

Assessment of the Functional State of the Diaphragm and Respiratory Muscles by Electroneuromyography in Patients with Chronic Obstructive Pulmonary Disease

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Introduction

Chronic obstructive pulmonary disease (COPD) is currently the most common respiratory disease in the world. In the structure of chronic lung diseases, the most common are chronic obstructive pulmonary diseases (COPD), which occur in more than 14% of men and 8% of older women. The decrease in physical endurance of COPD patients is primarily due to increased work and increased fatigue of the respiratory muscles due to restriction of air flow. In order to make sure that there is fatigue, it is necessary to have data that the clinical symptoms are due to the loss of contractile strength and endurance of the respiratory muscles as a result of significantly increased work of breathing in adverse conditions of activity. Due to the prevalence of respiratory muscle fatigue syndrome early diagnosis and treatment of respiratory muscle dysfunction is an urgent problem of its clinical diagnosis.

Purpose of the study

To notice electroneuromyographic change in respiratory muscles in patients with chronic obstructive pulmonary disease.

Material and methods

A study was conducted of the functional state of the respiratory muscles and the pulmonary function test in 28 COPD patients aged 48 to 70 years. Among the examined patients, men (77%) predominated compared with women (23%). The first group includes patients with COPD with a 2 and 2-3 severity level - 13 people, patients of the 2nd group - COPD of the 3rd degree of severity - 15 people. To review the useful situation of the respiratory muscles and diaphragm, electroneuromyography (ENMG) was performed on a Myograph Synapsis Neurotech Russian apparatus. The following were determined: the amplitude (mV) of the M-response of the Phrenicus and long pectoralis nerves: laterally (ms) of the nerves of Phrenicus D et S (region of the sternoclavicular mastoid muscle); and N. Toracicus longus D et S (Erb's point). We analyze a graphic picture of the thump addition rate (SPI-distal).

Results

Patients complained of causeless shortness of breath, decreased exercise tolerance, periodic respiratory failure in sleep, drowsiness, decreased quality of life, and development of respiratory failure. In patients with COPD 2 and 2-3 thsp. severity revealed moderate clinical symptoms of the disease and mild changes in clinical and laboratory parameters. In this group of patients with COPD, a decrease in the m-response along the right phrenic nerve, signs of moderate dysfunction of the anterior scalene muscle were revealed. Patients COPD-3. the severity had moderate changes in clinical and laboratory data and the results of instrumental examination.

An ENMG study of respiratory muscles in patients of the second group revealed a moderate decrease in the amplitude of the muscular response along the left phrenic nerve and long thoracic nerve. The signs of muscular - diaphragmatic changes in the muscles of the chest were revealed.

Patients with COPD revealed the same type of changes: the amplitudes of the M-response along the long thoracic nerves from 2 sides were reduced, moderate signs of muscular-dystrophic changes in the anterior dentate muscles of the chest from 2 sides were reduced.

Thus, a moderate decrease in the amplitude of the muscular response along the left phrenic nerve and long thoracic nerve was revealed in patients with COPD. Signs of muscular-dystrophic changes in the muscles of the chest and signs of moderate dysfunction of the anterior scalene muscle. The data obtained confirm the opinion of a number of authors that the thickening of the diaphragmatic muscle is associated with its hyperactivation due to increased respiratory load against the background of bronchial obstruction and at the beginning of the disease is functional in nature.

The obtained results confirm that at the beginning of the pathological process, patients with COPD have a hyperfunction of the diaphragmatic muscle with an increase in the thickness of the muscle of the diaphragm, a change in the relaxation rate of the muscle of the diaphragm, and a decrease in excursion of the diaphragm during forced breathing. Further progression of the pathological process in the lungs leads to the development and aggravation of (respiratory failure), which may be due, inter alia, to an increase in dysfunction of smooth muscle structures of blood vessels and bronchi. Fatigue develops with subsequent weakness of the respiratory muscles due to depletion of the reserves of compensation, atrophic changes begin to prevail, while the tendon part of the diaphragm loses its elasticity.

Findings

In patients with COPD, a moderate decrease in the amplitude of the muscular response along the left phrenic nerve and long thoracic nerve was revealed. Signs of muscular-dystrophic changes in the muscles of the chest and signs of moderate dysfunction of the anterior scalene, dentate muscles.

Identified

Violations of the functional state of the respiratory muscles and the function of external respiration significantly exacerbate the progressive nature of the pathological process in the lungs with COPD. Pulmonary rehabilitation should be started before COPD becomes severe.

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