inefficient hearts it frequently drops to 1,000 foot pounds or less.

Kahn⁷ has recently applied such function tests as deal with pulse rate and blood pressure following exercise to over 200 cases, including the normal, tachycardias, bradycardias, neurocirculatory asthenias, etc. His results appear definite. But before such function tests can be of significance in these diseases, the relation of the test to cardiac failure must be more firmly established. Hence the most urgent need just now is a function test with an established relation with heart failure. This will require observation over long periods. It may be that prolonged observation will establish the delayed rise of blood pressure after exercise as a test of definite diagnostic and prognostic value. It may be that some other evidence of a weakened circulation will be discovered and made use of. But whatever test develops, its diagnostic value will be in the insight it gives us into the heart's ability to maintain the circulation, and its prognostic value in the foresight it gives us of heart failure. It will deal with the circulatory apparatus as a whole and not as made up of nerves, arteries, muscle and valves.

A NEW ASPIRATOR

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This aspirator, designed principally for thoracentesis of the pleura, consists of a bottle, a suction pump, a dial manometer, a needle holder with different sized needles, and connecting rubber tubing. It is an extension in usage of the Philips empyema apparatus for simple thoracentesis of the pleura. It incorporates in the usage of the apparatus the advantages offered in the original empyema apparatus.¹

OPERATION

The needles, needle holder and connected rubber tubing, up to the first glass connecting rod, are sterilized. The selected needle is now forced firmly on the needle holder, and the tubing of the holder connected to that of the bottle. The clamp just distal to the needle holder is shut, and a negative pressure of 40 mm. of mercury is produced in the closed system, by means of the suction pump. The needle is now very slowly introduced into the skin, and when the orifice of the needle is entirely beneath the superficial layers of the skin, the clamp next to the needle holder is released. The needle is now forced, very slowly, into the tissues. Emphasis is placed on the words "very slowly," for it is

Aspirator for thoracentesis of pleura.

possible, by so doing, to stop the needle when the orifice is almost flush with the parietal pleura, which will be indicated by the appearance of the aspirated fluid, in the glass connecting rod, next to the needle holder. In this way the danger of traumatizing the lung by the aspirator needle is made minimal. The pleural fluid will now flow into the bottle under the previously established negative pressure. The lung will expand gradually. As it expands, naturally the negative pressure will diminish. It can be increased, at will, by aid of the suction pump. The desired amount of fluid is aspirated, and the desired negative pressure produced in the system, which now includes the pleural sac, before the needle is withdrawn. Thus an expanded lung, in a pleura with a measured negative pressure, is assured at the end of the procedure.

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Care of the Eyes.—The adjustment of the frames of glasses is as important as the correct strength of the lenses. Many a time properly prescribed glasses fail to remove eye strain because of faulty adjustment of the frames.—W. M. Carhart, *Pub. Health*, Michigan, September, 1919.