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MORPHOMETRIC FEATURES OF RAT’S BRAIN STEMS’ ARTERY

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The vast amount of information that is accumulated in the development of biology and medicine, suggests that morphology remains a basic science. The fundamental problems of biology, physiology, and practical medicine are solved on the basis of morphological data. The study and establishment of brain stem arterial relations of human and some laboratory animals is an urgent medical and biological problem.

The comparison of the individual vessels’ morphometric characteristics in different variants of their structure, will allow to give a reliable assessment about the anatomical characteristics of the brain’s stem arteries’ distribution in humans, and some laboratory animals. This will complement existing data on the structure and equalization of brain artery. Moreover, it will help to make more precise conclusions when conducting experimental studies on laboratory animals associated with vascular pathologies of the brain, as models in experimental practice. The simulation aimed at reproducing human and animal diseases should solve a number of tasks: to fully reflect the clinical and anatomical complex of symptoms that characterizes this disease.

A blood supply of the rats’ brain is not significantly different from the blood supply of the human brain. Rats are often used to model vascular pathology. However, for the correct interpretation of simulated results, it is necessary to take into consideration that certain features of the rats’ brain stem structure and its blood supply, as well as to find out the initial values of different vessels’ morphometric parameters, which can be used for comparison later.

**The purpose of the study:** to establish comparative features of the structure, shape and size of arterial relationships, human’s and rats’ brain stem. To identify the characteristic differences that are needed to be taken into consideration when experimental research and extrapolating results to a person.

**Material and methods of research.** The study and evaluation of the spatial organization of the the brain stem vessels have been carried out on the brain’s preparations of 20 mature, non-breeding white laboratory rats of different sexes used in other experiments undergoing euthanasia in accordance with the bioethics’ rules.

The vessels of the brain were filled with colorless liquid latex "Gummimilch gefarbt" with a painted dye for the "Silk" baccata, red. Laying of vessels was carried out with a single dose of 2 grams, using a subclavian catheter - G 24 v /v ultraflon – medvurobu, placed in the left ventricle of the heart by first tied the lower part of the aorta in the thoracic part., A subclavian catheter-G 24 v /v ultraflon-medvurobu was installed in the internal jugular vein, through which another 5-percent solution of formalin was injected with another disposable 2 g nozzle.

Then, according to a specially developed technique, the brain was extracted together with the cervical spinal cord from the cranial cavity and vertebral canal. Then we tie the thread to the part of the spinal cord and place it in a container with 10% solution of formalin in a suspended state for 3 - 5 days. After such fixation, all structure’s topographical and morphological features of the brain’s and blood vessels’ parts are preserved.

To study the brain arteries of the rats of Wistar, we placed a fixed drug of the brain on a millimeter paper (previously slightly dry the drug with filter paper). The millimeter paper allowed to see the total ratio of brain sections. The drug was placed on the basal surface to the top. Using binocular glasses with an increase of 10 crits, as well as microsurgical instruments, carefully removed the web of the membrane, releasing the major arteries and their branches.

**Results** Caudal and nasal connecting branches depart from the internal carotid artery in the brain section. Nasal branches at the level of visual crossing give the middle cerebral arteries. Turning the intersection of the optic nerves, the nasal connecting arteries are immersed in the longitudinal gap of the brain, where they merge into one single nasal cerebral artery. To the front of the visual crossing, both nasal connecting arteries are interconnected with a thin posthiasmatic branch, which resembles the front connecting artery in humans. Caudal connecting arteries merge with caudal cerebral arteries, which are branches of the main artery, that is formed by fusion of two vertebral arteries. The internal carotid arteries give nasal and tail connecting branches that together with caudal cerebellar arteries form a closed circle. For people, this is the сircle of Willis

When comparing the nasal connecting branch and the middle cerebral artery, it can be noted that the diameter of the latter is slightly less than the nasal conjunctive artery. A higher level of branching in the basin of the middle cerebral artery was noted, which may indicate a high rate of linear blood flow in its branches.

The symmetry of the main artery branching on the caudal cerebral arteries is close to the absolute, that is, spatially, for such vessels, the maximum level of hemodynamic resistance is characteristic.

We also found that there was a decrease in the diameter of the main arterial trunks that feed the brain in rats in the internal carotid artery system after each bifurcation. The diameter of vertebral arteries is 2 times smaller than the brain parts of the internal carotid arteries, and their total diameter is 1.5 times the diameter of the main artery. Such relationships, on the one hand, create optimal conditions for maintaining the proper level of intracranial pressure, and on the other provides an appropriate rate of blood flow through the vessels.

The obtained data give reason to believe that most of the blood to the brain in rats comes through the system of internal carotid artery, and smaller through the system of vertebral arteries. This factor can be considered as one of the reasons for the possibility of comparing blood supply of the rats’ brain to the human’s brain stem blood supply.