

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.

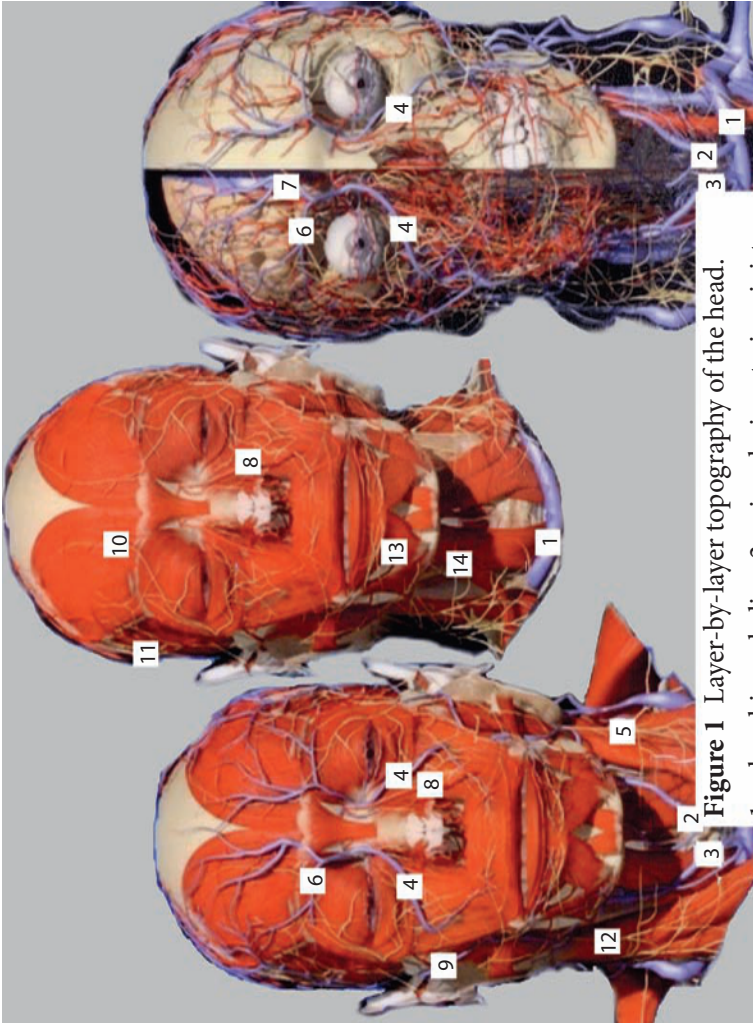


Figure 1 Layer-by-layer topography of the head.

- 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 cervixialis; 13. m. depressor labii inferioris; 14. m. diceastricus (venter anterior).

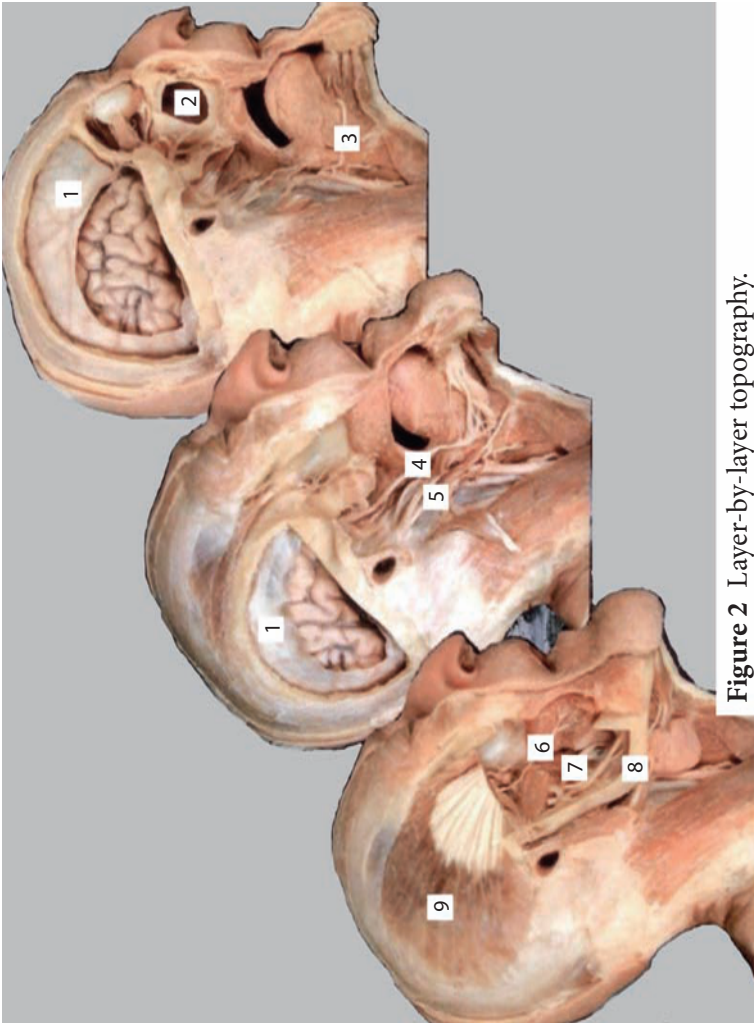


Figure 2 Layer-by-layer topography.

