

Main sources of blood supply of the guinea pig brainstem

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Abstract

Experimental and theoretical medicine has recently been interested in the peculiarities of the blood supply to the brainstem of some laboratory animals.

The objective of our work is to determine the main sources of blood supply to the guinea pig's brainstem. On the basis of the data received by us, it is possible to define that guinea pigs are characterized by weak development of internal carotid arteries, but they have well-developed vertebral arteries which are formed the large basilar artery.

Introduction

The nervous system is the most important system of humans and animals [1]. The greatest interest is always aroused by the anatomical structure of the brain and its blood supply [2, 3]. Experimental and theoretical medicine has recently been interested in the peculiarities of the blood supply to the brainstem of some laboratory animals [4].

The similarity of the morphological structure of organs and tissues of vertebrates is the main factor that determines their use as an object for modeling pathological processes in experimental practice [5, 6, 7].

The aim of our work is to determine the main sources of blood supply to the guinea pig's brain.

Material and methods

This study was performed on the carcass of a laboratory animal – a guinea pig, given by the vivarium of KhNMU.

To determine the sources of blood supply to the arterial bed, the injection of arteries was performed with acrylic latex (3060 LBS, SYNTHOS DWORY), which contains red dyeware (Pigment-Mix, INCHEM).

The arterial system was washed through the left ventricle with 0.9% saline and 5000 IU of heparin. Filling of arterial vessels was performed through the internal carotid and vertebral arteries, installing a catheter KD-FIX, G18 1.3 x 45 mm, and fixing them with a ligature. After injection, the material was fixed in 10% formalin solution for 5 days. After fixation, the skull was dissected and the brain with the filled vessels was removed. Then there was performed dissection using microsurgical instruments and binocular dissection glasses.

Research results

As a result of our research, we've found the peculiarities of the blood supply to the guinea pig's brain.

It has been found that the arterial circle of the guinea pig's brain resembles the typical vascular system in mammals, although with a few notable exceptions. Internal carotid arteries are characterized by underdeveloped or poorly developed intracranial segments. They are observed in the form of very thin vessels branching laterally from the common carotid artery just below the occipital artery. The internal carotid arteries are directed to the base of the brain, where they rarely merge with the caudal connecting arteries within the arterial circle of the brain.

Conclusions

Thus, we can determine that guinea pigs are characterized by weak development of the internal carotid arteries, but they have well-developed vertebral arteries, forming a fairly large basilar artery.

References

- [1] Zelenevskij NV. Workshop on veteran medicine. Vol. 2, Splanchnology and Angiology. St. Petersburg: Logos; 2006. 320 p.
- [2] Hrustaleva IV, Mihajlov NV, Shnejberg JaI. Anatomy of Domestic Mammals. Hrustaleva IV, editor. Moscow: Kolos; 1994. 703 p.
- [3] Samotesov PA, Dralyuk MG, Shnyakin PG. Variant anatomy of central perforating arteries of Willis polygon. Siberian Medical Journal (Irkutsk). 2010 March; 93 (2): 22-5.
- [4] Nizamov FH. Features branche cerebral artery depending on the types of branching. Medical Science and Education of Ural [Internet]. 2016 [cited 2020 Aug 6]; 17 (1): 50-3.
- [5] Esteves A, Freitas AC, Rossi-Junior WC, Fernandes GJM. Anatomical arrangement and distribution of the cerebral arterial circle in rats. Braz j morphol sci [Internet]. 2013; 132-9.
- [6] Kuchinka J. Morphometry and Variability of the Brain Arterial Circle in Chinchilla (*Chinchilla laniger*, Molina). Anat Rec [Internet]. 2017 Aug 1 [cited 2020 Aug 6]; 300 (8): 1472-80. DOI: <https://doi.org/10.1002/ar.23566> [PMid:28181413]
- [7] Taylor DK, Lee VK. Chapter 25 - Guinea Pigs as Experimental Models. In: Suckow MA, Stevens KA, Wilson RP, editors. The Laboratory Rabbit, Guinea Pig, Hamster, and Other Rodents [Internet]. Boston: Academic Press; 2012. p. 705-44. (American College of Laboratory Animal Medicine). DOI: <https://doi.org/10.1016/B978-0-12-380920-9.00025-0> [PMCID:PMC5419829]