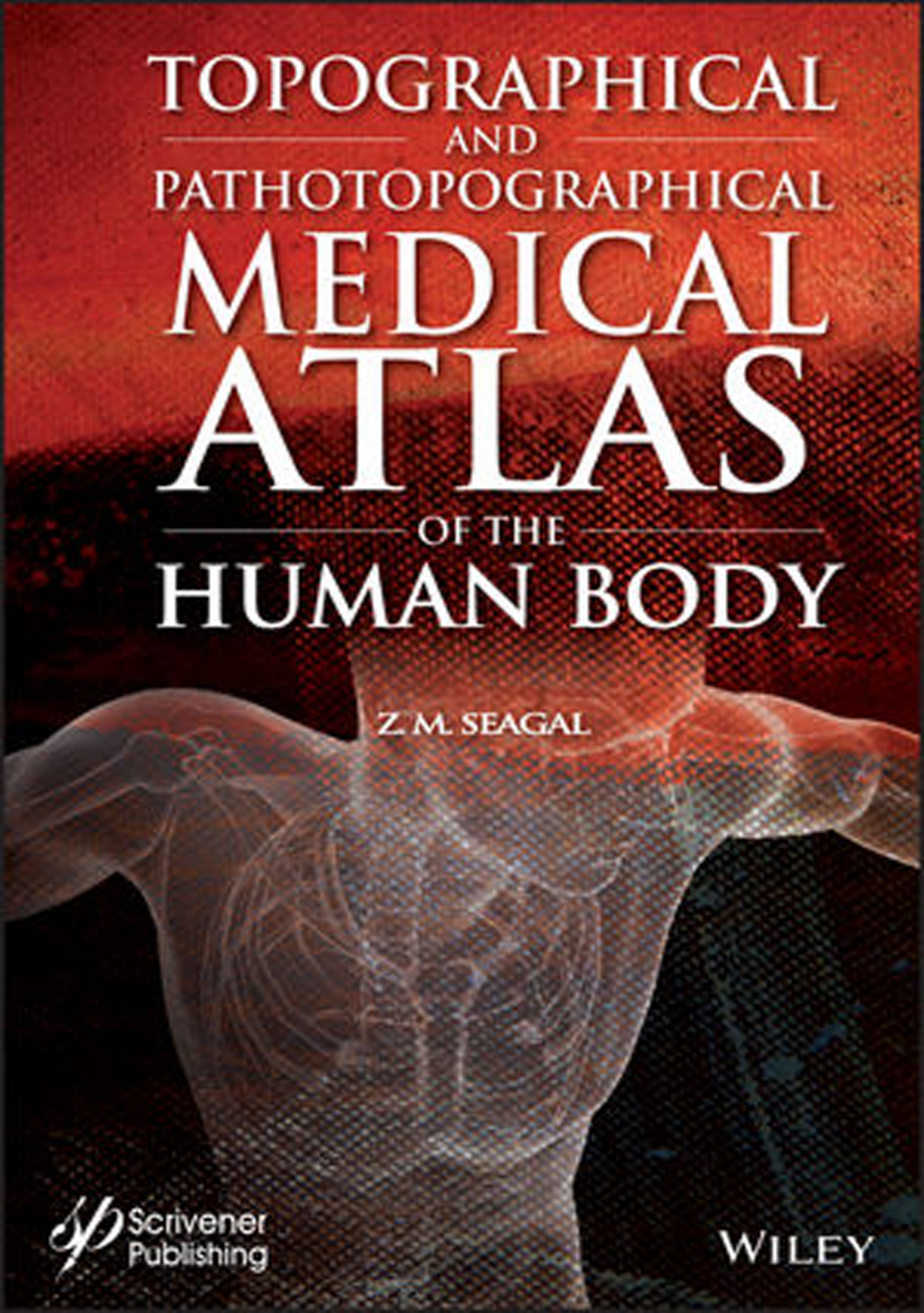
TOPOGRAPHICAL AND PATHOTOPOGRAPHICAL MEDICAL ATLAS OF THE HUMAN BODY

Z. M. SEAGAL



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Contents

Preface

Topographical and Pathotopographical Medical Atlas of the Human Body is a fundamental and practically important book designed for doctors of all specializations and students at medical schools. The atlas contains almost everything connected with the topographic and pathotopographic human anatomy, topography of different areas in layers, pathotopography, variant, normal, computer and magnetic resonance imaging (MRI) of topographic and pathotopographic anatomy. Also presented in the atlas are new theoretical and practical sections of topographic anatomy developed by the author; these are published for the first time. They are of practical importance in mastering the technique of operative interventions and denying the possibility of iatrogenic complications during operations.

Images of individual and age-related changes in human organs are presented according to variant topographic anatomy. Topographic anatomy describes holotopy, skeletopy, organ syntopy and main anatomic formations, fascial compartments, cellular spaces, neurovascular bundles, collateral circulation, sensor and motor parts of nerve trunks. Pathotopographical anatomy is shown on typical pathology examples in various fields.

It is important to visualize topographical anatomy structures not only on a corpse, but also on patients who have undergone surgical interventions. These data were obtained using computerized MRI topography, transillumination of organs and tissues, pathotopography and ultrasound topography.

Currently, there are no modern atlases in the world for clinical topographic and pathotopographic anatomy. There are several reasons for this. Firstly, this subject has been studied only in Russia and Hungary. In other countries, it is either absent or present in related disciplines, such as anatomy or surgery. A number of sections, such as pathotopographic, variant, normal topographic anatomy, transillumination, and vital topographic and pathotopographic anatomy on sick and healthy people were developed by the author of this atlas for the first time.