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

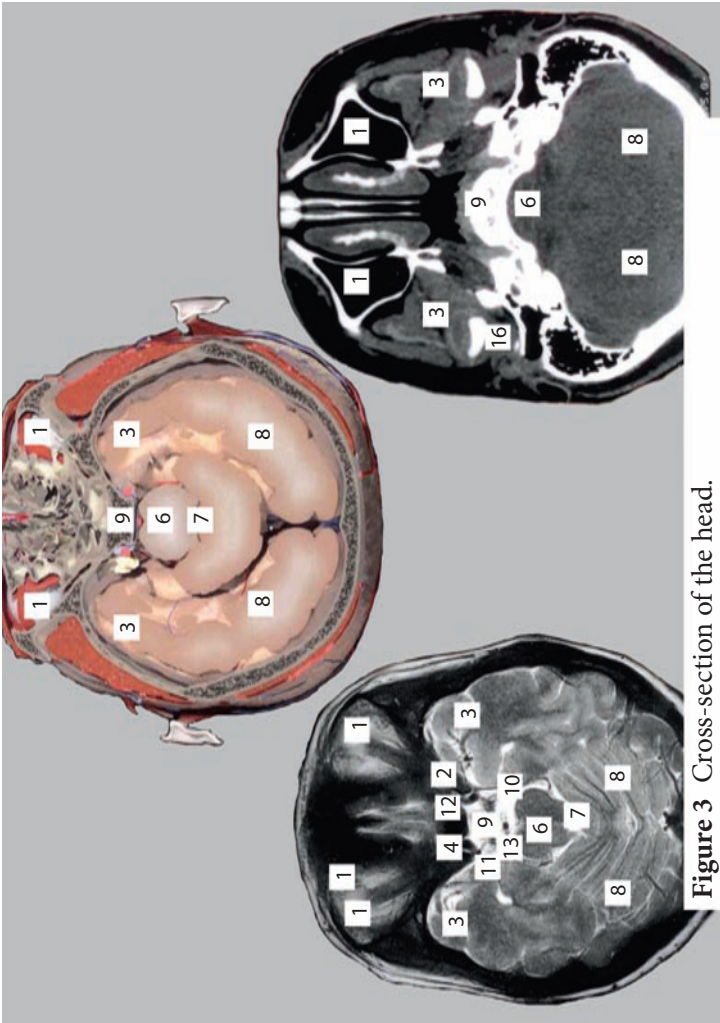


Figure 3 Cross-section of the head.

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.

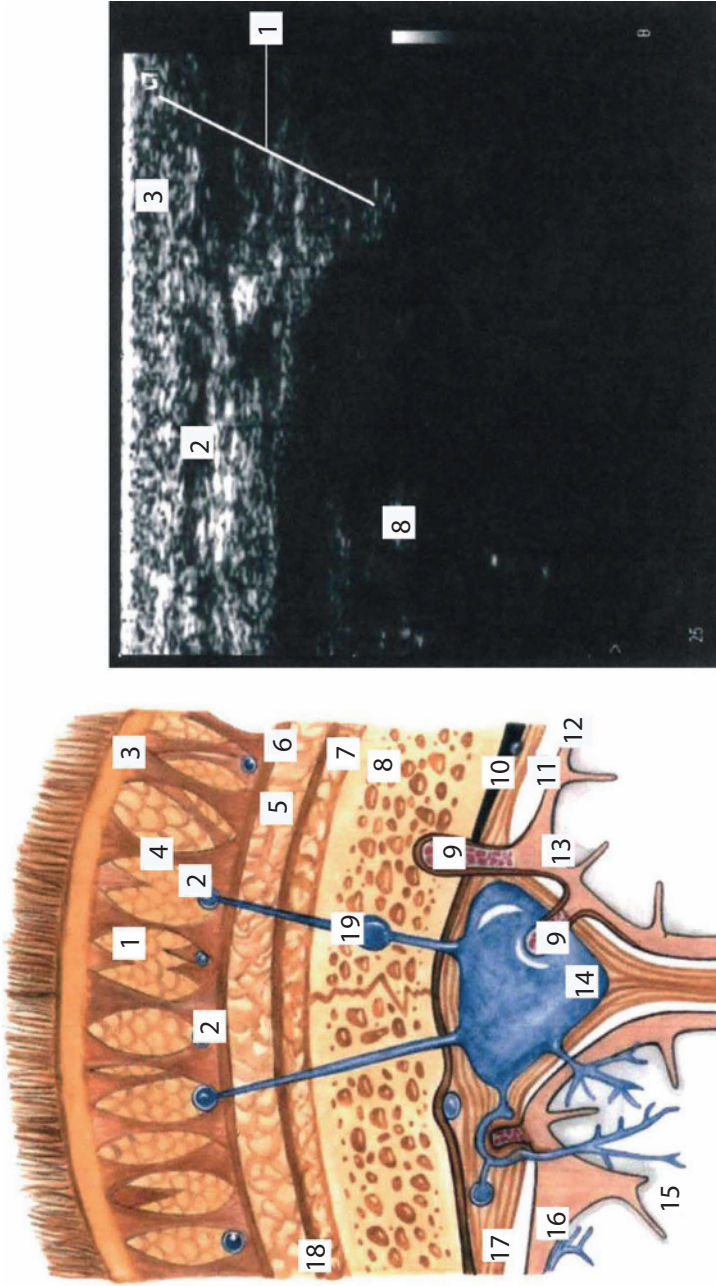


Figure 4 Comparative ultrasonic topographical anatomy of the head.

