СТРУКТУРНАЯ ОРГАНИЗАЦИЯ НЕРВОВ ВНУТРЕННИХ ОРГАНОВ ВЕРХНЕГО ЭТАЖА БРЮШНОЙ ПОЛОСТИ

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STRUCTURAL BODY OF THE NERVES OF VISCERA OF THE UPPER PART OF ABDOMINAL CAVITY

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Nerves of the upper part of abdominal cavity are rather thoroughly studied at the macroscopic level, and the results of certification of nerve fibers of vegetative gastric, liver, spleen and pancreas plexuses require further studying for obtaining quantitative characteristics of myeloarchitectonics of these nerves. Works doing the morphological research of extravisceral nerves of liver, spleen, stomach and pancreas state that architecture of liver, spleen and gastric plexuses are to certain degree dependent on topography and branching pattern of the vessels going to these organs.

Studying the morphology of nervous system of the bile-excreting apparatus which takes part in biliary excretion regulation and plays certain role in the development of pathological processes in this area is of special interest. That is why the bile ducts nervous system has repeatedly been the subject of study for both clinicians and morphologists. However, quite a number of questions in anatomy and histology of extrahepatic ducts nerves needs further studying. In literature there are certain research works that present quantitative rates of age peculiarities of myeloarchitectonics of the nerves that make a part of the liver plexus in the area of hepatoduodenal ligament and splenic plexus. Gastric plexus and also the pancreas nerves are less studied. The existing reports contain general information about availability of the mentioned plexuses of myelin and nonmyelinated fibers in the nerves without quantitative analysis of the architectonics.

Thus, in the present time there is no comparative data concerning myeloarchitectonics of the nerves of viscera of the upper part of abdominal cavity. Material of the research was presented by neurovascular complexes of splenic, common hepatic and gastroduodenal arteries of corpses of mature, elderly and old people. Each age group contained 20 complexes. The series of transverse sections were made (the Krutsay method). Measuring the diameter and calculating the myelin fibers on the histograms with the help of the eyepiece micrometer were done. The initial numerical data were handled by common methods of variational statistics. We subdivided all the myelin fibers into

3 groups: thin (less than 3,9 micrometers), medium (4 – 6,9 micrometers) and thick (from 7 micrometers and more).

Results of the research and its discussion. While studying the external structure of liver, gastric and spleen plexuses the following was stated: liver plexus runs from celiac plexus to liver hilum following the common hepatic artery. In the strata of the hepatoduodenal ligament the plexus is divided according to the branch of the artery into the left and the right part. This division can occur at different levels of the stated ligament from the level of the duodenum up to liver hilum. In cases when the arterial vessel goes from the left gastric artery to the left lobe of liver, it is followed by the nerve plexus starting from the left gastric plexus. In these cases the left branch of the proper artery can be absent, and the basic mass of the nerve trunks of liver plexus goes to the right part of the liver hilum and only individual trunks go to the left lobe of liver. The splenic plexus follows the splenic artery, and its external structure reflects the configuration and topography of its division to the segmental branches. The topography of the gastric plexuses is connected with the topography of the arteries located along the greater and the lesser curvature of stomach.

We carried out the analysis of the myeloarchitectonics of the nerves forming vegetative plexuses of the viscera of the upper part of abdominal cavity at two levels in the initial part of liver, splenic and gastric plexuses and near the hila. On all the specimen of the nerves transverse section where the myelin fibers were coloured we can observe vast areas of clearing that according to modern belief are occupied by nonmyelinated fibers. The amount of myelin fibers in the individual nerve trunks varies within broad limits, and the total number in all the nerves forming each plexus for the old people comparing with the mature people is by 3,5 times less (146 versus 497) for the myelin fibers, and by 4 times (205 versus 620) for the liver part. Reduction of the number of myelin fibers is observed in the nerves of splenic and liver plexuses and for the elderly people comparing with the second period of the mature age. Nerve plexuses of the terminal part of splenic artery comparing with the nerves of the initial part contain by 2-2,5 times fewer myelin fibers for the mature and elderly people, and by 1,5 times fewer for the old people. This peculiarity can be explained by “migrating” of a part of myelin fibers with nerve branches to the body and tail of pancreas, to the left gastroepiploic and short gastric arteries. In connection with the high individual variability of the quantitative content of myelin fibers in the nerves of the same plexus and of the fibers of different categories in each of them a table of the relative indices in % is presented.