This atlas can serve as reference in the daily work of theoretical and practical physiologists and pathophysiologists, anatomists and typographic anatomists, pathologists, therapists, surgeons, obstetricians and gynecologists, neurologists and dermatovenerologists, radiation diagnostitions, anesthesiologists, otolaryngologists, trauma surgeons, orthopedologists, pediatricians, and dentists, as well as those in narrow specialties, such as cardiovascular surgeons, urologists, plastic surgeons, neurosurgeons, etc.

The topographic and pathotopographic anatomy presented can be subdivided into surgical, anatomy, therapy, dental and pediatric. Specific and non-specific features of pathotopography and normal variants have already been found and are presented in the atlas; normal anatomy, divided into pathological, ultrasound topographic and pathotopographic anatomy, is established in the book.

Topographic clinical anatomy changes with the disease and recovery during iatrogenic manipulations, surgical and therapeutic treatment. That is why some of these points are described in the atlas.

Our atlas of topographic and pathotopographic anatomy is a full-colored handbook for students and doctors in almost all specialties. It covers all the organs and tissues of the human body. Its fundamental and practical importance is that topography and pathotopograpy are presented for the first time in vivo. These sections (ultrasound topography and pathotopography, transillumination topography and pathotopography) are of great practical importance both for early diagnosis and for providing the right treatment, including proper surgical tactics. They are important for surgeons in planning and performing numerous surgical operations. The author of the atlas has a unique museum of operative surgery at the Academy, which is visited by doctors and students from all over the world. Some exhibits from this museum are presented in our atlas. They are normal and pathotopographical surgical anatomy, electrified stands and steps of surgical intervention on the complex of formalin preparations. This three-track museum is dedicated to typical and atypical surgical interventions, as well as the author´s operations with use of the author´s original tools and techniques. Nothing like this currently exists in the world. It is reflected in the atlas and has great educational and practical importance both in surgery and medicine. There are more than a hundred complexes in the museum which were developed and collected on the operations on various organs and tissues in surgery, dentistry, pediatric surgery, thoracic surgery, urology, and other areas and organs. Thus, surgical anatomy became particular for practical doctors of various specialties. In modern medicine, major problems are late diagnosis, false positive and false negative diagnostic results, and stage and size of acute pathology, which can lead to wrong treatment, mortality and disability of patients, and also to recurrence of the disease, ineffective treatment, wrong prognosis and incorrect prevention of post-operative complications in the short term and the long term. A gold standard of diagnostic and treatment, unfortunately, does not include appropriate and effective control of the diagnosis and treatment, which needs to be developed.

Comparative analysis of CT scan, MRI and pathotogram, including vital transilluminatory and ultrasound ones, revealed benefits of our vital monitoring method, which is reflected in the atlas. It provides more information and specifics on malignant and benign tumor, on degenerative, dystrophic, inflammatory processes, traumas and its complications. In the atlas there are clinical data reversible and irreversible of regional blood circulation disorder with focal pathology (adenoma, cyst, breast and thyroid cancer, vessel stenosis, intestinal paresis, etc.). Methods like PET, MRI and X-ray are highly sensitive but they cannot guide a doctor live during an operation in tumor topography. Maintenance of the surgery with these methods is not possible, which leads to iatrogenic complications: bleed, damage of lactiferous duct, and false results, and also causes an increase in the extent of the operation, recurrence and other complications. Pathotopograms mentioned in the atlas are important to determine surgical access, to visualize normal and changed lymph nodes, and to know the required extent of the operation. Ultrasound pathotopograms of focal arthritis and rheumatoid arthritis mentioned in the atlas revealed new specific differential signs of pathology, which is of practical importance in the treatment and prevention of iatrogenic rheumatic complications and in screening studies.

Our work is devoted to the memory of patients who have died from the lack of scientific achievements, lifetime pathotopograms and a new diagnostic technology. One might

be surprised at the very possibility of such support in the pre-operative diagnosis, surgery and postoperative treatment. But this technological support not only accompanies, but also helps the surgeon to choose between conservative and other tactics of treating the patient. We hope that this full-color book will prolong life in patients and improve the skill of doctors and students in diagnosing and preventing diseases. Between the doctor and the patient should stand medical equipment, but it should not block them from each other. A doctor armed only with a scalpel is dangerous for the patient. A doctor armed with modern and original technology is dangerous for his illness.

Managers of our pathotopographic, transilluminative and ultrasound technology already operate in urgent and scheduled medicine. Our atlas and devices will be used by future doctors. Now is the time to speed up and implement rational innovations, and so it is necessary to start with the government, rather than finish with it. Three periods of illness – preoperative, surgery and post-operative, as well as three periods of life – childhood, maturity and old age are inseparable from each other, because they are associated with one person, one illness. As in life a wise mentor is needed during treatment, surgery and the post-operative period; this cannot be accomplished without the wise, lifetime functional pathotopographic results presented in our atlas. Flexible new medical technologies presented to the reader put them in a position to guarantee the patient's vitality.

Part 1

ULTRASONIC TOPOGRAPHICAL AND PATHOTOPOGRAPHICAL ANATOMY

1

Topography and Pathotopography of the Head

The chapter on the ultrasonic topography and pathotopographical anatomy of the head includes layer-by-layer topography of the visceral and cerebral craniums with the cross-sectional imaging of the head.

Ultrasonic images of external and internal bone lamellae, vessels of the subcutaneous layer, skin, and subcutaneous fat, depressed compression and linear fractures are demonstrated. Ultrasonic images of the medial cerebral artery, infundibulum, posterior communicating artery, pons cerebelli, medulla oblongata, anterior inferior cerebellar artery, basilar artery, anterior cerebral artery, posterior cerebral artery, and olfactory tract are verified based on the topographical anatomy of the basilar region of the cranium.

