

PATHOGENETIC SUBSTANTIATION OF APPROACHES TO PHYSICAL REHABILITATION OF CHILDREN WITH RECURRENT BRONCHITIS, INFECTED WITH CORONAVIRUS (COVID-19)

Sadiqova Nozima Baxodirovna.,

Tashkent Medical Academy, Republic of Uzbekistan, Tashkent

Resume

The aim of our study was the pathogenetic and scientific substantiation of the use of kinesiohydrotherapy (KHT) by the method of monitoring the function of external respiration at the stage of rehabilitation of children with recurrent bronchial obstruction (RBO). A study of children aged 1 to 6 years of Uzbek ethnicity with recurrent bronchitis occurring with bronchial obstruction syndrome was conducted. A comparative analysis of spirometric indicators in children with RBD before and after KHT in the experimental group and in the control group showed the effectiveness of the method of complex rehabilitation with the inclusion of KHT with special breathing exercises on land and in the pool. Effective use of KHT reduces the activity of the inflammatory process in the bronchi due to good training of the smooth muscles of the bronchi and chest muscles.

Keywords: rehabilitation, bronchitis, kinesiohydrotherapy, children.

Today, to optimize the rehabilitation of children with bronchopulmonary pathology (BPP). The emergence of COVID-19 has posed challenges for healthcare pediatricians related to early diagnosis and provision of rehabilitation care to patients. In recent years, the study of the clinical features of bronchopulmonary diseases infected with coronavirus (Covid-19) has continued. An urgent problem is the development of new means of its prevention and therapy. The recommendations presented in various documents of the Ministry of Health are largely based on materials on the diagnosis, prevention and treatment of COVID-19 published by specialists from the WHO and the European Centers for Disease Control.

The purpose of our study was the pathogenetic and scientific substantiation of the use of kinesiohydrotherapy using the method of monitoring external respiratory function at the stage of rehabilitation of children with recurrent bronchial obstruction.



Material and research methods. A study was conducted on 72 children aged 1 to 6 years of Uzbek ethnicity with recurrent bronchitis occurring with bronchial obstruction syndrome (BOS). The control group included 45 practically healthy children of the same age and population without bronchopulmonary pathology or allergy history. The main first group consisted of children diagnosed with recurrent bronchitis (J40.0), occurring with bronchial obstruction syndrome 3 or more times during the year. Diagnoses were made on the basis of clinical and anamnestic data, laboratory and instrumental research methods, incl. spirometry with a provocative test. An analysis of the clinical course, premorbid background, obstetric-somatic history and the influence of exogenous factors was carried out using questionnaires developed by us.

Research results

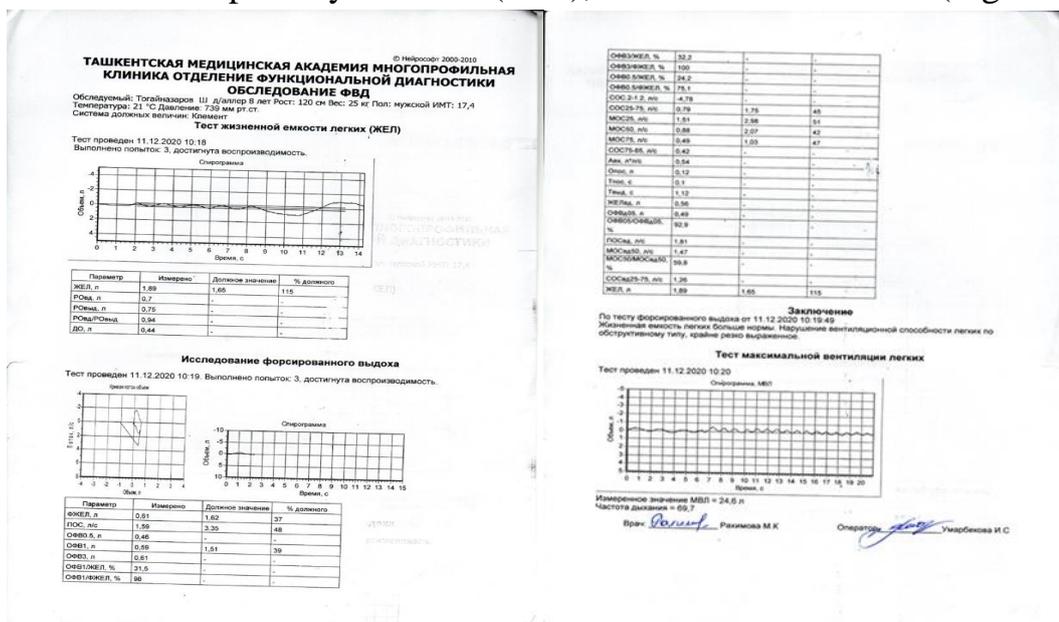
Upon admission to the hospital during an exacerbation on day 2, spirometric parameters were examined in patients. The main indicators obtained during spirometry were the following measurements: 1. vital capacity of the lungs (VC); 2. forced vital capacity (FVC); 3. FEV1—forced dose volume in 1 second; 4. spirometry indicators, including flows measured at different levels of FVC (MOS25, MOS50, MOS75, SOS25-75); 5. maximum ventilation (MVL); 6. peak expiratory flow (PEF). In the experimental study, spirometry was performed initially on days 1-2 of hospital stay, after 6 months and 1 year. The spirometric study determined the degree of respiratory tract airway and the type of ventilation disorders. A bronchodilator test was performed using standard methods to establish the reversibility of BO and determine the potential effect of bronchodilator therapy. An increase in FEV1 equal to or greater than 12-15% of predicted is a positive test of bronchodilation and is documented as reversible.

