DAMAGE TO THE VESSELS OF THE HYPOTHALAMUS BY CORPSES OF THE DEAD FROM ACUTE MASSIVE HEMORRHAGE AND HEMORRHAGIC SHOCK BACKGROUND OF ACUTE ALCOHOL INTOXICATION

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Abstract: *in the structure of neurological disorders neurodegenerative diseases occupy an important place, being the main cause of dementia and various movement disorders. In the cerebrum individuals, subjected to judicial – medical expertise according to the death from acute and massive hemorrhage in the form of on crushed -cutting wounds, established availability of neurodegenerative changes in the form of amyloidal calf. Their basic quantities concentrate around blood-vascular, in per ventricular area, and also under the soft cerebral membranes. A great number of amyloid calf's, karyolysis and cytolysis of neurons in two cases can be associated with intoxication narcotics, with the age of suffering and also existence cirrhosis of liver. The detection of amyloid calf in the preparation of cerebrum dictates essential emergence availability of concomitant diseases and intoxication for more exact definition of thanatogenesis.*
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Relevance. Blood loss on the background of acute alcohol intoxication is a wide-spread variant of traumatizing effects [7]. In damage to the heart and large vessels resulting in massive blood loss thanatogenesis most probably is associated with anemia of microcirculatory bed vessels (MCB) in the brain. Dystonia of vessels and impairment of rheological features of the blood in the brain are most significant in multiple damages to peripheral vessels [2]. Ethanol intoxication produces impairment of vascular wall permeability and its metabolic disturbances which result in marked edema of the brain, dura mater and pia mater [1, 6]. Simultaneously with disturbance of the brain vascular system following acute intoxication caused by ethyl alcohol (ethanol content in the blood and urine makes 4.1-8.9 %) high degree of damage to neurons in the brain trunk is noted [4, 5]. Morphofunctional insolvency of the brain vessels and strengthening of thanatogenetic vascular – coagulopathic component are observed in the brain in blood loss on the background of AAI [3]. Detailed study of arteries and MCB vessels condition in hypothalamus in various types of blood loss on the background of alcohol intoxication will make it possible to reveal additional aspects of thanatogenesis.

Aim: to evaluate thanatogenesis in various types of blood loss and hemorrhagic shock (HSh) on the background of alcohol intoxication by studying morphological condition of hypothalamus vascular system.

Material and methods. The wall of ventricle III with hypothalamus area has been studied in 47 corpses of persons who underwent forensic medical expert examination for death caused by acute (ABL) (3 cases), massive(MBL) blood loss due to impairment of the heart and magistral vessels (14), MBL caused by impairment of peripheral vessels (22) and in persons who died at the in-patient department in clinically made diagnosis of HSh caused by MBL following the impairment of peripheral vessels (8 cases). Blood loss and hemorrhagic shock were caused by impairments of vessels, organs and tissues by sharp (cut-stab) instruments. In all observations in forensic chemical study presence of ethyl alcohol in amount to 3% was determined in the blood of died people. Hypothalamus of the people died of similar types of blood loss and HSh has also been studied without presence of alcohol in their blood (50 cases). The pieces of the brain were fixed in 10% of neutral formalin, carried through alcohol battery, poured over with paraffin and colored by hematoxilin and eosin, resorcin- fuxin according to Veigert' method, with Shiff-reactive, Mallory and Nissle's method. In all types of blood loss and HSh functional condition of arteries is determined by quantity. With this arterial tonus is estimated in conditional units: spasm- 0,0, normotony – 0,5, atony – 1,0. Average indexes on the whole material give quantitative characteristics which expresses functional condition of muscular type arteries of a certain caliber [7]. In addition the content of blood filled MCB vessels was determined on hypothalamus sections with application of a large quadrate of measuring net of G.G. Avtandilov (25points) in all types of blood loss and HSh The study was carried out on two levels of hypothalamus – inner (the 1st level) and outer(the2d level) layers. For mathematic processing of the data the Student's method with determination of arithmetic mean M, average error of relative values m and coefficient of difference reliability t was employed; applied subprograms of Microsoft Excel 97 program product were used in the part of descriptive statistics, determination of standard deviations and comparison of extracts.