The deep facial area contains the internal wing muscle, mandibulum, and submandibular salivary gland; the oral cavity contains the tongue, peripharyngeal space, and posterior veil of the soft palate, as well as the

superficial temporal artery, auriculotemporal nerve, maxillary artery, and middle meningeal artery. The ultrasonic images of the internal and external muscles are shown.

Images of the parotid gland, superficial cervical lymph nodes, and common carotid artery are presented.

Linear fracture is associated with the external bone lamella of the area of intact bone, with the intracranial space, and the hypoechogenic track. Under conditions of tamponade of the fourth ventricle of cerebrum with transition to the pons cerebelli, a blood clot is revealed in the vicinity of the clinoid plate at the pyramid apex of the temporal bone. The intraventricular blood clot can be pathotopographically associated with the left lateral ventricle, whereas liquid blood is observed at the lumen of the right lateral ventricle.

The atlas also contains images of the pathotopographical anatomy of the intraventricular hemorrhage, hematoma in the thalamus, fronto-basal intracerebral hematoma, and acute epidural hematoma in the left parieto-occipital space accompanied by the phenomenon of the "boundary amplification".

Thus, the ultrasonic topographic anatomy of the head provides the basis for the research into the pathotopographical anatomy of a given pathology and determines specific diagnostic features of injuries and/or volume structures.

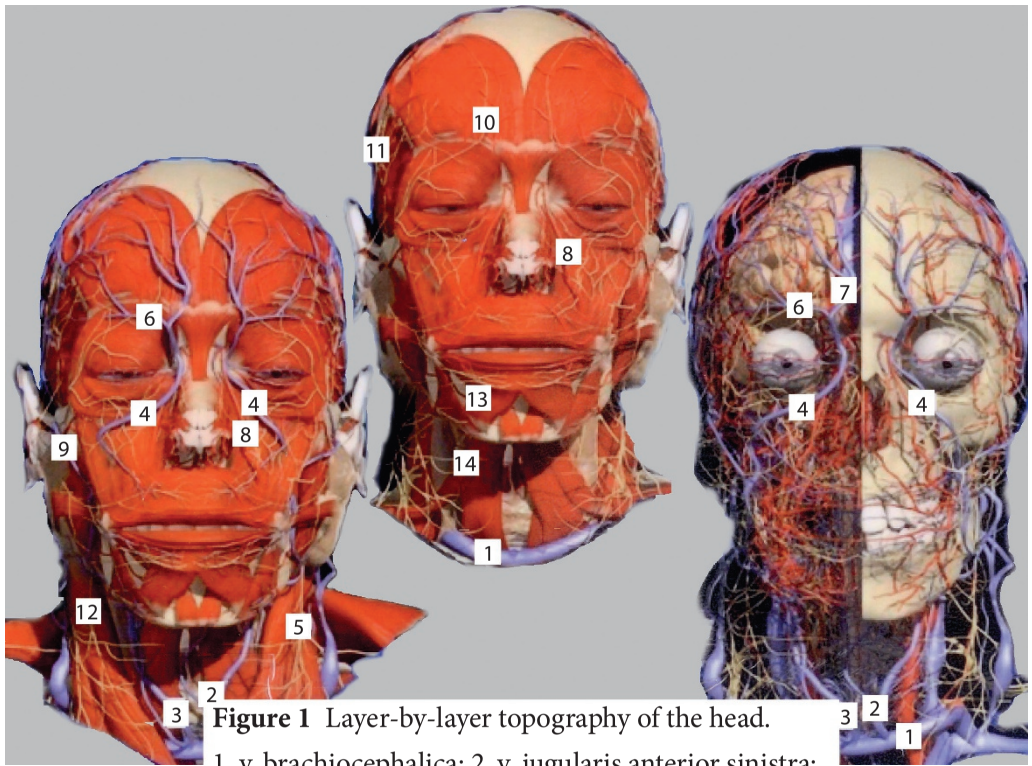

Figure 1 Layer-by-layer topography of the head.
1. v. brachiocephalica; 2. v. jugularis anterior sinistra; 3. v. jugularis anterior dextra; 4. v. angularis; 5. Plexus cervicalis; 6. v. supratrochlearis; 7. v. nasofrontalis; 8. a. angularis; 9. v. temporalis superlicialis; 10. n. supraorbitalis; 11. n. auriculotemporalis; 12. Plexus cervixalis; 13. m. depressor labii inferioris; 14. m. dieastricus (venter anterior).

