FUNCTIONAL TESTS IN CARDIOLOGY (VELOERGOMETRY, TREADMILL TEST, 6 MINUTES WALK TEST)

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Introduction. Veloergometry (VEM) is a test with dosed physical load with simultaneous recording of ECG performed to detect latent coronary insufficiency, transient arrhythmias and establish individual patient tolerance of exercise.

Criteria. Exercise causes heart palpitations, mild increase in blood pressure, an increase in the delivery of oxygenated blood to the heart work to working muscles and, consequently, increase myocardial oxygen demand. In a healthy person, this leads to an adequate expansion of the heart blood vessels, increases delivery of oxygen-enriched blood in the myocardium, increases the strength of heart contractions. Under conditions of reduced coronary blood flow in patients with atherosclerosis of the heart, during exercise occurs between myocardial oxygen demand and delivery, which can lead to acute coronary insufficiency, manifested attacks of angina (pain in the heart) and change on ECG – VEM.

Procedure. In physical load tests, ECG recording and blood pressure measurement are performed simultaneously. A specific exercise (peddling/ exercise bike) and physical load are selected individually, taking into account the patient's age and condition; the load gradually increases. The study is stopped at a certain heart rate or due to changes in the ECG, the appearance of the patient's pain or fatigue. ECG and blood pressure measurement is carried out for another 5-10 minutes after the termination of the study to assess the recovery period.

Results. Physical load test can detect hidden (silent) myocardial ischemia, evaluate the possibility of a person to work in conditions of increased physical or psycho-emotional stress, as well as determine the level of health of the patient who had undergone coronary artery disease exacerbation.

Along with VEM, there are alternative diagnostic tests:

• step-test (the stairs rise);

• treadmill (treadmill with changing angle of inclination);

• tele-electrocardiography (ECG at a distance from a transmitter).

Sensitivity, specificity, and information content-wise, all these methods are approximately the same. The choice depends on the load test of the main diagnosis, patient history (transferred and related diseases) and the general state of his health.

In Russia and Europe, doctors prefer VEM, and in the US the most popular physical load test is treadmill.

The purpose of the six-minute walk test (6MWT) is to evaluate the reliability and validity with respect to its ability to predict functional capacity in patients with chronic heart failure. The 6MWT demonstrates moderate correlation with peak VO2 levels, and ability to predict VO2 (functional capacity) dependent on distance walked. Cut-off distances vary from 300 to 490 meters depending on the study; if total distance walked remains equal or less than these values, the 6MWT retains its strong predictive value. The 6MWT has good reliability, moderate validity, and a significant ability to predict functional capacity in patients with CHF who do not walk greater than 490 meters.