Topographical and Pathotopographical Medical Atlas of the Head and Neck
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About the Author

Z. M. Seagal is an Honoured Scientist of the Russian Federation and the Udmurt Republic, Honorary Academician of the Izhevsk State Medical Academy, Head of the Department of Operative Surgery and Topographic Anatomy, Doctor of Medical Sciences, and Professor.


The atlas presents topographical and pathotopographic human anatomy for both the adult and the child. The section “Head” includes cerebral and facial parts according to the areas. Layer topographic anatomy, variant, computer and MRI-topographic anatomy are presented in the section. The surgical anatomy of congenital malformations of the head includes cerebral hernia and hydrocephalus, and of the face - macrostomy, coloboma, clefts of hard and soft palate. In the section “Neck” there are given individual and age differences, fasciae and cell spaces, triangles and vascular-neural bundles, collateral blood supply of the brain in injuries or occlusion of the main neck arteries, topography of the neck organs. All the pictures are colorful and original. The atlas is written in accordance with the educational program of medical universities of the Russian Federation. The original graphs of logical
structures are presented according to the sections of topography and congenital malformations. This allows an effective study of the subject.

This atlas is intended for the students of General Medicine, Pediatrics and Dentistry faculties, as well as for interns, residents, postgraduate students and surgeons. The monograph is intended to be used by physicians, junior physicians, medical residents, lecturers in medicine, and medical students.
Introduction

This color atlas of topographic and pathotopographic human anatomy is the fundamental and practically important book designed for doctors of all specializations and students of medical schools. Here you can find almost everything that is connected with the topographic and pathotopographic human anatomy, including original graphs of logical structures of topographic anatomy and development of congenital abnormalities, topography of different areas in layers, pathotopography, computer and magnetic resonance imaging (MRI) of topographic and pathotopographic anatomy. Also you can find here new theoretical and practical sections of topographic anatomy developed by the author himself which are published for the first time. They are practically important for mastering the technique of operative interventions and denying the possibility of iatrogenic complications during operations.

All the pictures are completely original, drawn and colored at a highly professional level. There are also illustrations of individual and age differences of human organs in the chapter of variant topographical anatomy. In the chapter of topographical anatomy you can find holothopy, sceletothopy, synthopy of organs and main anatomical formations, facial vaginae, reticular spaces, branches of nerves and vessels,
collateral vessels, zones of sensory and motoric innervation of nerve trunci. Pathotopographic anatomy is displayed by the examples of typical pathology of different areas.

One of the distinguishing features of this book is that topographic and anatomic structures are presented both in corpses and postoperative patients. This data is gathered by the use of MRI and transillumination of organs and tissues.

Unfortunately, nowadays there is no publication of modern atlases of clinical, topographic and pathotopographic anatomy due to several reasons. Firstly, this subject is separated only in Russia and Hungary. In other countries, it is either absent or exists as a part of similar subjects like anatomy or surgery. Some of the themes presented in this book like pathotopographic, variant, normal, topographic anatomy, transillumination, pathotopographic and topographic anatomy of patients and healthy people are original studies of the author of this book.

This color atlas can serve as a textbook for routine necessities of theoretical and practical work of physiologists and pathophysiologists, anatomists and topographic anatomists, pathoanatomists, therapists, surgeons, gynecologists and obstetricians, neurologists and dermatovenerologists, radiologists, reanimatologists, anaesthesiologists, otorhinolaringologists, traumatologists, orthopedists, pediatricians, dentists and other doctors of narrow specializations like angiosurgeons, urologists, plastic surgeons, neurosurgeons, etc.
Topographic and pathotopographic anatomy presented in this book can be divided into surgical anatomy, therapeutic anatomy, stomatological anatomy, pediatric anatomy, etc. There are also some specific and non-specific indications of pathotopography and variants of physiology, differences between physiology and pathology, and ways of using ultrasound topographic and pathotopographic anatomy. It should be pointed out that studying a living human organism in physiological and pathological conditions is the most effective way for reliable diagnostics. Here you can also find descriptions of less traumatic and non-traumatic operations, as well as effective ways of treatment.

Topographic clinical anatomy changes in the course of a disease and recovery, iatrogenic manipulations, as well as therapeutic and surgical interventions. Some of these situations are described in this book. The author of this book will eagerly accept all constructive criticism and take it into consideration in the next editions of the book.
Topographic Anatomy of the Head

Limits, outer orienteers. The head is separated from the neck with the line which begins on chin elevation – protuberantia mentalis, after that it laterally continues across the lower mandible edge, continues by the lower semicircle of outer aural meatus, goes on to the upper nuchal line, linea nuchae superior, and ends on both sides on outer elevation of occipital bone with protuberantia occipitalis externa. In general, the head is divided into cerebral cranium – cranium cerebrale and facial cranium – cranium faciale.

