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| Research Article

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Microsurgical Anatomy

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Annotation
The paper presents the concept and content of microsurgical anatomy. The properties of microscopic, macroscopic and macromicroscopic anatomy are considered. Microsurgical anatomy of such topographic-anatomical formations as the eye socket, spinal canal, and intervertebral openings has its own characteristics.

Keywords: parenchymatosis, gland, organ, liver, pancreas, thyroid gland, microsurgery, macromicroscopy, anatomy.

The initial basis for defining microsurgical anatomy can be the generally accepted concepts of topographic and surgical anatomy. The Great Medical Encyclopedia defines topographic anatomy as a section of anatomy that studies the mutual arrangement of tissues, organs and body parts. The Encyclopedic Dictionary of Medical Terms describes topographic anatomy as anatomy that studies the structure, shape and relationship of organs in body regions. Close, but not identical definitions.

Surgical anatomy is defined in the Encyclopedic Dictionary of Medical Terms as a branch of anatomy that studies the structure of the human body in relation to surgical issues, primarily for the purpose of substantiating surgical approaches and techniques.

Considering the term “microsurgical anatomy” in the system of terms given above, it could be defined as follows.

Microsurgical anatomy is a branch of clinical anatomy that studies the structure and topography of small anatomical structures of organs and body regions in health and disease in relation to microsurgical needs. The main feature of microsurgical anatomy is the study of anatomical structures in the macromicrosurgical field of view, i.e. in the range of stereoscopic magnifications. pic microscope, surgical loupes and an operating microscope.

Specifically, this is the magnification range from 3x to 45x. It is this range that can be defined as macromicrosurgical . In this case, the optical boundaries between macroscopic, macromicroscopic and microscopic anatomy are quite clear. Microscopic anatomy, or special histology, begins with low magnifications of a biological microscope, usually 56x. This is the anatomy of tissue structures of organs.

Macroscopic anatomy is traditional anatomy studied with the naked eye.

Macromicroscopic anatomy is the anatomy of structures that are confidently studied in the optical range indicated above. It fills the anatomical niche between macroscopic and microscopic anatomy well , and forms the continuity of anatomical information at different levels.

Here it is necessary to emphasize the enormous contribution made to the development of macromicroscopic anatomy by the creator of the method of macromicroscopic dissection V.P. Vorobyov and the Kharkov anatomical school, academicians D.A. Zhdanov, V.V. Kupriyanov, M.R. Sapin and the teams they led, and many domestic and foreign anatomists.

Microsurgical anatomy did not arise out of nowhere. It developed on the basis of data from two major sections of anatomy: macromicroscopic and topographic anatomy.

In microsurgical anatomy, according to the above-mentioned sources, two principles were combined: the use of macromicroscopic fields of vision corresponding to the magnification range of a surgical loupe and an operating microscope, and the topographic principle of studying the structure and location of anatomical structures.

The content of microsurgical anatomy is the macromicroscopic structure of an organ, the morphometric characteristics of its structures, extraorgan macromicroscopic topography, intraorgan histotopography , macromicroscopic angio- and neuroarchitecture .

Methods of studying microsurgical anatomy. The methodological basis for studying microsurgical anatomy is a set of methods in which the leading place is occupied by macromicroscopic dissection and the histotopographic method.

Macromicroscopic preparation in its classical form is a stereomorphological preparation method developed by academician V.P. Vorobyov and widely used in performing anatomical studies.

Such preparation was carried out under a binocular magnifying glass, miniature instruments, under a "falling drop", with a selected direction of the light source. To facilitate the isolation of small anatomical formations, the prepared area or organ was previously exposed to weak acid solutions.

The use of this technique allowed anatomists to obtain extensive data on the macromicroscopic structure of organs, their blood supply, innervation, the structure of peripheral nerve plexuses, etc.

At present, macromicroscopic preparation is performed using more advanced optical equipment – stereoscopic microscopes MBS-2, MBS-9 and MBS-10. These microscopes have a significantly larger field of view, a wide range of magnifications from 3.6× to 98.0×, various options for illuminating the object, convenient options for both preparation and studying finished preparations (anatomical and histotopographic) in incident and transmitted light. As applied to microsurgical anatomy, macromicroscopic preparation allows obtaining, first of all, data on the fine topographic relationships of the objects being studied with preservation of small blood vessels, ducts, and nerves.

