THE SIGNIFICANCE OF CT IN THE VERIFICATION OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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The purpose of the study is to evaluate the diagnostic capabilities of computed tomography in diagnosing early signs of COPD at various degrees of obstructive obstruction.

Material and methods. The radiological semiotics of 60 patients (of which 20 patients were women) who were undergoing examination due to concerns about prolonged cough were studied. The age of the patients ranged from 20 to 70 years. The main clinical sign of the disease in the majority of those examined was a prolonged cough, some even with sputum production and shortness of breath during exercise.

All patients, along with a clinical examination, underwent a survey radiography of the chest organs in two projections and computed tomography.

Research results. Of all 60 examined patients, the diagnosis of COPD was established in 21 (35%), the remaining 39 (65%) patients according to the nosological forms of lung diseases were as follows: chronic bronchitis was established in 22 (56.4%), pulmonary emphysema - in 17 (43.6%) patients. Those examined with a confirmed diagnosis of COPD (21 people) were divided into 4 main groups depending on the severity of the disease: stage 1 - mild COPD; Stage 2 - moderate COPD; Stage 3 - severe and stage 4 - extremely severe COPD, as well as a risk group for developing COPD.

The subjects at risk of developing the disease (8 people) were bothered by a prolonged cough and moderate sputum production. Five patients made up the group with grade 1 severity (mild course), who complained of shortness of breath with significant physical exertion, cough, and production of a moderate amount of sputum. With moderate severity of COPD, 4 patients (grade 2) had shortness of breath on exertion, cough, and production of a significant amount of sputum. For the 3rd degree of severity (3 patients), in severe cases, shortness of breath at rest, cough and production of large amounts of sputum were observed. And finally, 1 patient, who made up the group with the 4th degree of severity, had an extremely severe course of the disease, severe shortness of breath at rest, cyanosis, acrocyanosis, respiratory and right ventricular failure.

All radiographs of the lungs were performed at the height of inspiration, with held breathing. The most characteristic radiological signs of obstruction in the lungs were: increased airiness of the lung tissue in the exhalation phase due to excess air content in the respiratory parts of the lungs (14%); flattening of the domes of the diaphragm and smoothness of the pleural sinuses (19%); vertical position of the heart axis on a plain X-ray of the chest organs in a direct projection (heart shadow of

“small” sizes or the so-called “drip” heart) (19%); “saber-shaped” shape of the trachea - the predominance of the sagittal (antero-posterior) size of the trachea, determined by a lateral radiograph over the transverse size, changed by a radiograph in a direct projection (12.6%).

In addition, plain radiography of the chest organs in patients with COPD revealed: strengthening and deformation of the pulmonary pattern in the hilar and supradiaphragmatic parts of the lungs (19%); thickening of the walls of the lobar and segmental bronchi (23%); blurred contours of blood vessels, bronchi, as well as “blurred” structure of the roots of the lungs (33%), as well as signs of deformation of the pulmonary pattern in the hilar regions of the lungs with thickening of the walls of the bronchi of various sizes.

Computed tomography in patients with COPD allows one to evaluate the structure of the lung tissue and the condition of the small bronchi. Using CT, the localization of the most airy zones in the lungs is clarified. In addition, comparison of densitometric indicators of adjacent areas of the lung during inhalation and exhalation helps to determine not only overinflated, but also poorly ventilated sections.

When using CT in the expiratory phase, all patients from the risk group were found to have air “traps” in the lungs, a “tree with buds” symptom, indicating pathological changes at the level of small bronchi.

When performing a CT scan, in 2 patients with 1st degree of severity of COPD, expansion and deformation of the segmental and subsegmental bronchi were noted, and all 5 patients had signs of “air trapping” in the expiratory phase. According to the results obtained, in almost half of the examined patients with COPD, X-ray did not reveal changes in the lungs, while CT data revealed these changes.

When performing CT scans, practically all patients with COPD with the 2nd degree of severity of the disease showed signs of damage to the bronchi of various calibers, in the form of thickening and deformation of the walls of the segmental and subsegmental bronchi, a positive sign of “tram rails”; on CT examination, signs were noted in the inhalation phase “mosaic” lung, as well as in all patients with COPD with stage 2 of the disease, CT signs of “air trapping” were verified during examination in the expiratory phase in the lungs.

With a diagnosis of stage 3 COPD, 3 patients were examined, whose radiographs revealed changes in the pulmonary pattern in the form of pneumosclerosis and thickening of the bronchial walls, the presence of bronchiectasis: saccular and cylindrical bronchiectasis were differentiated. CT revealed the following signs of bronchial lesions: thickening of the walls, the “tram rails” symptom, changes at the level of small bronchioles (the “tree with buds” symptom). Moreover, in all 3 patients in the expiratory phase there was a symptom of a pronounced expiratory “air trap”.

For grade 4 COPD severity, the leading clinical sign of the disease was severe shortness of breath at rest, worsening with the slightest physical exertion. X-ray examination revealed multiple “sac-like” bronchiectasis, thickening and intensification of the pulmonary pattern in the lower parts of the lungs, and an increase in the size of the heart shadow. On CT scan, in the inhalation and exhalation phases, the lungs remained as if swollen and were in a state of “fixed inhalation.” When performing expiratory CT, the greatest diagnostic value in these cases was the identification of bronchiectasis and the symptom of valvular swelling, “air trap”.

Conclusions. CT scan of the lungs using functional respiratory tests (inhalation and exhalation phases) made it possible to detect early signs of the development of COPD, including morphological ones, already at the preclinical stage of the disease, even with normal parameters of external respiratory function. Particularly significant for COPD during computed tomography is the symptom of expiratory “air trap”, combined with dilation and deformation of bronchi of various sizes, up to broncho- and bronchiolectasis.

Thus, inspiratory-expiratory CT, which is the most informative method of radiological diagnosis of chronic obstructive pulmonary disease, makes it possible to timely prescribe adequate treatment and judge the effectiveness of the therapy

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