

LASER THERAPY IN THE TREATMENT OF NONSPECIFIC LUNG DISEASES IN CHILDREN

Endobronchial laser therapy was used in children with nonspecific lung diseases. Effectiveness of laser therapy was evaluated using cytogram of bronchoalveolar lavage fluid (BALF). There was observation of 29 children with nonspecific lung diseases: they were performed endobronchial laser therapy with use of gallium arsenide laser. This investigation has proved the effectiveness of laser therapy, and the method is recommended for treatment of nonspecific lung diseases in children.

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Introduction

In the present time, the treatment of nonspecific lung diseases (NLD) is provided with traditional sanation bronchoscopy with use of different medications (antibiotics, steroids, enzymes, etc.) (Kaganov et al., 1979; Artamonov, 1982). For the treatment of purulent endobronchitis in NLD it is also used helium-neon laser.

The aim of the presented investigation was the improvement of the treatment results of the purulent endobronchitis in children with nonspecific lung diseases with intrabronchial use of gallium-arsenide laser.

Materials and methods

The observation studied 29 children with purulent endobronchitis at the age from 1 to 13 years old. Among them, there were 17 boys and 12 girls. 9 of children had recurrent bronchitis, 10 children had chronic pneumonia, and 10 children were with foreign bodies in the bronchus.

The lung washing out (lavage) of 10 children with urolithiasis served as a model of bronchoalveolar-lavage fluid (BALF) in "healthy lung." The children had not pathology of the respiratory tract, the lavage was taken during the surgical operation through the intubation tube. In the comparison group there were children with chronic pneumonia, recurrent bronchitis and foreign bodies of the bronchus. These children received traditional therapy, during their bronchoscopy it was not used laserotherapy. In order to perform endobronchial laser irradiation it was used low-intensive semi-conducting laser on the gallium-arsenide base (ALT "Sogdiana", Uzbekistan), with persistent acting in the red diapason with the length of wave 0.67 mkm, in the dose 4.87 Jg\sm³.

Laserotherapy was performed in the following way. During the bronchoscopy it was carried out lavage with use of physiologic saline until the clear irrigated waters from the orifice of segmental bronchus. Subsequently, it was irradiated by the use of the light of gallium-arsenide laser with exposition during 1 minute. From the sediment of BALF centrifugation it was prepared the smear with the following fixation. Calculation of the cells elements was performed under the immersion for 100 cells with the percentage evaluation of the cytological composition.

Results

The distinctive clinical features of the diseases in children were the frequency of cough and the amount of expectoration; these cough was more frequent and the expectoration

amount was larger in children who had chronic pneumonia. Also, auscultative data were distinguished: the presence of the local bubbling rales in children with chronic pneumonia, scattered dry and single bubbling rales in children with recurrent bronchitis. During the bronchological investigation in all patients it was diagnosed purulent endobronchitis. The control group was characterized with prevailed amount of alveolar macrophages (AM) 91.4 ± 2.0 ; low amount of neutrophils (NP) 10.8 ± 2.0 and lymphocytes (LC) 7.8 ± 1.2 .

In all examined children, except children from the control group, it was determined the increasing amount of neutrophils and lymphocytes and the sharp decreasing amount of alveolar macrophages.

Table 1 shows how the amount of BALF cells changes depending on the type of the treatment of the groups of children. Normalization of the BALF cytograms was determined in children with foreign bodies and recurrent bronchitis who received laserotherapy. Although in children with chronic pneumonia (Table 2) normalization of the cytograms was not determined, but these indices were much better in the contrast of children who received traditional treatment. Positive clinical manifestation was directly correlated with the BALF cytogram.

Conclusion

Thus, treatment with the use of gallium-arsenide laser is one of the acceptable and effective methods of treatment of purulent endobronchitis in children with NLD. This method allows reaching during the short time a restoration of the bronchial patency, regression of the inflammatory process in bronchus and also restoration of the local lungs' defense.

TABLE 1. CYTOLOGICAL CHARACTERISTIC OF BRONCHOALVEOLAR-LAVAGE FLUID IN PATIENTS WITH RECURRENT BRONCHITIS AND FOREIGN BODIES IN BRONCHUS

Indices	Traditional treatment (comparison group) n=10			Treatment with use of gallium-arsenide laser (basic group) n=19		
	I-bronchoscopy	II- bronchoscopy	III- bronchoscopy	I- bronchoscopy	II- bronchoscopy	III- bronchoscopy
Cytosis	11.7 ± 0.6	9.1 ± 1.2	8.8 ± 0.4	5.4 ± 1.6	2.6 ± 0.9	1.8 ± 0.7
Cytogram:						
Alveolar macrophages	5.05 ± 0.5	7.2 ± 2.8	$8.2 \pm 0.8^*$	4.9 ± 1.7	10.4 ± 4.0	$25.8 \pm 7.4^*$
Neutrophils	89.9 ± 7.8	84.3 ± 8.9	$79.0 \pm 3.1^*$	89.7 ± 2.7	78.9 ± 5.6	$67.1 \pm 6.4^*$
Lymphocytes	5.1 ± 0.7	8.2 ± 1.2	$13 \pm 1.4^{**}$	5.4 ± 1.2	10.7 ± 0.4	$7.1 \pm 1.3^{**}$

Note: * - difference with significance level $P=0.001$; ** - difference with significance level $P=0.005$.

TABLE 2. CYTOLOGICAL CHARACTERISTIC OF BRONCHOALVEOLAR-LAVAGE FLUID IN PATIENTS WITH IN PATIENTS WITH CHRONIC PNEUMONIA

Indices	Traditional treatment (comparison group) n=10			Treatment with use of gallium-arsenide laser (basic group) n=10		
	I-bronchoscopy	II- bronchoscopy	III- bronchoscopy	I- bronchoscopy	II- bronchoscopy	III- bronchoscopy
Cytosis	11.7 ± 0.6	9.1 ± 1.2	8.8 ± 0.4	6.9 ± 1.2	6.4 ± 1.9	2.8 ± 0.8
Cytogram:						
Alveolar macrophages	5.05 ± 0.5	7.2 ± 2.8	$8.2 \pm 0.8^*$	2.8 ± 0.8	4.2 ± 1.6	$15.1 \pm 3.1^*$
Neutrophils	89.9 ± 7.8	84.3 ± 8.9	$79.0 \pm 3.1^*$	90.4 ± 6.3	85.0 ± 4.2	$73.1 \pm 3.5^*$
Lymphocytes	5.1 ± 0.7	8.2 ± 1.2	13 ± 1.4	6.8 ± 1.3	10.8 ± 2.1	11.8 ± 1.9

Note: * - difference with significance level $P=0.001$; ** - difference with significance level $P=0.005$.

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