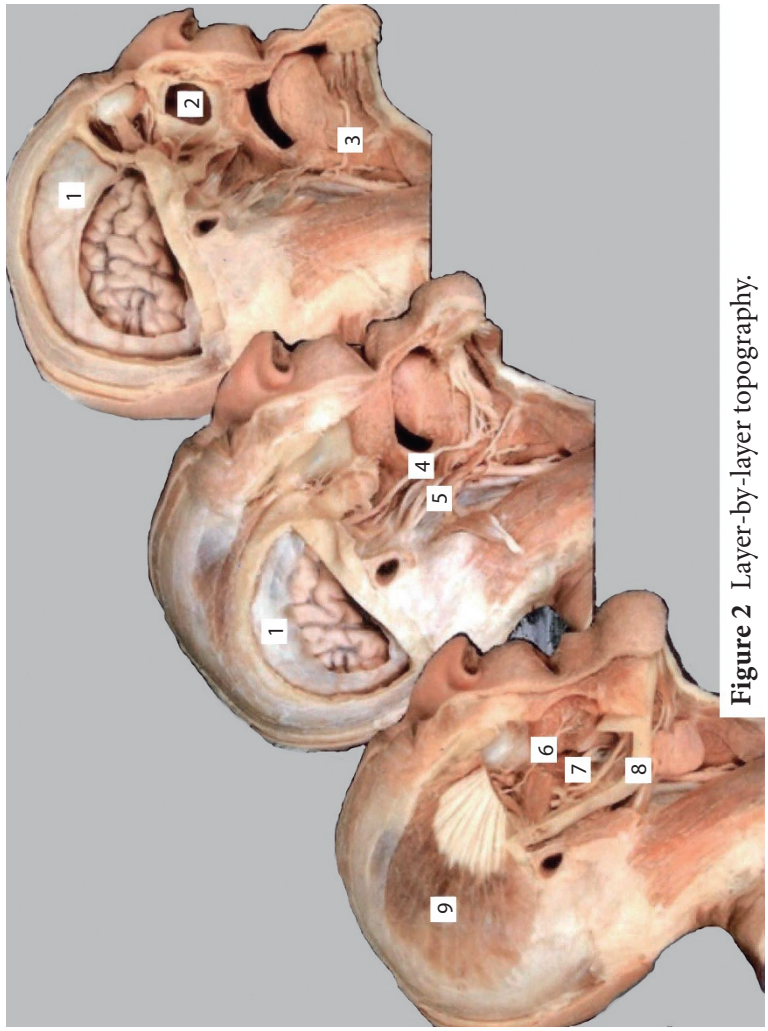

Figure 2 Layer-by-layer topography.

1. Falx cerebri; 2. Sinus maxillaries; 3. n. hypoglossus; 4. n. hypoglossus; 5. n. facialis; 6. n. lingualis; 7. n. alveolaris inferior; 8. Arcus maxillae inferioris; 9. m. temporalis

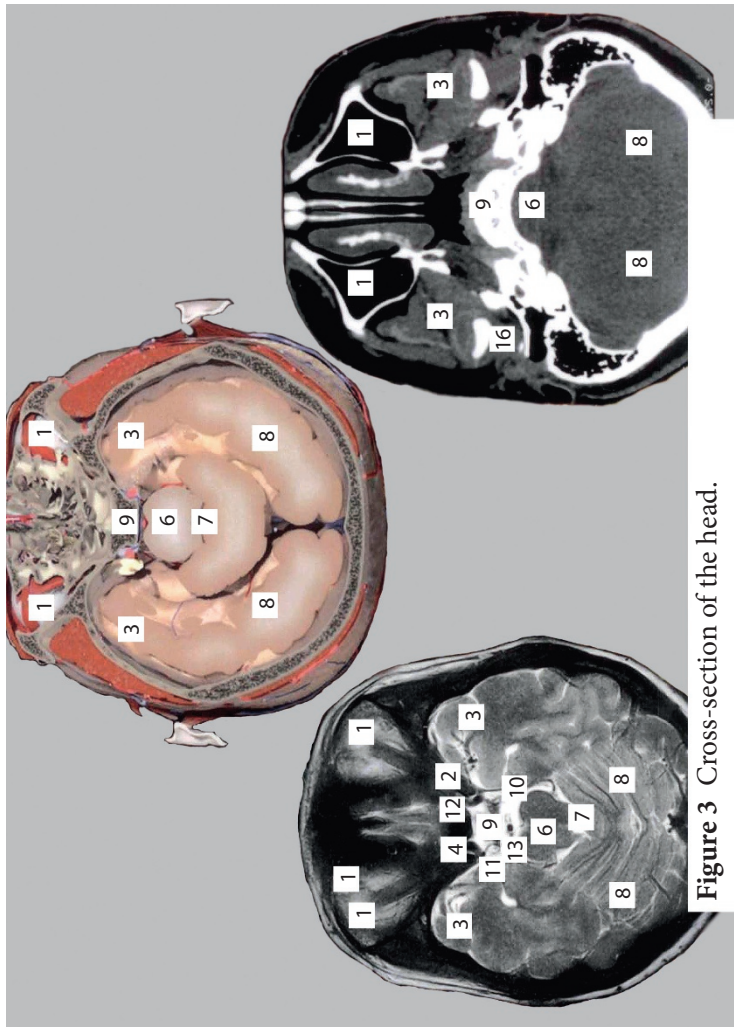

Figure 3 Cross-section of the head.

1. Eye bulb; 2. Optic nerve; 3. Temporal lobe; 4. Internal carotid artery; 6. Pons varolii; 7. Ventricle of the brain IV; 8. Cerebellar hemisphere; 9. Optic nerve; 10. Visual tract; 11. Middle cranial fossa; 12. Temporal lobe of cerebral hemisphere; 13. Ephippium; 16. Temporal gyrus.

