

THE CONDITION OF PRO-AND ANTIOXIDANT SYSTEMS IN CHILDREN WITH ACUTE LARYNGOTRACHEITIS WITH IMMUNOMODULATING THERAPY

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Abstract: it is known that the activation of free radical oxidation OSLT, with the development of imbalances in the LPO - AOS and the accumulation of toxic compounds such as malondialdehyde (MDA) is one of the factors determining the severity of infection at laryngotracheitis in children, which results in increased expression of intoxication syndrome. Violation of this balance towards the increased activity of oxidative processes often leads to a generalization of infection, complications arise and the development of secondary immunodeficiencies. The study is based on clinical and laboratory examination of 275 children with acute stenosinglaryngotracheitis. The study revealed an increase in the intensity of free radical processes against progressive failure of antioxidant system in erythrocytes of children with ASLT. A more pronounced increase of intensity of lipid peroxidation and inhibition of enzyme activity of AOP in membrane structures of cells observed in children in the subgroups in which to implement integrated treatment including immunomodulatory drugs, evidence of its effectiveness compared with traditional therapy.

Keywords: acute constrictive laryngotracheitis, antioxidant system, children, immunomodulatory drugs.

Relevance of study. Increase in the number of acute respiratory infections in children, accompanied by airways obstruction, which often leads to the development of stenoticlaryngotracheitis. One of the factors determining the severity of the infection, with laryngotracheitis evident in increasing expression of intoxication syndrome is the activation of free radical oxidation at OSLT, with the development of imbalances in the LPO (lipid peroxidation) - AOD (antioxidant protection) and the accumulation of toxic compounds such as MDA (malondialdehyde) [7-14]. Violation of this balance towards the increased activity of oxidative processes often leads to a generalization of infection, complications arise and the development of secondary immunodeficiencies, which makes it relevant to the problem of studying the possibility of exposure to the disease agents with antioxidant activity [1-6]. However, some interest is the study of the influence of immunomodulatory drugs on the state of the antioxidant system, as AOS imbalance can lead to loss of functional activity of immune cells at OSLT. Also according to literature data prolonged and persistent increase in POL reduces the functional activity of lymphocytes, which can lead to the formation of immune deficiency. In that regard, the purpose of our research was: to study the activity of pro- and antioxidant system in the membranes of red blood cells in children with primary and recurrent laryngotracheitis before and after treatment [15].

Materials and methods of research. The study was based on clinical and laboratory examination of 275 children with acute stenosinglaryngotracheitis hospitalized in Clinic of SSMI № 1 in the period from 2016 to 2019.

For an adequate assessment of laboratory data were examined 30 healthy children of comparable age. All examined children were divided into 2 groups by forms of acute stenosinglaryngotracheitis: - 1 group of 122 (44.4%) children with primary stenosinglaryngotracheitis.

- 2 group - from 153 (55.6%) with recurrent stenosinglaryngotracheitis.

In this paper was investigated the determination of the level of lipid peroxidation - the initial product of diene conjugates (DC) in the membranes of red blood cells and the end product of lipid peroxidation - MDA. All biochemical studies on determining the parameters of lipid peroxidation and antioxidant protection were held in the research laboratory.

Was determined the level of CT (catalase) in the blood as well as serum cholinesterase activity pursued by a colorimetric method for the SF-46 for $q / e = 500-560$ nm. The intensity of chemiluminescence (chemiluminescence) was studied by the method of Yu. Vladimirov, A.I. Archakova. Definition of MDA was conducted by the method of N.A. Andreeva et al. The activity of SOD (superoxide dismutase) was determined by the method of E.E. Dubinin et al.

Obtained results and discussion. The study revealed an increase in the intensity of free radical processes against progressive failure of antioxidant system in erythrocytes of children with OSLT, the deepening of expressions of immune T-link. In the period of exacerbation of the disease was noted a significant rise in the level of MDA in patients of Group 1 to $2,79 \pm 0,11$ nmol/L in Group 2 - $8,23 \pm 1,11$, which exceeds the control 2.33 times and 2.9 times respectively in groups, and it reaches the level of DC in patients of Group 1 to $3,27 \pm 0,09$ U / ml, in group 2 - $5,61 \pm 0,69$. Obtained results indicate a significant activation of LPO. The level of SOD in group 1 decreased by 99.5% in group 2 - 99.6%, indicating the structural and functional changes in the membrane of cells. Perhaps in these violations of micro- and macro blood rheology the considerable role belongs to the activation of free radical processes. Thus, Coconnier M.H. et al. (2007) showed that the activation in erythrocytes free-radical

processes reduces fluidity and deformability of erythrocyte membranes, violates morphological structure and thus modifies the aggregation ability of these cells [5]. Activation of lipid peroxidation and the AOC, as a result, and the presence of changes in lipid structure are the basis for therapeutic and preventive measures aimed at correcting these violations. Thus, studies have established a significant violation of a pathogenic role of antioxidant function in organisms of OSLT children. Changes in the system POL-AOP were the leading mechanism of dysfunction of lymphocytes. The loss of functional activity of immune cells at OSLT can be linked to an imbalance of oxidant and antioxidant systems (Table. 1).

