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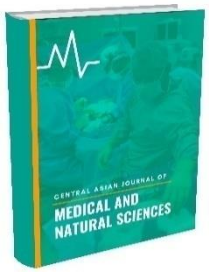

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Indications for Disorders of Central Hemodynamics and Transcapillary Metabolism in Patients with the Toxicogenic Stage of Acetic Acid Poisoning

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Annotation: Disorders of central hemodynamics and the development of exotoxic shock in patients with acetic acid poisoning are associated with gastrointestinal bleeding, swelling of the esophageal mucosa and stomach. We examined 64 patients with acetic acid poisoning of varying severity. The correlation between the state of transcapillary metabolism and the indicators of central hemodynamics was revealed. Transcapillary metabolism disorders in acetic acid poisoning are systemic in nature.

Keywords: acetic acid poisoning, transcapillary metabolism, central hemodynamics.

Acute poisoning with substances of cauterizing action is still one of the most common etiological factors of acute household poisoning. In recent years, the number of poisoning with cauterizing fluids in general and acetic acid in particular has decreased. According to the data, acetic acid poisoning in the structure of poisoning in the period from 2021 to 2022 amounted to 8.2%, the mortality rate decreased from 35.3 to 26.8%.

Hemodynamic disorders are one of the characteristic syndromes of acetic acid poisoning, the incidence of exotoxic shock is 84.5%. It is exotoxic shock that causes death on the first day of acetic acid poisoning. Disorders of central hemodynamics and exotoxic shock are based on a number of factors, and first of all, absolute hypovolemia caused by plasma loss through the burn surface, bleeding, severe metabolic acidosis, the development of DIC syndrome, etc. Which study violations of the systemic inflammatory response in acute poisoning with acetic acid. In their opinion, in case of poisoning with acetic acid, the development of exotoxic shock may be associated with the release of cytokines, damage to the vascular epithelial wall and violation of transcapillary metabolism.

The aim of the study was to study central hemodynamics and transcapillary metabolism in patients in the toxicogenic phase of acetic acid poisoning.

Material and methods of research. 64 patients with acetic acid poisoning were under observation. The study of central hemodynamics was carried out by the method of impedance rheo-plethysmography with the calculation of shock volume (UO), shock index (UI), cardiac index (SI),

specific peripheral resistance (UPS) according to W. G. Kubicek. Systolic (blood pressure system) and diastolic (blood pressure diast.) were also measured blood pressure, calculated the blood pressure of the media. The final diastolic pressure in the left ventricle was calculated. The volume of circulating blood (BCC) was determined by the blue Evans dilution method.

The state of transcapillary metabolism was studied using a modified V. P. Kaznacheev technique with the calculation of capillary permeability for liquid before (Vf) and after (Vf1) loading in ml and for protein before (P) and after (P2) loading as a percentage. When calculating, it is necessary to keep the "minus" and "plus" signs, since they provide the direction of movement of the liquid and protein. With a "minus", the permeability vector will be turned in the "blood-tissue" direction, and the "plus" sign indicates the movement of fluid or protein in the "tissue-blood" direction. The severity of the general condition of patients was assessed according to the classification of E. A. Luzhnikov.

Results. As can be seen from the data in patients of mild and moderate severity upon admission to the intensive care unit of the toxicological center AD system, AD diast. and HELL of environments. they did not significantly differ from the indicators of the control group. BCC, circulating plasma volume (CCP) and central venous pressure (CVP) progressively decreased. In patients with mild MI, at the same time, it statistically significantly decreased by 13.3% and amounted to 44.4 ± 1.7 ml/m2. An increase in heart rate by 10.4% leveled the decrease in SI ($p<0.05$). UPS increased to 800.0±46.1 din x s x cm-5/m2.

Prior to the hydrostatic test, the permeability of capillaries for water and protein in relation to the control group did not significantly change (Table. After the hydrostatic test, the permeability to water only significantly increased, amounting to 3.1 ± 0.2 ml ($p<0.001$). The permeability vector had a negative value, which indicated the passage of fluid through the vascular wall into the tissue. A significant correlation was revealed between the indicators of hypovolemia and an increase in capillary permeability to fluid. Hypovolemia increased in moderate patients. A significant decrease in preload was noted, which was confirmed by the level of CDDLJ. UI and SI decreased, and the UPS increased to 1159.2±53.7 din x s x cm-5/m2.

When conducting a correlation analysis before performing a hydrodynamic test, a significant negative correlation was found between an increase in Vf and BCP, Vf and BCC, Vf and CVD, Vf and CDLJ. Correlation analysis also revealed a negative correlation between Vf and UI ($r= — 0.41$; $p<0.02$),

Vf and SI ($g= — 0.44$; $p<0.02$). After the hydrodynamic test, the same dependencies were recorded, but the magnitude of the correlation coefficients in most cases increased, as did their reliability.

In contrast to patients with mild poisoning, patients with moderate poisoning had a negative correlation between an increase in protein permeability of %P and BCC, %P and BCC, and a positive correlation between %P and CODE ($g=+0.41$; $p<0.05$). The decrease in BCC, BCC, CVD and CDDLJ significantly correlated with a decrease in MI and SI. After the hydrodynamic test, the revealed dependencies remained, and in some cases an increase in the correlation coefficient was noted.

Patients with severe acetic acid poisoning had more pronounced volitional and hemodynamic disorders, in particular arterial hypotension. At the same time, MI significantly decreased by 36.1%, amounting to 32.4± 2.9 ml/m2, SI — up to 2.8± 0.22 ($p<0.001$). The UPS increased to 1159.2±53.7 din x s x cm-5/m2.

Trans capillary metabolism disorders and hemodynamic state in patients with severe poisoning were critical. The permeability of capillaries before the hydrostatic test in relation to the control group increased by 3.87 times for liquid and 2.11 times for protein, respectively, amounting to 6.85 ± 1.0 ml

and — 9.0± 1.9% (p<0.001). The permeability vector also had a negative value, which indicated the transfer of fluid and protein through the vascular wall into the tissue even before the load test.

At the end of the hydrodynamic test, a further increase in capillary permeability to water was noted to -17.6 ± 1.7 ml, that is, 4.3 times relative to the initial stage (p< 0.001), and protein to -27.2 ± 1.7%, that is, 4.35 times also relative to the initial stage (p < 0.001).

Conclusions

Acute poisoning with acetic acid is not only a loss of fluid through the burn surface and due to gastrointestinal bleeding, but also a systemic violation of capillary permeability. Increasing the permeability of capillaries to liquid and protein depends on the severity of acetic acid poisoning. Loss of fluid through the vascular wall of the capillary and the main indicators of central hemodynamics (stroke index, cardiac index, end diastolic pressure in the left ventricle, central venous pressure, circulating blood volume and circulating plasma volume). A decrease in colloidal osmotic pressure is one of the causes of hypovolemia and exotoxic shock.

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