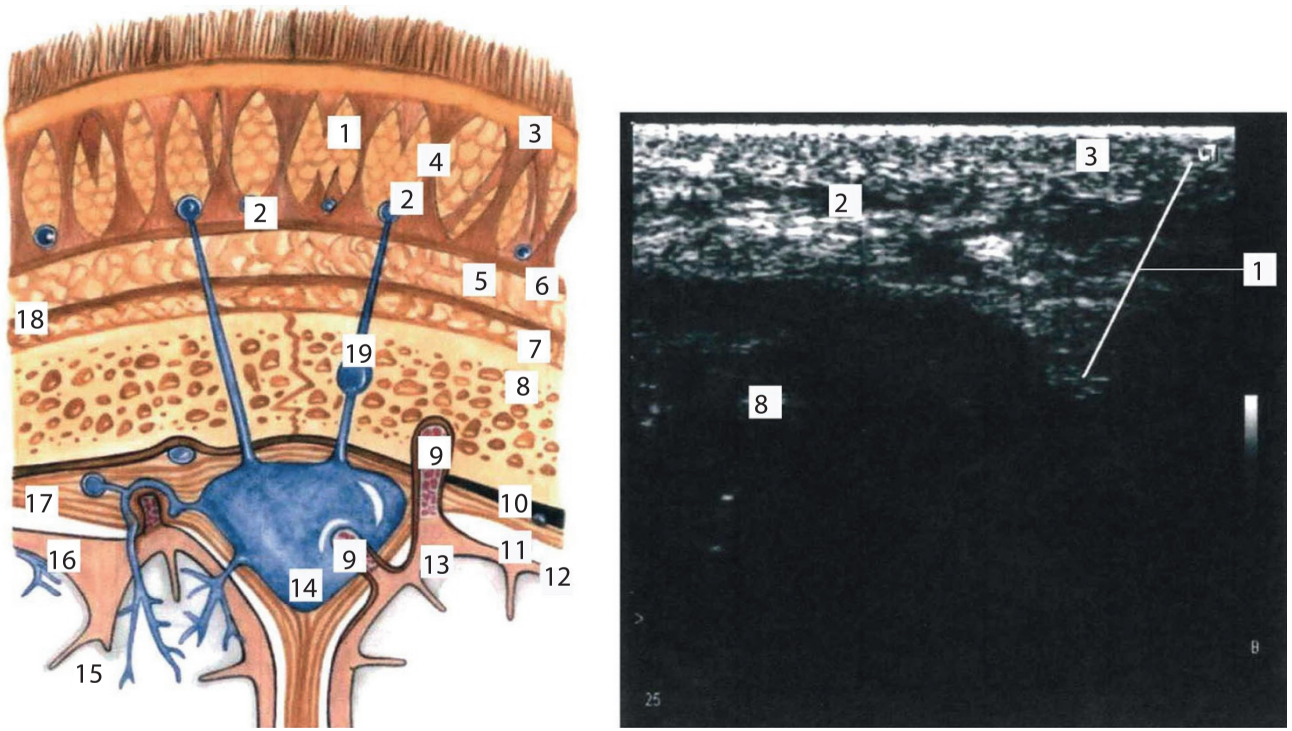

Figure 4 Comparative ultrasonic topographical anatomy of the head.

1. Subcutaneous tissue; 2. Vessels of the subcutaneous layer; 3. Skin; 5. Subgaleal cellular tissue; 8. Bone.

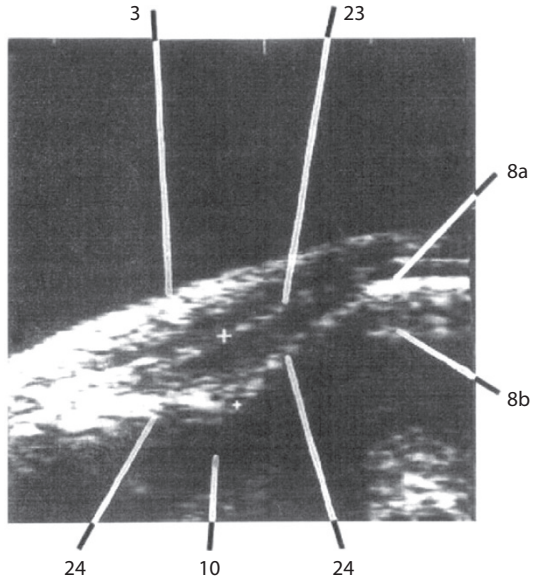

Figure 5 Hollow depressed fracture.

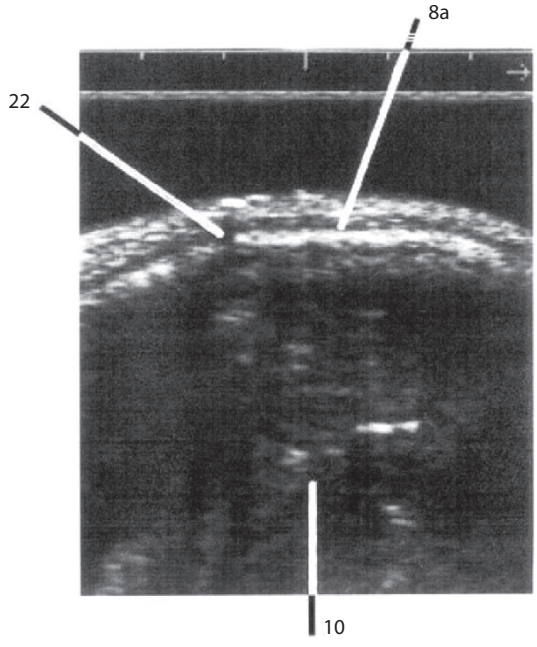

Figure 6 Linear fracture.