Results and discussion. The study of hypothalamus in various types of blood loss on the background of alcohol intoxication of slight and moderate severity made it possible to determine the changes of

morphofunctional condition of hypothalamus vessels in comparison with blood loss without alcoholemia. In ABL on the background of alcoholemia spasm of various caliber arteries is noted in hypothalamus. Tonus condition of large and small arteries on the 1st level of hypothalamus makes 0,2, average – 0,1 conditional units. On the 2d level of the organ tonus of large arteries makes 0,2 conditional units, average and small ones – 0,1. In ABL without alcoholemia spasm of arteries is marked in a greater degree and makes 0,1 for the most of hypothalamus vessels excluding average arteries on level 1 (0,2). In MBL caused by single impairment of the heart and magistral vessels on the background of alcoholemia, tonus of arteries of large, average and small caliber makes 0,3, 0,4, 0,5 conditional units. However in a deep hypothalamus layer the vessels appear to be sharply spasmodic, their tonus makes 0,2, 0,2, 0,1 in conditional units accordingly. These indexes in the given type of blood loss without alcoholemia after a single injury make 0,1, 0,2 and 0,3 on level 1 of hypothalamus for large, average and small arteries and 0,1, 0,3, 0,7 conditional units on level 2 that can be estimated as dystonia of the organ vascular system. Less marked spasm of intracerebral arteries is observed in multiple injuries of the heart and magistral vessels resulting in MBL on the ground of alcoholemia. On level 1 of hypothalamus tonus of arteries of large, average and small caliber makes 0,5, 0,5 and 0,4 conditional units and 0,5,0,4, 0,2 accordingly. In similar types of blood loss without AAI the indexes are 0,5, 0,5 and 0,3 on level 1 and 0,4, 0,2 and 0,3 conditional units. In MBL caused by single impairment of peripheral vessels on the background of AAI spasm of small arteries (0,2 conditional units) is observed. Large and average arteries are being in the condition of a slight spasm (0,4 and 0,4 cond. un.) on level 1 of hypothalamus, normotonia or spasm on level 2 (0,5 and 0,3 cond. un.). In multiple injuries of peripheral vessels on the background of alcoholemia arterial spasm is more clearly marked, on level 1 arterial tonus of large, average and small caliber makes 0,2, 0,3 and 0,1 of cond. un., on level 2 – 0,2,0,2 and 0,1. For hypothalamus vessels after similar type of blood loss without AAI in single injury the signs of dystonia are typical, as the tonus of large, average and small arteries on level 1 makes 0,4,0,2 and 0,6 and on level 2 – 0,5,0,4 and 0,2 cond. un. In multiple injuries of peripheral vessels a similar picture is observed, as arterial tonus of different caliber makes 0,4, 0,3 and 0,2 on level 1 and 00,6,0,4 and 0,2 on level 2. In HSh caused by MBL after injury of peripheral vessels on the background of AAI spasm of small arteries is more typical. Tonus of large, average and small arteries makes 0,4,0,4 and 0,2 cond. un. on level 1 and spasm of vessels is more clearly marked on level 2 making 0,2,0,2 and 0,1. In HSh caused by a single injury of peripheral vessels without alcoholemia spasm of different caliber arteries occurs rarer: 0,4, 0,2 and 0,6 cond. un. on level 1 and on level 2 their atonia is noted (0,7, 0,6 and 0,6 cond. un.). Probably in ABL, MBL and HSh on the background of AAI and without it dissociated spasm of arteries is often observed as it does not occur equally in the vessels of different caliber. However in blood loss without alcoholemia tendency of vessels to atonia is often observed that is not marked in different types of blood loss on the background of AAI. In hypothalamus (level 1) the number of blood filled vessels in ABL on the background of AAI and without it is not significantly different but on level 2 in alcoholemia their number is 3.8 times less than only in blood loss. In MBL due to single or multiple injuries of the heart and magistral vessels on the background of AAI marked blood filling of hypothalamus is marked and these indexes are much higher than the similar ones without alcoholemia. In a single injury of peripheral vessels resulting in MBL anemia of MCB vessels is determined in hypothalamus of persons' group with AAI and it is decreased in comparison with the group without alcoholemia 1.5 times on level 1 and almost 7 times on level 2. In multiple injuries in alcoholemia the number of blood filled MCB vessels is larger in hypothalamus on level 1 whereas on level 2 their number is reliably less than in comparative group without alcohol in blood. In comparison of two subgroups of persons with HSh caused by a single injury of peripheral vessels on the background of alcoholemia and without it we revealed that the number of blood filled vessels of MCB is also less particularly in a deep layer of hypothalamus (2.4 times). Thus, in ABL on the background of AAI spasm of hypothalamus arteries is less marked but anemic MCB vessels were more often observed than without alcoholemia. It can be caused by disturbance of redistribution of blood in the brain in alcoholemia. In ABL having the course of rapid loss of relatively small blood volume death is caused by heart failure [9]. In MBL caused by a single or multiple impairments of the heart and magistral vessels on the background of alcohol intoxication of mild or moderate severity less marked arterial spasm is marked in hypothalamus in comparison with similar blood loss but without alcoholemia. In these terminal conditions in alcoholemia blood filling of MCB vessels is better marked. In MBL caused both by single and multiple injuries of peripheral vessels in presence of alcohol in the blood spastic conditions of arteries and anemia of MCB vessels is marked more often. The same phenomenon is noted in HSH. According to some authors opinion in alcohol intoxication of a mild degree impairment of the brain is less in blood loss that can be associated with pain- killing effect of alcohol [14]. In our observations arterial dystonia in hypothalamus in blood loss on the background of preceding AAI was not observed. Vascular dystonia is considered as manifestation of vascular decompensation, that is confirmed by frequent diapedetic blood loss [12, 13]. However in blood loss on the background of AAI there is no circulation improvement in hypothalamus as difference of arterial tonus of large, average and small caliber persists. There is a complex, multi-link regulation in the vascular system of the brain which determines interaction of different histological structures in arteries, capillaries and veins joining them on blood flow realization, providing metabolism and neurons function [11]. Probably in blood loss both without

