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Vital microscopy of the microcirculation the bed of the mesentery of the small intestine in the dynamics of acute poisoning by sodium nitrite

Magomedov MA[1], Abdurakhmanova DB, Osmanova AA, Magomedov KhM

[1]Dagestan State Medical University, Makhachkala, Russia

Objective. Study of the state of hemo – and lympho-microcirculatory bloodstream of the mesentery of the small intestine of a rat in the dynamics of acute oral poisoning by sodium nitrite.

Materials and methods. The experiments were performed on 50 white rats weighing 180–200 g, divided into 2 groups: I intact (control) - 20 and II - model of acute sodium nitrite poisoning (experiment) - 30.The poisoning was reproduced by oral administration to anesthetized animals through a probe into the stomach of sodium nitrite at a dose of 50mg / kg.

Results. There was biomicroscopic noted a general slowing of the blood flow in 30 minutes after intoxication. On the back of vasodilatation in arterioles and precapillaries the blood flow slowed down and became continuous homogeneous or granular.Morphometry showed the expansion of the diameter of all links of the lympho-microcirculatory bloodstream of mesentery of the small intestine, compared with intact values. There wasdeterminedan increase in the diameter of arterioles by 22% (compared with the control), precapillaries - by 18.8%, a decrease in the number of perfusable capillaries in90 minutes after intoxication. The average diameter of the capillaries increases by 31.4% (compared with the control).Postcapillaries and venules were distinguished by plethora, great tortuosity and slower blood flow.The increase in the diameter of postcapillaries and venules compared with the control was 20.4 and 23%, respectively.The diameter of the lymphatic vessels increased by 30% (compared with the control). There was revealed an aggravation of signs of impaired hemomicrocirculation after 180 minutes, biomicroscopy. The number of drugs with deformed contours increased. The number of lymphangion contractions decreased to 1-2 in 1 minute.Their diameter compared with the intact increased by 40% ($P < 0.05$).

Conclusion. In 30 minutes after acute (LD50) oral poisoning with sodium nitrite the changes in the lympho-microcirculatory bloodstream of the mesentery of the small intestine are manifested in an intensive increase by 90 and 180 minutes of intoxication: vasodilation of the resistive link with a decrease in the rhythm of their vasomotion, venular hypertension, increased arteriole venous bypass surgery, vascular tortuosity, total venous hypertension, increased arteriole venous bypass surgery, vascular tortuosity, total venous hypertension, increased arteriole venous bypass surgery, vascular sinuosity, general venous hypertension, increased arteriole venous bypass surgery, vascular sinuosity, total venous hyperpression. In the lymphatic vessels a weakening of the motility rhythm of the lymphangion is progressing, with the appearance of the formed elements of blood

Keywords:
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in the lumen.

For correspondence: Magomed A. Magomedov, Candidate of Medical Sciences, Associate Professor of the Pathological Anatomy Department, Dagestan State Medical University, Russian Federation.
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The nitrate-nitrite pressure in many c ountries of the world is currently a real threat to the health of the population, given that these nitrogen compounds enter the human body mainly with food and drinking water [9]. It has been proven that nitrites are constantly present in the body and are endogenously synthesized by humans [9, 10]. Nitrates and nitrites are also widely used as medicines of vasodilating action [1, 6-8]. It is known that the severity of toxic effects in acute nitrite intoxication is due to the emergence of a dose-dependent multi-organ failure due to methemoglobinemia, hemic and histotoxic hypoxia, blood rheology and microcirculation disorders [1, 4-6, 10].

Purpose: Study of the state of hemo-and lympho-microcirculatory bed of the mesentery of the small intestine of a rat in the dynamics of acute (lethal dose 50) oral poisoning with sodium nitrite**.**

Materials and methods

The experiments were performed on 50 white outbred rats of both sexes, weighing 180 - 200 g, divided into 2 groups: I intact (control) - 20 and II - model of acute sodium nitrite poisoning (experiment) - 30. Poisoning was reproduced by oral administration of anesthetized animals (ketamine IM, 25 mg / g body weight) through a probe into the stomach of sodium nitrite at a dose of 50 mg / kg, i.e. 10 mg per rat [1].