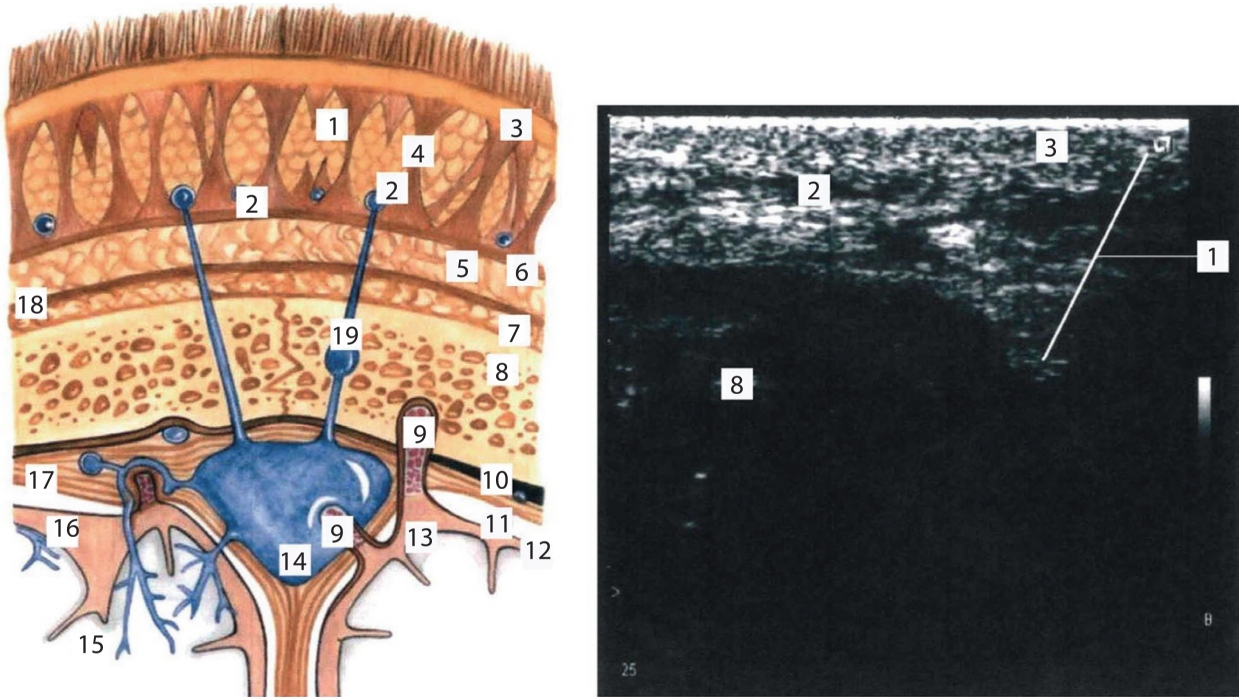

Figure 7 Layer-by-layer ultrasonic topographical anatomy of the head.

1. Subcutaneous tissue; 2. Vessels of the subcutaneous layer; 3. Skin; 4. Tendinous intersections; 5. Subgaleal cellular tissue; 6. Aponeurosis; 7. Subperiosteal cellular tissue; 8. Bone; 9. Pacchionian granulations; 10. Epidural cavity; 11. Subdural space; 12. Arachnoid membrane; 13. Choroid; 14. Venous sinus; 15. Encephalon; 16. Subarachnoid space; 17. Dura mater; 18. Periosteal coverage; 19. Diploic vein and draining vein.

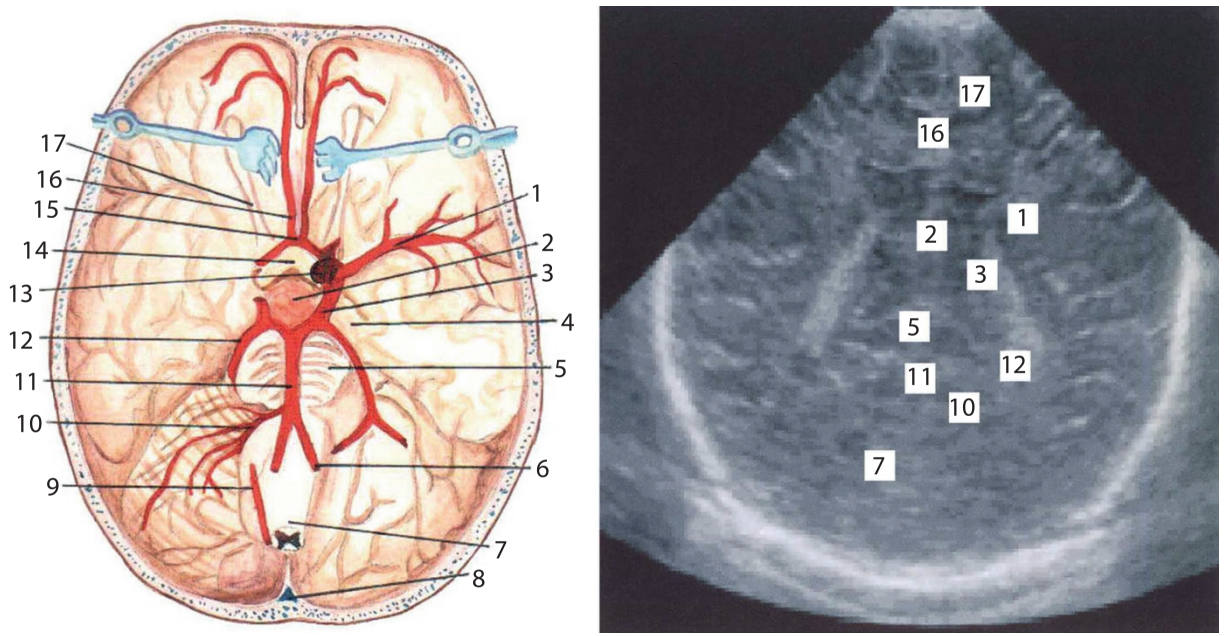

Figure 8 Basilar region of the cranium.

1. Medial cerebral artery; 2. Infundibulum; 3. Posterior communicating artery; 4. Cerebral peduncles; 5. Pons cerebelli; 6. Vertebral artery; 7. Medulla oblongata; 8. Occipital sinus; 9. Posterior inferior artery of cerebellum; 10. Anterior inferior artery of cerebellum; 11. Basilar artery; 12. Posterior cerebral artery; 13. Interior carotid artery; 14. Optic chiasma; 15. Anterior communicating artery; 16. Anterior cerebral artery; 17. Olfactory tract.