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

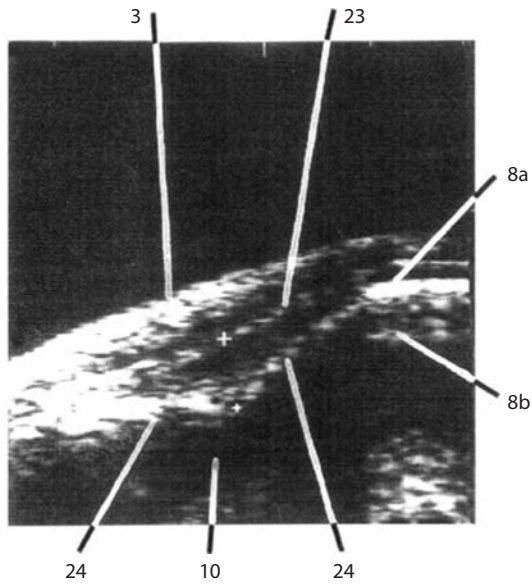


Figure 5 Hollow depressed fracture.

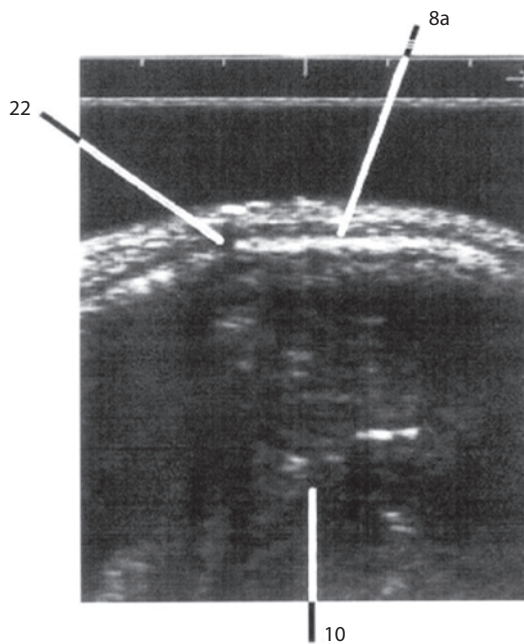


Figure 6 Linear fracture.

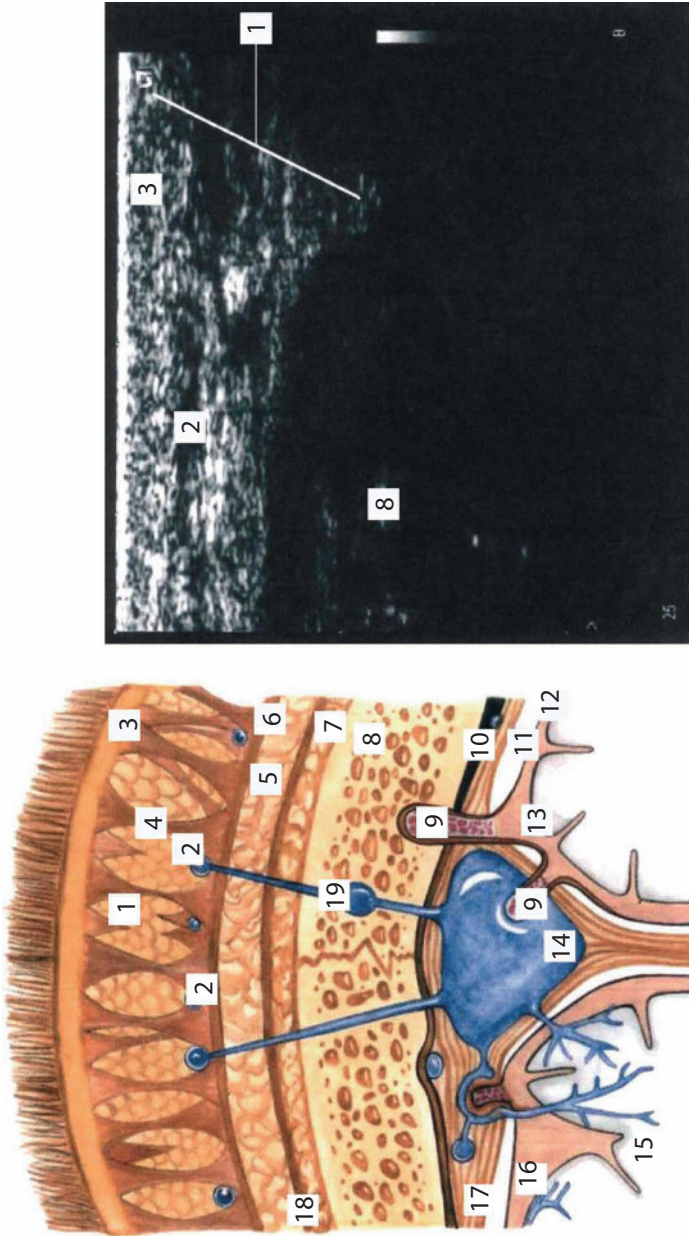


Figure 7 Layer-by-layer ultrasonic topographical anatomy of the head.

- 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.