Analysis of the data in the table has shown that nerves forming liver, splenic and gastric plexuses, and also the extravisceral nerves of pancreas, contain myelin fibers of type B and of all the categories of types A and B. Also fibers of a very big diameter can be found in the initial parts of splenic plexus and in the branches of celiac plexus towards the head of pancreas. Fibers of small diameter prevail in the nerves of all the plexuses by the quantity of myelin fibers. Their minimum

quantity is defined in the initial parts of liver and splenic plexuses, 87.3% and 87.6% respectively, and the maximum quantity is in the plexuses along the right gastroepiploic artery on the artery of the body of stomach in the branches of splenic plexus to the pancreas – 100%. In the other parts of plexuses their quantity vary within the limits of the stated minimum and maximum values. The quantity of fibers of medium and big diameter is also unequal in different plexuses. Most part of fibers of these categories can be found in the initial parts of liver plexus - 5.6% and 7.1%, 8.4% and 3.2% respectively, and in the branches of liver plexus to the head of pancreas – 8%. In other plexuses the quantity of fibers of medium diameter vary in the limits of 1.8% in splenic plexus near the hilum and 3.9% in the branches of liver plexus to the body of pancreas. The fibers of big diameter can not be found in all the plexuses (0.3%) – in the branches of celiac plexus to the head of this gland, and we found the fibers of very big diameter only in the nerves of the initial part of splenic plexus (0.8%) and in the branches of celiac plexus to the head of pancreas (0.9%).

Comparison of the quantity of myelin fibers of different categories within the plexuses that were studied has shown that in their peripheric parts comparative content of the fibers of small diameter grows and relatively the number of fibers of other categories lessens. Besides, in liver plexus number of fibers of small diameter in the area of liver hilum grows up to 95.5% and relatively the percent of fibers of medium (from 5.6% to 2.5%) and big (7.1% to 2%) diameters comparing with the initial parts of the plexus lessens. In the peripheric parts of splenic plexus fibers of very big and big diameters aren't found, and the number of fibers of medium diameter lessens to 1.8%. In the plexus along the right gastroepiploic artery in the initial part 2.3% of the fiber of medium diameter were found, and in the area of greater curvature of stomach on the level of the body fibers of this category aren't found. The pancreas receives myelin fibers from different sources. Structure of the nerves approaching pancreas isn't homogeneous. Branches of the nerve plexus to the head of the gland contain myelin fibers of all the categories, and to the body of the gland – only fibers of small, medium and big diameter. Branches of the superior mesenteric plexus to the gland also contain the three named groups of fibers, branches of liver plexus contain only fibers of small and medium diameter, and branches of splenic plexus contain only fibers of small diameter. According to modern belief fibers of medium, big and very big diameters in the nerves of viscera of abdominal cavity are labeled as afferent fibers of spinal origin. Fibers of small diameter (up to 3.9 mictrometers) in the visceral nerves are labeled as effector preganglionic (type B). However, a number of authors consider that among these fibers there are also afferent fibers referring to group A (from 5 to 2 mictrometers) that are the prongs of small sensory cells of spinal ganglions. Besides, among these thin fibers there are fibers that appeared as a result of multiplication of fibers of a bigger diameter – this process goes under the notion about extra- and intravisceral multiplication of sensory fibers. It is possible that a part of thin fibers in the nerves that

we studied are the prongs of intravisceral Dogel type II neurons, axons of which go to abdominal prevertebral ganglia, and then follow to the spinal cord and form synaptic contacts with pseudounipolar somatosensory neurons in the spinal ganglia.

Thus, extravisceral multiplication of myelin fibers should be regarded as a result of adaptive evolution that ensures realization of integrative activity of nervous system already on the level of the first afferent neuron.