During the acute period, patients received traditional drug treatment and physical therapy (UHF, drug electrophoresis, inhalations) in the hospital. The study population of children with RBD were divided into 3 groups, of which 1 experimental group (EG) consisted of 42 patients with RBD and 2 - comparison group (KHT) 30 children with RBD, who received standard recommendations upon discharge and 3 group was practically healthy - control (KG) of 45 children of the same age. Upon discharge from the hospital, children from the EG were given recommendations for comprehensive rehabilitation with KHT (Appendix No. 3 Memo on CHT) over the next year. Upon discharge, a group of children with RBO were given recommendations for medication and physical rehabilitation measures



using the KHT method. The Kinesihydrotherapy KHT program included the above-mentioned program (see Chapter 6.2). Upon discharge, parents of the EG and GS were notified that their children would return in 6 and 12 months for spirometric and clinical anamnestic examination. Comprehensive rehabilitation of children with RD includes clinical observation, medication recommendations and physical therapy. The method for determining the effectiveness of KHT in children with RBO in rehabilitation was the study of respiratory function initially on the 2nd day of hospital stay (1 study) and after 6 (2 studies) and 12 months (3 studies). When performing spirometry, the following main indicators were analyzed: FEV1; FVC; Tiffno index – FEV1/FVC ratio; PSV; MOS25, MOS50 and MOS75; MVL-maximum ventilation.

In children with RBO, initially during the period of exacerbation there were signs of impaired external respiratory function (RFF), characteristic of RBO (Figure 1).



Rice. 1 Results of spirometry of a patient with recurrent bronchial obstruction

It was manifested by a decrease in: FEV indicators - forced expiratory volume in 1 s (decrease in FEV1 below 80% of expected), maximum expiratory flow and maximum volumetric velocities, FEV1/FVC. At the same time, moderate impairments of MOS50 and MOS25 were established in more than 80% of patients, MVL - in 40%, FVC - in 1/3 of patients, PEF - in 1/4 patients, IT in 14.7% and 16.7%, respectively, MOS75 - respectively in 17.6% and 20.0% of the subjects.