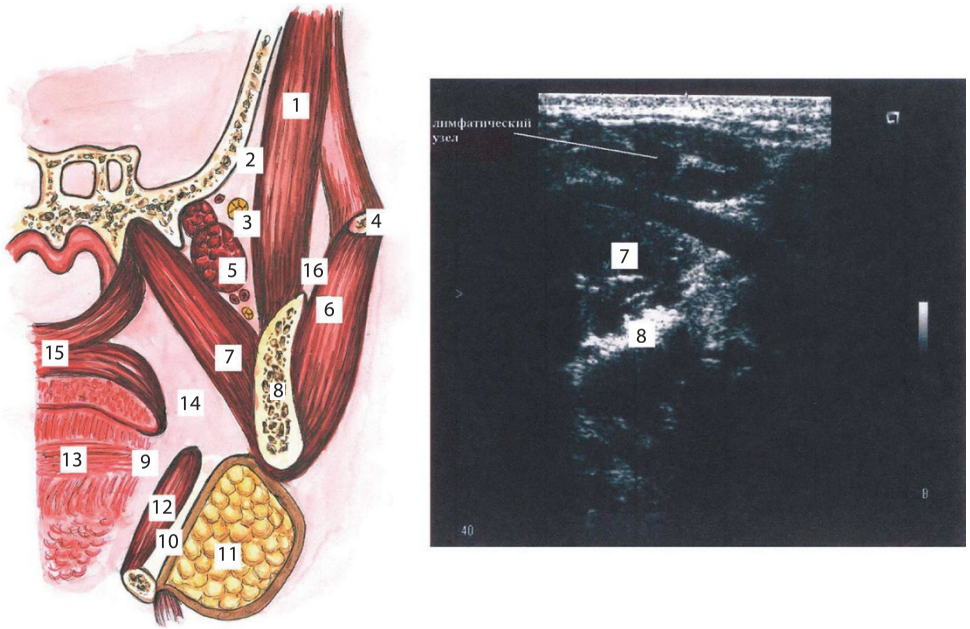

Figure 9 Deep facial area.

1. Temporal muscle; 2. Temporal pterygoid space; 3. Buccal nerve; 4. Arcus zygomaticus; 5. Exterior pterygoid muscle; 6. Masticatory muscle; 7. Interior pterygoid muscle; 8. Mandible; 9. Subglossal cellular space; 10. Bed of submandibular salivary gland; 11. Submandibular salivary gland; 12. Mylohyoid muscle; 13. Tongue; 14. Peripharyngeal space; 15. Soft palate; 16. Masticator maxillary space.

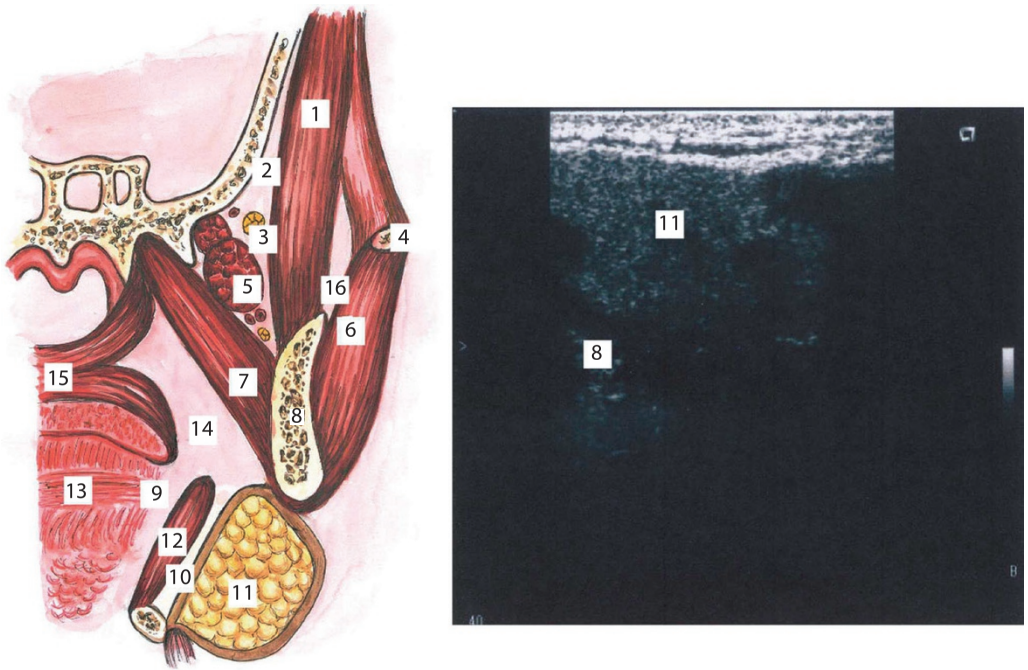

Figure 10 Facial area of the head.

1. Temporal muscle; 2. Temporal pterygoid space; 3. Buccal nerve; 4. Arcus zygomaticus; 5. Exterior pterygoid muscle; 6. Masticatory muscle; 7. Interior pterygoid muscle; 8. Mandible; 9. Subglossal cellular space; 10. Bed of submandibular salivary gland; 11. Submandibular salivary gland; 12. Mylohyoid muscle; 13. Tongue; 14. Peripharyngeal space; 15. Soft palate; 16. Masticator maxillary space.

