



Enzyme Activity and Intensity of Lipid Peroxidation in AIO

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Annotation: In 118 white rats, obturation from the middle part of the small intestine, strangulation by connecting with the intestinal mesentery was called in the intestinal obstruction experiment.

Dynamics of mine biochemistry and SOD (superoxide dismutase) parameters were studied. Examinations showed that all indicators showed high changes in strangulation intestinal obstruction, and when the cause of intestinal obstruction was removed, the changes did not return to their original state, polyorgan failure

Against the background of impaired microcirculation, hemorheology, and developing endotoxemia and hypoxia, the antioxidant defense system is weakened, which may be the cause of a violation of the structural integrity of biomembranes. One of the factors leading to membrane destabilization under hypoxic conditions is the activation of phospholipase A2, which leads to the breakdown of membrane phospholipids and the release of polyunsaturated fatty acids, which are the main substrates of LPO.

Keywords: LPO, polyorgan, SOD (superoxide dismutase), AIO.

Intensification of lipid peroxidation leads to the formation of "pores" in the membranes, disruption of ionic equilibrium and inhibition of the functioning of polyenzymatic systems localized in membrane structures.

Purpose of the study- Given the above, we have studied the dynamics of changes in LPO processes and some metabolic parameters of the blood in various forms of acute intestinal obstruction in dynamics.

Material and methods

Experiments were carried out on 118 outbred male rats of a displaced population with an initial weight of 180-200 g, contained in a laboratory diet in a vivarium. The model of the obstructive form of acute intestinal obstruction (AIO) was reproduced by ligation of the small intestine in the middle third, and the strangulation AIO, when the intestinal area was ligated together with the adjacent mesentery.

Determination of LPO intensity. The level of MDA in the above biological materials was determined according to the method (Andreeva A.I. et al., 1988). The calculation of the products reacting with thiobarbituric acid was carried out using the molar extinction coefficient of MDA equal to $1.56 \cdot 10^{-1}$ mol-cm and expressed in nmol MDA/mg of protein.

Determination of superoxide dismutase activity. The determination of SOD activity in our work was carried out according to the method of V.G. Mkhitarian and G.E. Badalyan (1979). The principle of the method is based on the ability of SOD to inhibit the reduction reaction of nitrotrazole blue in an alkaline medium. The calculation of the enzyme activity was carried out using the percentage of reduction of nitrotrazole blue, which was determined from the ratio:

$$T\% = \frac{E_k - E_o}{E_k} \cdot 100\%$$

E_k

SOD activity was calculated by the formula:

$$A = T\% \cdot n$$

$100 - T\%$. n where: A -activity of the enzyme in arbitrary units / min.mg of protein,

p -dilution of the bioassay; m is the amount of protein in the bioassay.

The results of the study showed the activation of free-radical lipid oxidation processes in AIO. In the blood serum, we found a gradual increase in the level of MDA in both obstructive and strangulation forms of AIO.

We observed pronounced hyperlipoperoxidation 6 hours after the reproduction of obstruction. This indicator increased statistically significantly by 68.9% and amounted to 9.122 ± 0.133 nmol/ml, with the normal value of the indicators: 5.398 ± 0.0302 nmol/ml. Such dynamics persisted by the 12th hour of the experiment, when the studied index increased to 9.511 ± 0.099 nmol/ml. With the aggravation of the pathological process and the development of peritoneal phenomena, the degree of hyperlipoperoxidation increased sharply, exceeding the values of the previous period and the parameters of the norm by 59.3 and 187.5%, and amounted to 15.15 ± 0.254 nmol/ml.

In contrast to the obstructive form of AIO, the strangulation changes were more pronounced and were detected from the first hours of the experiment. Thus, 2 hours after the reproduction of the strangulation OKN model, the MDA level increased by 20.7% and amounted to 6.355 ± 0.089 nmol/ml. By the 4th hour of the experiment, this increase increased to 58.5%, which amounted to 8.688 ± 0.045 nmol/ml. The strangulation form of OKN proceeded very hard and already 6 hours after the reproduction of the model, the content of MDA exceeded more than 2 times the parameters in the control group of animals and reached 11.12 ± 0.149 nmol / ml. With the lengthening of the experiment, the phenomena of membranolysis were even more aggravated, and by 12-14 hours of the model, this increase was 208.8 and 346.9%, corresponding to the duration of the experiment. At the same time, the MDA level increased to $16. \pm 0.254$ and 23.55 ± 0.372 nmol/ml.

Consequently, the strangulation form of AIO proceeded with a pronounced predominance of lipid peroxidation, the dynamics of which was of a progressive nature. In both forms of AIO, peritoneal phenomena develop at a later date, which exacerbates hyperlipoperoxidation.