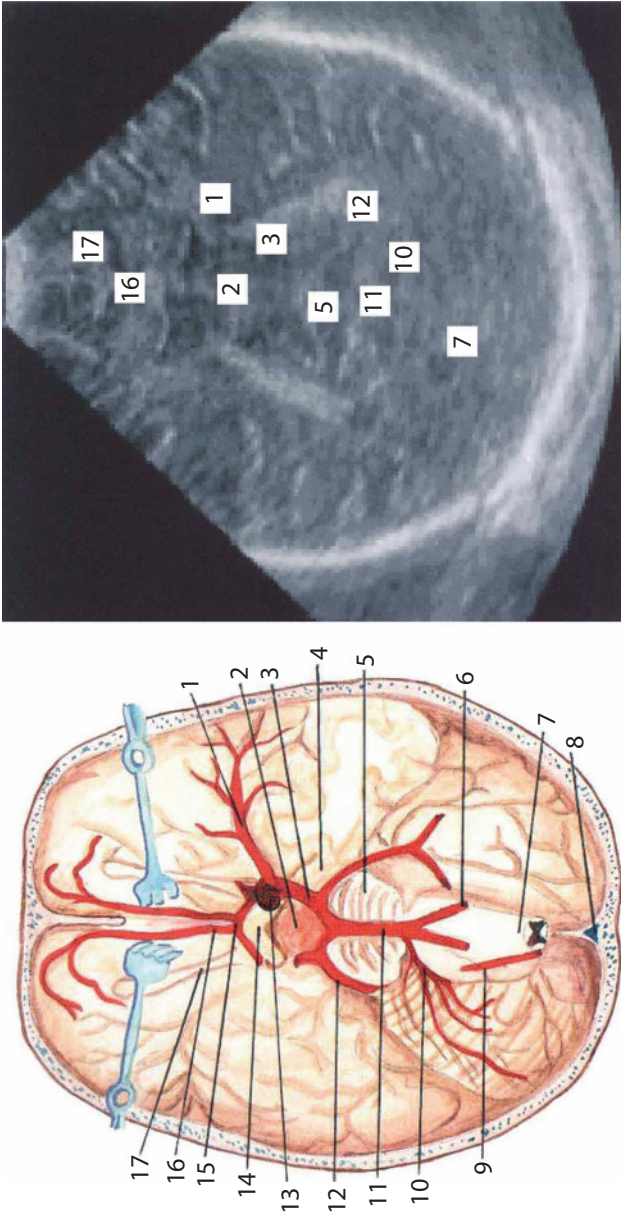


Figure 8 Basilar region of the cranium.

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.

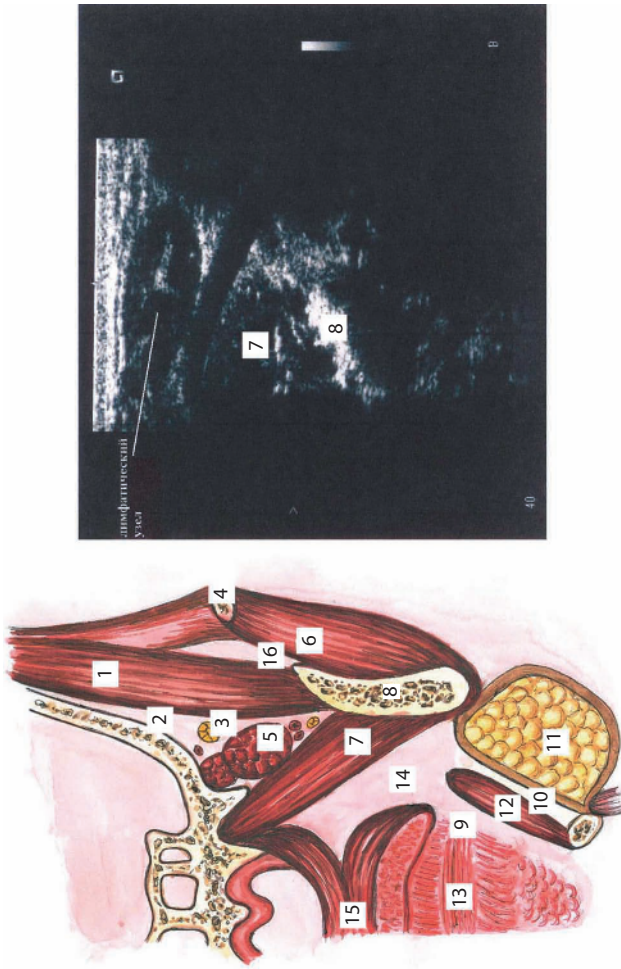


Figure 9 Deep facial area.

- 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.

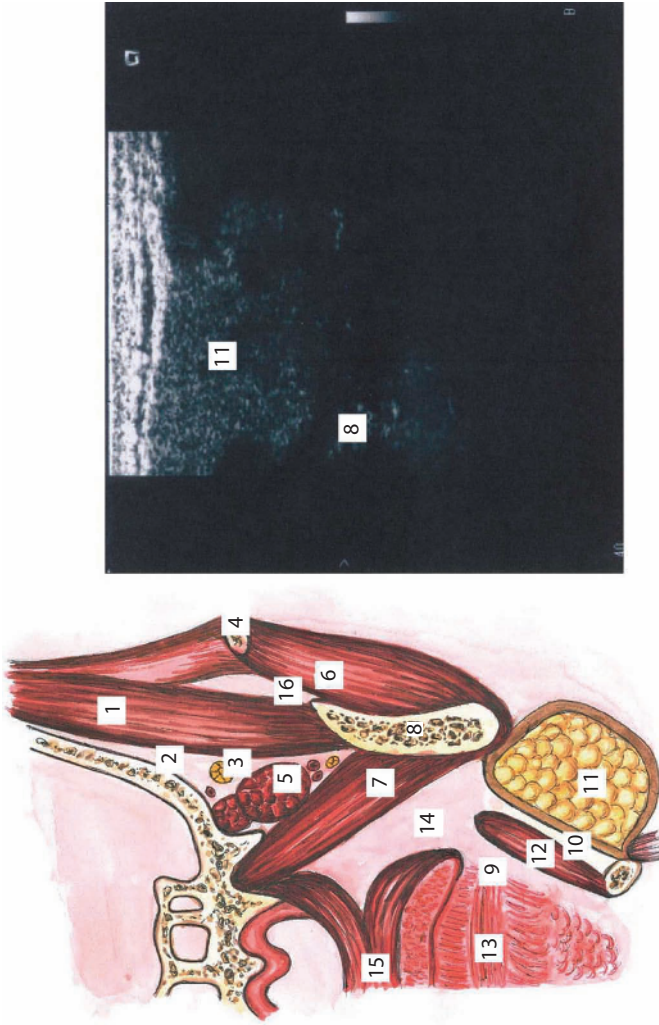


Figure 10 Facial area of the head.