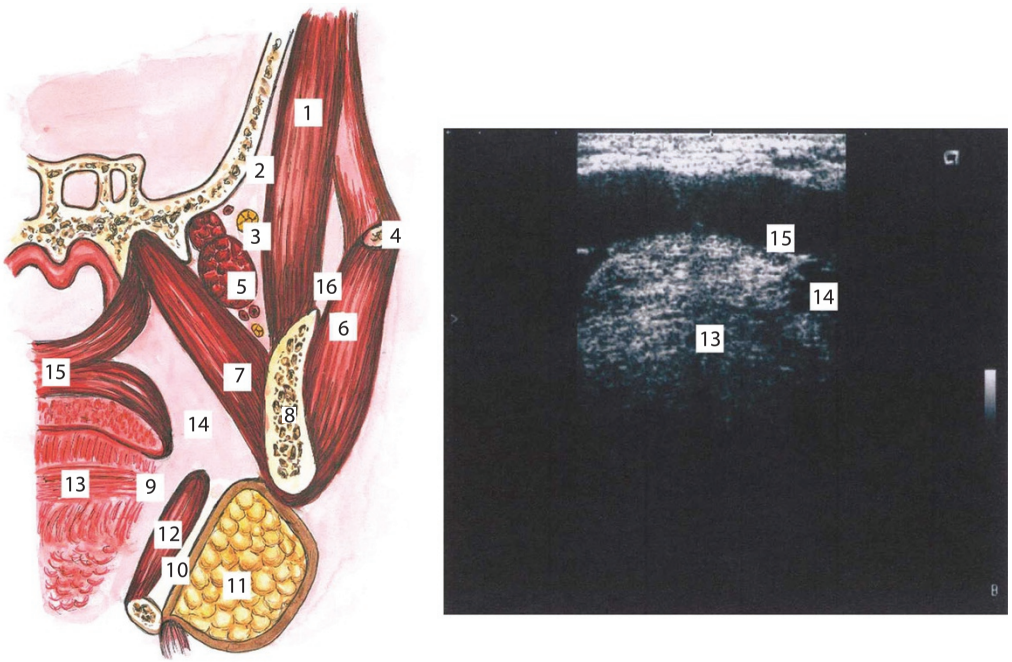

Figure 11 Infratemporal fossa.

1. Temporal muscle; 2. Temporal pterygoid space; 3. Buccal nerve; 4. Arcus zygomaticus; 5. Exterior pterygoid muscle; 6. Masticatory muscle; 7. Interior pterygoid muscle; 8. Mandible; 9. Subglossal cellular space; 10. Bed of submandibular salivary gland; 11. Submandibular salivary gland; 12. Mylohyoid muscle; 13. Tongue; 14. Peripharyngeal space; 15. Soft palate; 16. Masticator maxillary space.

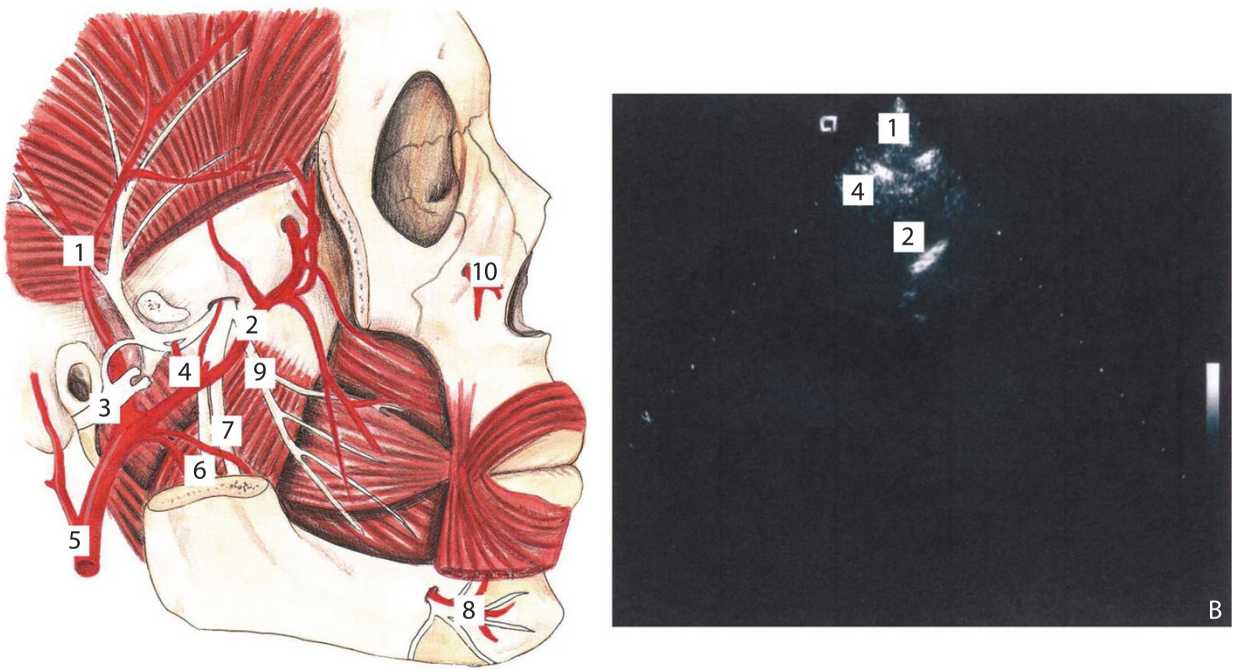

Figure 12 Maxillary artery with medial meningeal artery and superficial temporal artery.

1. Superficial temporal artery and auriculotemporal nerve; 2. Internal maxillary artery; 3. Facial nerve; 4. Medial meningeal artery; 5. Exterior carotid artery; 6. Inferior alveolar nerve; 7. Lingual nerve; 8. Submental artery and nerve; 9. Buccal nerve; 10. Suborbital artery.