Table 1. The activity of pro- and antioxidant system in the membranes of red blood cells in children with primary and recurrent laryngotracheitis

	Indicators	Control group(n=30)	Group 1 (n=122)	Group 2 (n=153)
POL	MDA nmol / l	2,79±0,11	6,51±0,22***	8,23±1,11***
	DC, U / ml	1,43±0,02	3,27±0,09***	5,61±0,69***
AOC	SOD units / ml	2,41±0,09	1,21±0,01***	1,01±0,01***
	CT mmol / mg	11,55±0,77	7,96±0,31***	5,66±0,39***

Note: * - the differences with respect to the data of the control group significant (* - P <0,05, ** - P <0,01, *** - P <0,001) (* - P<0,05, ** - P<0,01, *** - P<0,001)

Analysis of new data on the pathogenesis of OSLT allows to conclude that a significant and lasting increase in the intensity of lipid peroxidation is an essential mechanism for the formation of OSLT reduces functional activity of lymphocytes, leads to the formation of immune deficiency and, as a consequence, to severe course of the disease. In the last years it was found that among the mechanisms of damage to the membranes at OSLT important is the state of lipid peroxidation (LPO), leading to the destruction of the phospholipid matrix membranes and further cell death.

To adequately evaluate the effectiveness of treatment, both groups were divided into two subgroups (1a, 1b, 2a, 2b). Children 1a and 2a were treated by generally accepted traditional methods, and the children subgroup 1b and 2b received complex therapy with immunomodulatory effects preparations. For Kids as a traditional therapy for relief of bronchospasm were used the following drugs: Dexamethasone, Salbutamol, fenoterol, ipratropium bromide + Fenoterol. In addition, for children with RSLT was used Epinephrine simultaneously with immunomodulatory drug Anaferon for children sublingually, under the scheme. All the drugs were used according to the respective dosages, the life and the body weight of the child. Combined therapy was as follows: on a background of conventional therapy was injected to patients via a nebulizer bacterial immunomodulator poly oksidony to directly impact on the mucosa of the larynx and the vocal cords and the stimulation of local immunity. Poly oksidoniya powder was dissolved in 5 ml of 0.9% saline solution of poly oksidoniya inhalation using a nebulizer for the first time was carried out for 5 minutes, and then every other day 7-8 min 5 sessions simultaneously introduced viferon candles 2 times a day 10 days rectally. A more pronounced increase of intensity of lipid peroxidation and inhibition of enzyme activity of AOP in membrane structures of cells observed in children in the subgroups in which to implement integrated treatment testifies to its effectiveness compared with traditional therapy. In the subgroup where was used complex therapy after treatment with MDA significantly decreased from a high degree of confidence (P <0,001). In 1a subgroup of patients with PSLT complex therapy MDA level decreased by 1.1 times, in the subgroup 1b - 1.6 times, 2a - 1.9 times, 1.44 times, 2b. Other parameters after treatment were significantly (P <0,001) are reduced in comparison with the subgroup of patients treated with CT, but have not reached the normal level (tabl. 2).

Table 2. The activity of pro- and antioxidant system in the membranes of red blood cells in children with primary and recurrent laryngotracheitis before and after treatment

Indicators	Terms	Control group(n=30)	Group 1 (n=122)		Group 2 (n=153)	
			Подгруппа 1a	Подгруппа 1б	Подгруппа 2a	Подгруппа 2б
MDA, nmol/ L	Before	2,79±0,1	6,51±0,22***	6,43±0,39***	8,23±1,11***	8,31±0,66***
	After		5,80±0,34***	4,03±0,22***	4,13±0,26***	5,74±0,31***
DCU/ ml	Before	1,4±0,02	3,27±0,09***	3,23±0,16***	5,61±0,69***	5,65±0,34***
	After		2,80±0,19***	1,93±0,11***	1,83±0,11**	2,91±0,15***
SOD units/ml	Before	2,4±0,09	1,21±0,01***	1,25±0,05***	1,01±0,01***	1,08±0,04***
	After		1,27± 0,08***	1,96±0,09**	1,89± 0,11**	1,36±0,08***

CT mmol/ mg	Before	11,5±0,8	7,96±0,31***	7,88±0,47***	5,66±0,39***	5,71±0,46***
	After		8,40±0,36***	11,20±0,90	9,84±0,60	9,20±0,50*

Note: * - the differences with respect to the data of the control group significant (* - P<0,05, ** - P<0,01, *** - P<0,001)

Conclusion: 1. In all subgroups of patients surveyed the general reaction to the process before the treatment was increase of the level of lipid peroxidation - high intensity CL and MDA level, the imbalance in the AOP - low activity of enzymes SOD, CT in erythrocyte membranes. 2. In the subgroups where complex therapy after treatment with MDA significantly decreased from a high degree of confidence (P <0,001). Patients with PSLT complex therapy MDA level decreased in the subgroup 1a- 1.1 times, in the subgroup 1b-1.6 times, 2a - 1.9 times, 2b - 1.44 times. Other parameters after treatment were significantly (P <0,001) reduced in comparison with the subgroup of patients treated with CT, but did not reach the level of the norm.

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