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.

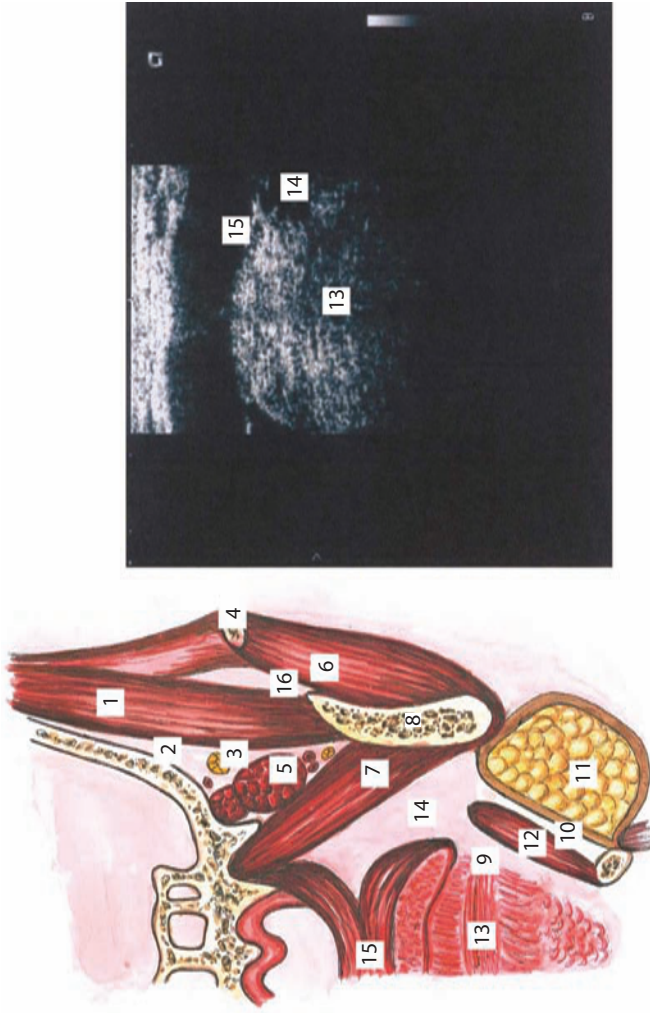


Figure 11 Infratemporal fossa.

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.

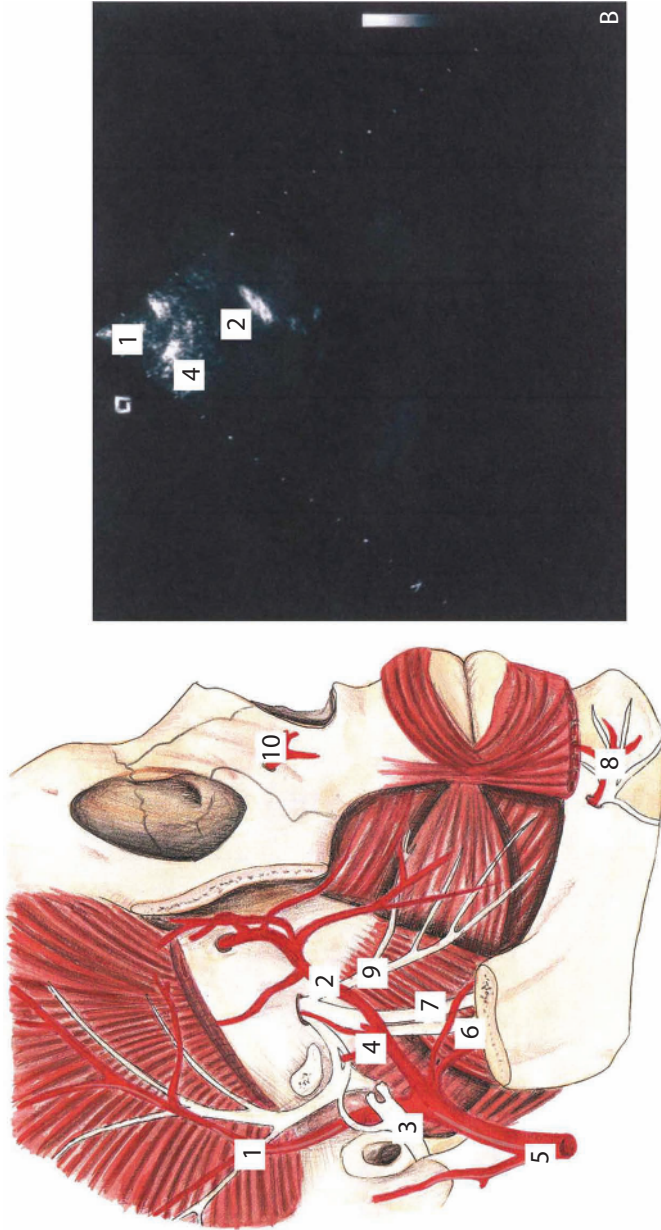


Figure 12 Maxillary artery with medial meningeal artery and superficial temporal artery.