Along with this, we studied the state of lipid peroxidation after the resolution of the causes of obstruction. To do this, animals with 2-hour obstructive and strangulation forms of OKN were allowed to resolve and the MDA level was examined 2 hours after resolution, which corresponded to a 4-hour experiment. Conducted studies have shown that if in the obstructive form of OKN there was a tendency to increase LPO compared with a 4-hour OKN (increase to 6.985 ± 0.302), which, in our

opinion, is apparently due to the effect of repeated intervention. However, in the future, the level of MDA gradually decreased. Thus, the studied indicator decreased to 8.411 ± 0.72 nmol/ml by 6 hours of the experiment, which was 41% lower compared to the values of the previous experimental group. The same trend continued in the future (24 hours), when its value was 5.277 ± 0.44 nmol/ml, which is 65.2% lower than the parameters of the non-eliminated group. During these periods of research, the studied indicator did not deviate from the parameters of the norm. The elimination of the 2-hour strangulation OKN contributed to an even greater increase in the level of MDA in the serum of experimental animals. The studied indicator increased to 9.88 ± 0.024 nmol/ml, which was 76.3% higher than the parameters of the uncorrected one and 80.7% higher than the control values. The same dynamics persisted in the future: an increase to 11.81 ± 0.19 nmol/ml after 24 hours from the start of the experiment. The studied indicators exceeded those of the uncorrected one, and were significantly higher than the control parameters by 11.8; 256.1; 380% according to the deadlines. The elimination of the 2-hour strangulation OKN contributed to an even greater increase in the level of MDA in the serum of experimental animals. The studied indicator increased to 9.88 ± 0.024 nmol/ml, which was 76.3% higher than the parameters of the uncorrected one and 80.7% higher than the control values. The same dynamics persisted in the future: an increase to 11.81 ± 0.19 nmol/ml after 24 hours from the start of the experiment. The studied indicators exceeded those of the uncorrected one, and were significantly higher than the control parameters by 11.8; 256.1; 380% according to the deadlines. The elimination of the 2-hour strangulation OKN contributed to an even greater increase in the level of MDA in the serum of experimental animals. The studied indicator increased to 9.88 ± 0.024 nmol/ml, which was 76.3% higher than the parameters of the uncorrected one and 80.7% higher than the control values. The same dynamics persisted in the future: an increase to 11.81 ± 0.19 nmol/ml after 24 hours from the start of the experiment. The studied indicators exceeded those of the uncorrected one, and were significantly higher than the control parameters by 11.8; 256.1; 380% according to the deadlines. The studied indicators exceeded those of the uncorrected one, and were significantly higher than the control parameters by 11.8; 256.1; 380% according to the deadlines. The studied indicators exceeded those of the uncorrected one, and were significantly higher than the control parameters by 11.8; 256.1; 380% according to the deadlines.

The obtained results indicate that if the resolution of the obstructive form of AIO can lead to a decrease in hyperlipoperoxidation, then with the strangulation form it tends to increase even more, apparently this is due, on the one hand, to the initially difficult condition of experimental animals due to the rapid development of peritoneal phenomena, the development of toxico-visceral shock, which leads to a certain degree of decrease in the body's resistance to repeated surgical trauma, on the other hand, the elimination of obstruction itself from a surgical point of view is more difficult. Thirdly, this is due to earlier involvement of the liver and kidneys in the pathological process, which leads to a slowdown in metabolism and toxic metabolites of metabolism, which causes pronounced development of endotoxemia in experimental animals.

In order to determine the AIO for the specific functions of the liver and kidneys, we studied the level of protein in the blood serum of experimental animals. The conducted studies showed that the level of protein in the serum of animals in both groups decreased in the dynamics of the development of AIO, especially with strangulation AIO. So, 2 hours after the reproduction of the model of obstruction, the level of total protein decreased to 6.32 ± 0.02 and 5.93 ± 0.01 g/dl, respectively, obstructive and strangulation forms. With obstructive OKN, these changes persisted up to 6 hours, and then we observed a trend towards an even greater decrease. By the end of the experiment, the studied index was 5.24 ± 0.08 g/dL. At the same time, in the strangulation form, the protein level progressively decreased up to 6 hours, amounting to 5.22 ± 0.06 g / dl by this time.

Elimination of acute intestinal obstruction, if in the obstructive form did not significantly change the content of total protein in the blood serum in the early stages, then in the future it gradually increased, approaching the control parameters. At the same time, during strangulation, it continued to decrease and amounted to 4.02 ± 0.04 g / dl by the end of the experiment.

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