Mesentery of the small intestinebiomicroscopy was performed according to the method of V.I. Kozlov (1972) in the control group, as well as after 30, 90 and 180 minutes after poisoning. Microscopy and photo-deregistration were performed using a Wilomed microscope (Germany), connected through a video camera to a computer, at x70 magnification. The morphometry of the microvessel diameters was carried out on a video monitor [3]. The digital material is processed statistically using the Statistika software package - 6.0. 2001**.**

Results and its discussion

Mesentery of the small intestinebiomicroscopy of intact rats found that arterioles had a continuous homogeneous blood flow, their diameter was 18 microns. They, branching, gave pre-capillaries with the same blood flow, their diameter was 10.6 microns. The number of vasomotor waves of arterioles was 17 in 1 min., and the pre-capillaries - 28 in 1 min. The capillary bed of the mesentery of the small intestine rats is represented by a small-leaf net. In the main capillaries, the blood flow is fast, homogeneous, and in the network - slow, granular, their diameter in the middle is 7.0 microns. The ways of the juxtacapillary blood flow, in the form of "semi shunts", had a blood flow similar to that in the magical capillaries. Postcapillary venules with a continuous granular blood flow, merging, formed venules. The diameter was 12.2 microns, and venules - 20.9 microns. Lymphatic capillaries in the mesentery of the small intestine were revealed in the form of “blind” outgrowths, with a diameter of 15 to 40 microns. As their diameter increased (up to 60-80 microns) and the appearance of valves, lymphatic postcapillaries were formed. Lymphatic vessels were channels with a diameter of 120 μm on average. The rhythmic contractions of their lymphangions were 12 in 1 minute. After 30 minutes after intoxication, among the complex changes in the lympho-microcirculatory bloodstream of the mesentery of the small intestine , detected biomicroscopically, there was a general slowdown of the blood flow, especially in the outflow links of the lympho-microcirculatory bloodstream in the form of an increase in the grain size of the blood flow in postcapillaries and venules. At this stage of intoxication in the arterioles and precapillaries against the background of their vacu- dilation, the blood flow slowed down and became continuous homogeneous or granular. The frequency of vasomotor waves of arterioles decreased to 11 in 1 min., they became ar-

rhythmic in nature. The precapillaries became tortuous with a decrease in vasomotor oscillations to 21 in 1 min.Violation of the capillary microcirculation was characterized by their increasing izvi-leafiness, plethora and a decrease in the rate of blood flow. Cases of intermittent flow have increased, especially in network capillaries. Morphometry showed an expansion of the diameter of all the units of the lympho-microcirculatory bloodstream of the mesentery of the small intestine as compared to intact values: in arterioles - by 7.2% (P≤0.05); in precapillary - by 3.7% (P≤0.05); in capillaries - by 23% (P≤0.05); in postcapillaries - by 14% (P≤0.05) and in venules - by 2% (P≤0.05).

Changes in the lymphatic bed of the mesentery of the small intestine were expressed in the deformation of drugs, apparently due to the dilation of certain groups of smooth muscle cells of their walls. Their diameter increased by 7.5% (compared to the control), the number of lymphangion contractions decreased to 8 in 1 min.

After 90 minutes after intoxication, further progression of the microcirculation of arterioles and precapillaries was determined with a weakening of their myogenic activity. The number of vasomotions of arterioles decreased to 8 per 1 min., Their diameter increased by 22% compared with the control and by 13% compared with the previous (30 ') observation period (P≤0.05). The precapillaries acquired a tortuous course, followed by a slow, grainy, interrupted blood flow. Their diameter increased by 18.8% compared with the intact group and by 14.5% compared with 30 minutes. intoxication (P≤0,05). The number of perfused capillaries decreased, the blood flow was preserved mainly in the main vessels, was slow and intermittent.