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.

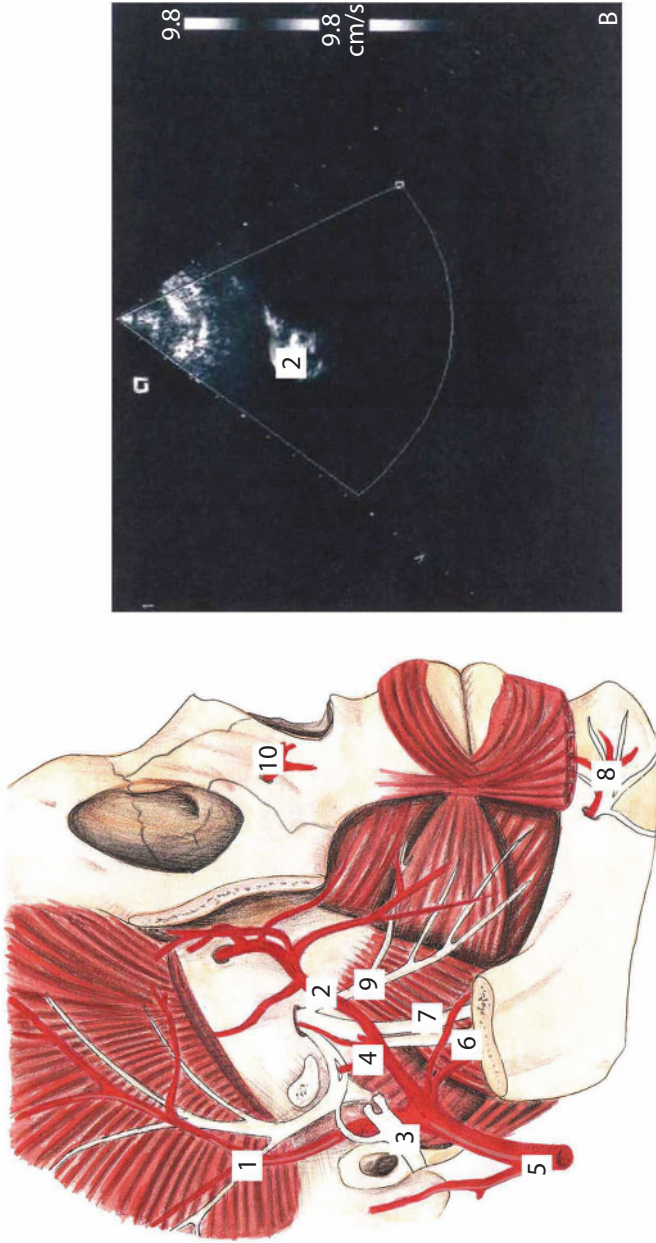


Figure 13 Maxillary artery.

1. Superficial temporal artery and auriculotemporal nerve; 2. 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.

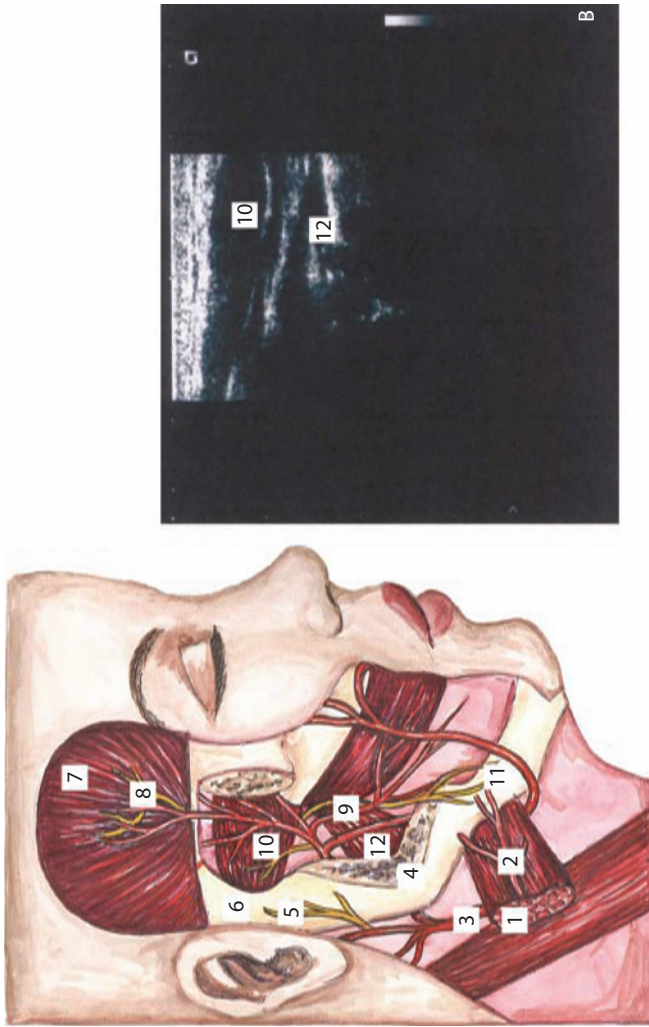


Figure 14 Mastication muscles.

1. M. masseter; 2. A. masseterica; 3. A. carotis externa; 4. Mandibular dipole; 5. N. auriculotemporalis; 6. Collum mandibulae; 7. M. temporalis; 8. A. et n. temporalis profunda; 9. A. buccalis; 10. M. pterigoideus externus; 11. Ramus marginalis mandibulae; 12. M. pterigoideus internus.