The results of observations in children with RBO on the 2nd day of illness showed that the initial FVD data were below the required indicators from the norm. In all subjects, PEF was initially below normal and of varying degrees of severity, which



in 36.8% of children this indicator was more than 80% of the required values, in 23.6% - more than 70%, in 17% - more than 60%, and in 2% of cases – less than 60%. These results indicate that in patients with RB in the acute stage there are moderate, and in some patients, severe manifestations of obstruction in medium and large bronchi. It is caused by swelling of the bronchial mucosa, hypersecretion of mucus, disruption of the rheological properties of bronchial secretions and desquamation of bronchial epithelial cells. It was found that in 54.2% (42) of children, respiratory function was within normal limits, mild obstructive impairments in ventilation ability were observed in 23.6% (18) of patients, moderate impairments in 15.7% (12), and in 5.2% (4) – significant violations. We analyzed the results of a study of children in the experimental group (EG) with RBO 6 and 12 months after treatment and rehabilitation measures, including effective KHT. During the recovery period, against the background of KHT, positive clinical dynamics were noted - a decrease in cough, its productive nature, the disappearance of shortness of breath on exertion, a decrease in the number of wheezes over the pulmonary fields were recorded in parallel with an improvement in respiratory function (Table 1).

Table 1 presents the average values of spirometric parameters from the required values before and after KHT in children with RB occurring with SBO. After a 1-year rehabilitation course, a significant positive effect was revealed in both the experimental and control groups. As can be seen from Table 6, in children with RBO after 6 months of rehabilitation, there is a gradual recovery of FEV, with indicators of FEV1 (68.1 + 4.1%), IT (70.2 + 3.2%) and POS (68.7+2.4%) did not yet correspond to official values. When carrying out complex differentiated rehabilitation, annual KHT in 76.5±4.6% of children with RB spirometry indicators approached the proper values. Results after an annual KHT program in children with RBO, only in 3.9% of cases there were moderate impairments of obstructive type of respiratory function, in 19.7% there were mild disturbances, in the remaining 76.3% of patients with RBO, the ventilation capacity of the lungs and bronchial patency were determined in within the age norm.



Table 1 Comparative analysis of spirometric parameters in children with recurrent bronchial obstruction before and after KHT, %

| Spirometric indicators | bastline (n=85) | In 6 months | After 1 year |
|------------------------|-----------------|-------------|--------------|
| | M ±m | M ±m | M ±m |
| WEL | 76,4±4,2 | 82,5±1,4 | 98,7±3,4* |
| FGEL | 51,4±2,8 | 76,8±3,0* | 82,3±5,4* |
| FEV1 | 52,3±2,3 | 68,1±4,1* | 76,1±4,3* |
| FEV1/ FVC | 64,5±5,1 | 70,2±3,2* | 89,4±3,7* |
| PIC | 54,2±2,1 | 68,7±2,4 | 74,1±1,6* |
| MOS 25 | 53,5±2,4 | 70,2±3,0* | 79,4±4,3* |
| MOS 50 | 58,1±2,8 | 75,2±2,5* | 81,7±3,2* |
| MOS75 | 65,9±5,2 | 78,4±4,3 | 80,2±4,1* |

Note: * p<0.05 significant differences in indicators relative to the baseline

As can be seen from the table, in children with RBO after 6 months of rehabilitation, there is a gradual recovery of physical function. In the control group of children, spirometry indicators showed a statistical increase in the number of patients with normative values of FVC from 57.3% to 76.2% (p<0.001), FEV1 from 58% to 78.4% (p<0.001), POS from 48, 8% to 75.6% (p<0.001), MOS75 from 61.2% to 80.3% (p<0.001) and MVL on average from 23.6 l to 42.1 l (p <0.05). In the control group of patients with RBO, it was noted that after 6 months of rehabilitation, the indicators FVC, FEV1, and the FEV1/VC ratio increased slightly.

Conclusions

A comparative analysis of spirometric parameters in children with RB before and after CHT in the EG and in the control group showed the effectiveness of the complex rehabilitation method including CHT with special breathing exercises on land and in the pool. In some patients of both groups, changes in POS did not have a stable trend, which can be explained by violations of the regularity of training. Spirometry showed that for children with RBO, the largest number of cases belonged to the obstructive type of ventilation disorders.

Thus, the use in rehabilitation therapy of a complex of necessary drug rehabilitation and physical training in the form of therapeutic water procedures and breathing exercises, i.e. Kinesihydrotherapy (KHT) is an effective technique in the rehabilitation of children with recurrent bronchial obstruction. A correct analysis of the results of the activities carried out makes it possible to assess the significance of



the rehabilitation methods used, their use in the future, the need to improve and introduce modern rehabilitation technologies in outpatient settings.

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