Table. Indicators of the diameters of the main groups of rat mesentery microvessels in the small intestine of rats in the dynamics of acute (lethal dose 50) oral poisoning with sodium nitrite (biomicroscopy; in microns; M ± m; n = 50; P≤0.05)

Group	Microcirculation links				
	Arterioles	Precapillary arterioles	Capillaries	Postcapillary venules	Venules
Intact group (control)	18±0,2	10,6±0,2	7,0±0,2	12,2±0,3	20,9±0,3
Sodium nitrite poisoning after 30 minutes	19,3±0,1	11,0±0,2	8,6±0,2	13,9±0,2	21,3±0,2
Sodium nitrite poisoning after 90 minutes	21,9±0,2	12,6±0,2	9,2±0,1	14,7±0,1	25,7±0,3
Sodium nitrite poisoning after 180 minutes	20,5±0,2	12,2±0,1	9,0±0,1	13,5±0,1	24,9±0,3

Erythrocyte agregates and signs of stasis, peri-vascular edema were detected in individual capillaries. Their average diameter increased by 31.4% (compared with control) and by 7% compared with 30 '(P≤0.05). In the field of view, arterio-venular anastomoses with intensive blood flow were often detected. Postcapillaries and venules were characterized by plethora, great tortuosity and slower blood flow. In some of them, signs of stasis, blood aggregation and perivascular edema were determined. The increase in the diameter of postcapillary and vezero compared to control was 20.4 and 23%, respectively. Compared with 30 'intoxication, their diameter increased by 5.7% and 20.6% (P <0.05), respectively. Changes in the lymphatic vessels of mesentery of the small intestine were characterized by further deformation of their walls with a decrease in the number of lymphangion contractions to 6 in 1 min. Their diameter has increased by 30% (compared with the control). Blood corpuscles were detected in some extended drugs because of the progressive increase in blood and drug permeability.

After 180 minutes, biomicroscopy revealed a general “impoverishment” of the lympho-microcirculatory bloodstream of the mesentery of the small intestine pattern, which was further aggravated by the unidirectional previously described signs of hemomicrocirculation impairment. The number of drugs with deformed contours containing shaped blood elements increased. The number of lymph-gion contractions decreased to 1-2 in 1 min.Their diameter compared with the intact increased by 40% (P <0.05) (table).

Conclusion

Thus, 30 minutes after acute (lethal dose50) oral poisoning with sodium nitrite, the changes in lympho-microcirculatory bloodstream of the mesentery of the small intestine are manifested in an intensive increase by the 90th and

180th minutes of intoxication: vasodilation of the resistive link with a decrease in the rhythm of their vasomotion, venous hypertension, increased arteriolar venous shuntro vascular conditions, tortuosity of blood vessels, general slowing of blood flow, stasis of erythrocyte aggregation with paravasal tissue edema. In the lymphatic vessels, a weakening of the motor lymphangion rhythm progresses with the appearance of the uniform elements of the blood in the lumen.

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Information about authors:

Magomed A. Magomedov, Candidate of Medical Sciences, Associate Professor of the Pathological Anatomy Department, Dagestan State Medical University, Russian Federation;

Jamilya B. Abdurakhmanova, Assistant of the Anatomy Department of the Medical College, Kaspiisk, Republic of Dagestan

Khadzhimurad M. Magomedov, Candidate of Medical Sciences, Assistant of the Pathological Anatomy Department, Dagestan State Medical University, Russian Federation;

Asiyat A. Osmanova, Candidate of Medical Sciences, Assistant of the Pathological AnatomyDepartment, Dagestan State Medical University, Russian Federation, e-mail: asiyt@mail.rue-mail:asiyt@mail.ru