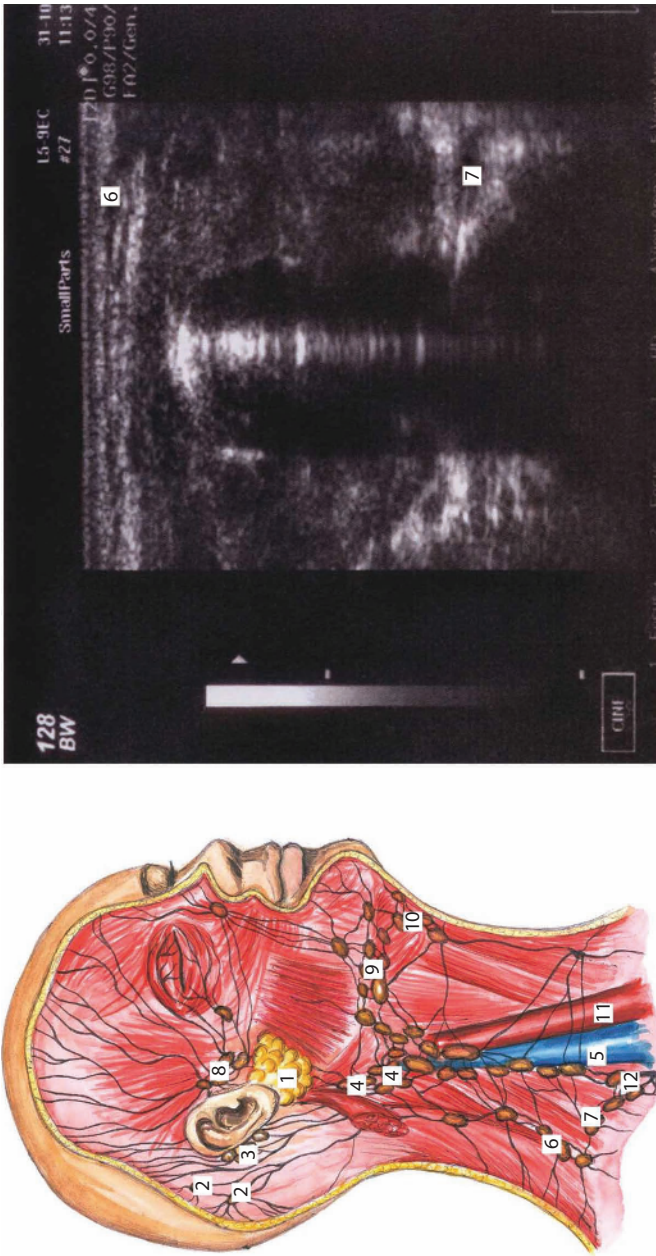


Figure 15 Lymphatic system of the head and neck.

1. Parotid gland; 2. Occipital lymph nodes; 3. Posterior auricular lymph nodes; 4. Deep superior cervical glands; 5. Internal jugular; 6. Superficial cervical glands; 7. Deep inferior cervical glands; 8. Anterior auricular lymph nodes; 9. Mandibular lymph nodes; 10. Submental lymph nodes; 11. Common carotid artery; 12. Right jugular lymph trunk.

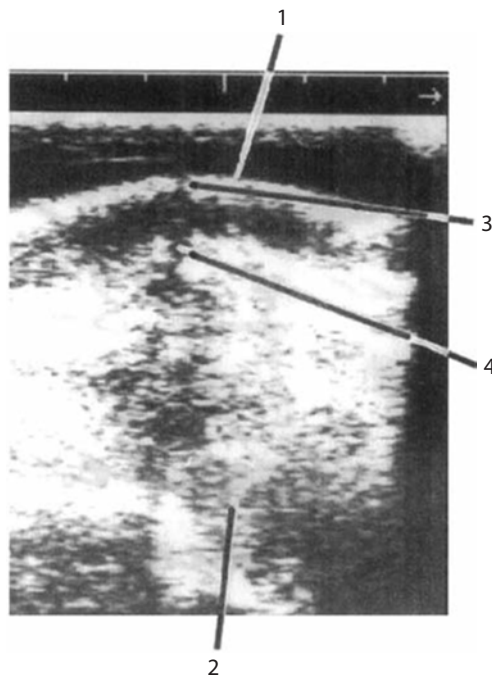


Figure 16 Linear fracture.

1. External bone lamella at the region of intact bone;
2. Intracranial space;
3. Linear fracture;
4. Hypoechoic track.

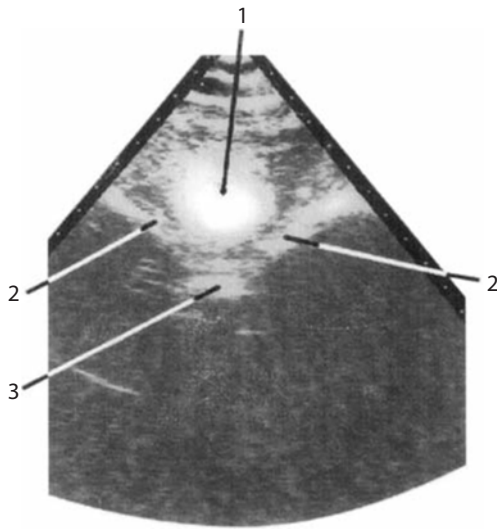


Figure 17 Tamponade of the ventricle of the brain IV with transition to pons cerebelli.