It is very important that the preparation can be carried out through a stereoscopic microscope or binocular magnifying glass in the same range of magnifications in which microsurgical interventions are performed on these objects or in a given area. The possibilities of macromicroscopic preparation are expanded by the use of preliminary injection of blood and lymphatic vessels with colored masses.

We assign a large role to the second method – histotopographic – when conducting research on microsurgical anatomy. Sometimes the histotopographic method is identified only with individual, large-area, stained histological sections, called histotopograms .

By histotopogram we mean a stained histological section of a complex of anatomical formations of a region, a separate organ or a large part of it, which makes it possible to study the structure and topographic relationships of various morphological structures at 3.6–48-fold magnification of a stereoscopic microscope.

But a separate histotopogram and the histotopographic method are not identical concepts. The histotopographic method should be understood as a method for studying the macromicroscopic structure, extra- and intraorgan macromicroscopic topography of organs and regions on serial spatially oriented histotopograms .

Consequently, we can speak of a histotopographic method if, firstly, a series of histotopograms of different but precisely fixed levels is used; secondly, their planes are spatially precisely oriented; thirdly, they are studied as a whole, which allows us to reconstruct topographic relationships along their length and in space. General histological staining methods are most often used to prepare histotopographic sections: hematoxylin and eosin and Van Gieson , but depending on the object and objectives of the study, special staining methods can also be used.

An analogy is appropriate between the histotopographic method in microsurgical anatomy and the method of cutting frozen corpses, proposed by N.I. Pirogov, in topographic anatomy, which has contributed so much to the study of the macroscopic topography of organs and areas of the human body.

In addition to macromicroscopic preparation and the histotopographic method, a number of other methods are used in studies of microsurgical anatomy, allowing the study of the structure and topography of large and small anatomical structures in the macromicroscopic range of optical magnification. These include microinjection methods for identifying intraorgan blood vessels, me methods of clearing anatomical sections of organs and various planar structures, staining of intraorgan nerves and plexuses (for example, with Schiff's reagent), microradiography . An obligatory component of the methodological support of macromicroscopic research is morphometry of the anatomical structures of the organ with subsequent variational-statistical processing.

Clinical applications of microsurgical anatomy. Depending on the type and characteristics of the organ, as well as the microsurgical operations being developed, the relationships between the components of microsurgical anatomy may be different. Its individual components acquire a particularly significant significance for the justification of microsurgical interventions.

Thus, for the anatomical substantiation and development of microsurgical interventions on hollow and tubular organs (esophagus, stomach, intestines, trachea and bronchi, bile ducts, ureters, fallopian tubes) , extraorgan macromicroscopic topography, the anatomical structure of the organ wall, data on the thickness of the wall and its constituent layers are of primary importance.

These components of microsurgical anatomy are of key importance for substantiating microsurgical methods of suturing these organs and creating interorgan anastomoses. When substantiating microsurgical methods of vascular suturing for restoring the integrity of a blood vessel and forming intervascular anastomoses, the data on the macromicroscopic structure, thickness, and biomechanical properties of the vascular wall as applied to blood vessels of different types and calibers are of primary importance.

For some blood vessels (for example, the coronary arteries of the heart), the immediate macromicroscopic environment, i.e. extraorgan macromicroscopic topography, is of great importance.

For parenchymatous, glandular organs (liver, pancreas, thyroid gland, etc.) the development of microsurgical techniques of operation is directly related to the data on the intraorgan macromicroscopic anatomical structure: the anatomy of the organ lobes, the expression of the

connective tissue skeleton, the intraorgan topography of the ducts, blood vessels, nerves. Parenchymatous organs Thyroid gland Lungs Liver Pancreas Kidneys Adrenal glands Prostate glandritoneoscopy , large and actively developing sections of endoscopic surgery: thoracoscopic , laparoscopic surgery, endosurgical interventions on the organs of the retroperitoneal space, etc. The microsurgical anatomy of such topographic-anatomical formations as the eye socket, spinal canal, intervertebral openings has its own characteristics.

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