Cerebral Cranium

Limits: The cerebral cranium is separated from facial cranium with the anatomical formations described below. It is
limited by glabella by the middle line. Afterwards this line goes along the brow arch, arcus superciliaris, then - by the rear edge of the processus zygomaticus ossis frontalis and processus frontosphenoidalis ossis zygomatici, then the line goes on by the zygomatic arch, then it continues vertically to the rear edge of the ascending branch of the mandible, and afterwards it continues on the bottom margin where it ends after connecting with a similar line coming from the opposite side – forming protuberantia mentalis.

**Area division:** The cerebral cranium can be divided into the cranium base, basis cranii, and the cranium fornix (or dome) which is also called calvaria. The cranium base is divided into inner one (basis cranii interna) and external one (basis cranii externa). Calvaria is divided into frontal, parietal, occipital, temporal and mastoid regions (regg. Frontalis, parietalis, occipitalis, temporalis et mastoidea).

Regio frontalis (or the frontal area) is located within the frontal region. Its limiting line begins in the lower part of glabella, spreads to the sides across eyebrow arches, crosses the zygomatic process of the frontal bone, continues upwards across temporal line, and then ascends by the projection line of the coronal suture.

Regio parietalis (parietal region). Limits: anterior limit is the coronal suture, lambdoid suture is the rear limit, temporal line limits it from the sides.

Regio occipitalis (occipital region) is located within the squama of the occipital bone. Limits: lambdoid suture limits it from the top and from the sides and the line drawn
horizontally from one apex of mastoid bone to another limits it from below. It’s called linea bimastoidea.

Regio temporalis (temporal region). Limits: upper and rear limit is the temporal line, lower limits are zygomatic arch and temporal line above the external aural canal, anterior limit is the zygomatic process of the frontal bone and the outer section of the temporal line. Layer topography of this area has its own complications: skin has less connective tissue septa the lower it is. Aponeurotic helmet becomes thinner and is called here fascia superficialis or superficial fascia. Fascia temporalis propria or proper temporal fascia is formed by the arcus zygomaticus after attaching with its lower margin. You can find its spatium interaponeuroticum, interaponeurotical space, between the plates.

Regio mastoidea or mastoid is an area which is limited with mastoid process. Layer topography of this area has its own complications: skin has no hair and is tightly attached with the mastoid aponeurosis or aponeurosis mastoideus lying below, which is a continuation of galea aponeurotica, but is significantly thinner that its origin. Mastoid process is covered with a thick layer of the periosteum and has attachment points of m. sternocleidomastoideus, mm. splenius capitis et cervicis, venter posterior m. digastrici.

Layers of Regions and their Characteristics:

1. Derma – thick, hair-covered skin, it has a large number of sebaceous and sweat glands. It is firmly attached to the deeper lying subcutaneous fat and
supracranial muscle, musculus epicranius, using vertically going connective tissue septa.

2. Panniculus adiposus – it’s subcutaneous fat. Blood and lymphatic vessels of this layer are firmly fixed using connective tissue septa. That’s why vessels do not collapse when injured.

3. M. epicranius – it’s epicranius muscle which consists of the frontal part, m. frontalis, and the occipital part of the m. occipitatis. Both parts have shared tendon helmet, galea aponeurotica, which is located in the parietal region and becomes thinner as it goes laterally during transition to the temporal region. These three layers which were described above form a single layer of tightly interconnected tissues.

4. Stratum fasciae – it’s fascial layer, a layer of incoherent connective tissue.

5. Periosteum is firmly attached to the skull bones only in the sutural areas.

6. Ossa cranii are the bones of the skull of variable thickness. Occipital region bones have the maximum thickness, and the temporal bones have the minimum thickness. The skull bones are composed of three layers. It’s the lamina externa or the external plate, substantia diploica or the spongy matter which has a lot of vessels – especially vv. diploicae, and lamina vitrea or glass-like plate.

7. Spatium epidurale – it’s the space above the dura mater.
8. Dura mater is composed of dense fibrous connective tissue. As it goes deeper, this tunica forms the falx cerebri or the crescent of the brain and with its help it divides cerebral hemispheres from each other; falx cerebelli or the crescent of the cerebellum divides the cerebellar hemispheres, and tentonum cerebelli or the tent of the cerebellum separates the occipital lobes of the cerebral hemispheres from the cerebellum. These processes of dura mater form channels for the drainage of venous blood from the cranial cavity which are called venous sinuses.

9. Spatium subdurale is a space beneath the dura mater.

10. Arachnoidea encephali or the arachnoid membrane contains blood vessels and continues from one gyrus to another without going in.

11. Spatium subarachnoidaie or subarachnoid space stores cerebrospinal fluid in its subarachnoid cisterns or cisternae subarachnoidaie.

12. Pia mater or the soft tunica contains a large number of vessels. The tunica finds its way inside all the sutures between the gyruses.

13. Spatium epicerebrale or epicerebral space. Has the most amount of cerebrospinal liquid between all the listened above spaces.

14. Gyri cerebri or brain gyruses.