1. Blood clot; 2. Pyramid apex of the temporal bone; 3. Clinoid plate.

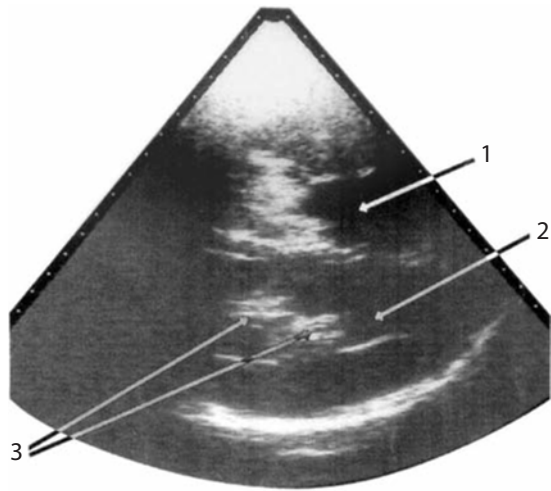


Figure 18 Intraventricular blood clot.

1. Left lateral ventricle; 2. Liquid blood in the lumen of the right lateral ventricle; 3. Blood clot.

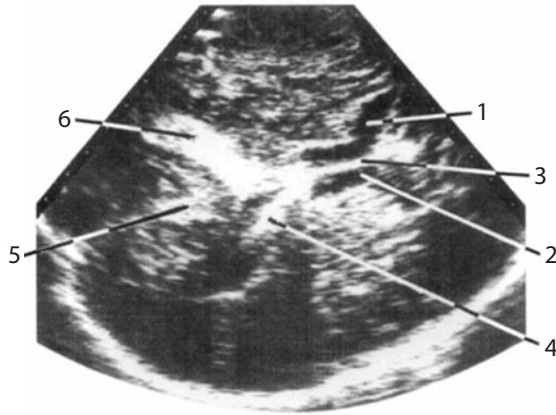


Figure 19 Intraventricular hemorrhage.

1. Anterior horn of the homolateral side ventricle; 2. Anterior horn of the contralateral side ventricle; 3. Pellucid septum; 4. Vascular plexus; 5. Longitudinal fissure of cerebrum; 6. Blood clot in the posterior regions of the right lateral ventricle.

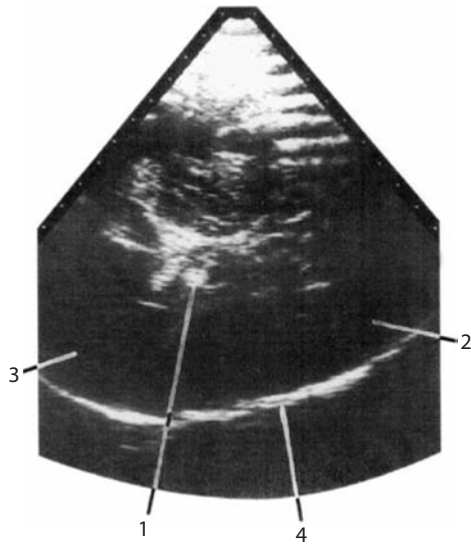


Figure 20 Hematoma at the optic thalamus.

1. Blood clot; 2. Frontal region; 3. Occipital region; 4. Cranium bone from the opposite side.

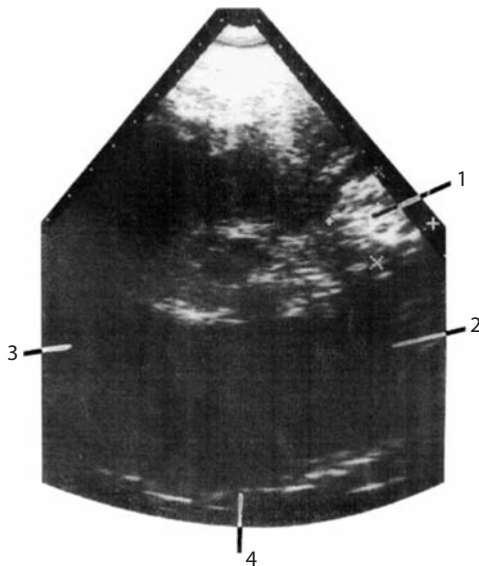


Figure 21 Frontobasal intracerebral hematoma.

1. Blood clot; 2. Frontal region; 3. Occipital region; 4. Cranium bone from the opposite side.

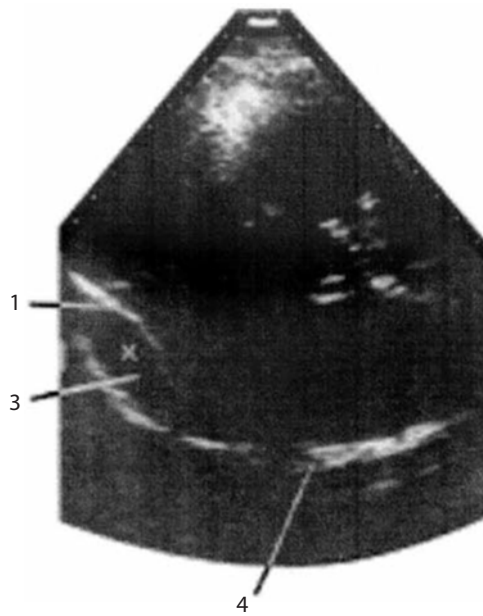


Figure 22 Acute epidural hematoma of the parieto-occipital left region.

1. Phenomenon of the boundary amplification; 3. Hematoma; 4. Cranium bones.