alcoholemia and on the background of AAI disturbance of coordinated activity of hypothalamus vessels takes place, i.e. dystonia of vascular system on the whole. In HSh there is also no tonus improvement of intracerebral vessels on AAI background. In MBL taking place on AAI background tonus condition correlate with blood filling condition of MCB vessels. In MBL caused by injury of the heart and magistral vessels in less arterial spasm blood filled MCB vessels occur more often. Constant anemia of MCB vessels is observed in MBL caused by injuries of peripheral vessels and also in HSh. In these blood loss types arterial spastic condition is observed more often. The revealed features of tonus condition of different caliber arteries and blood filling of MCB vessels in hypothalamus in different blood loss types and HSh serve as additional criteria for evaluation of thanatogenesis.

Conclusions:

1. In acute blood loss on the background of alcohol intoxication spasm of hypothalamus arteries is less marked but anemic MCB vessels occurred more often than without acoholemia.

2. In massive blood loss caused by single or multiple impairments of the heart and magistral vessels on the background of alcohol intoxication of mild and average severity less marked arterial spasm, better blood filling of MCB vessels are noted in comparison with a similar blood loss but without alcoholemia.

3. In massive blood loss caused by both single and multiple injuries of peripheral vessels and also in hemorrhagic shock spastic arterial condition and MCB vessels anemia are noted more often.

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