

Index of Clinical Content

1 The body

In the Clinic

- Determination of skeletal age 14
- Bone marrow transplants 15
- Bone fractures 16
- Avascular necrosis 16
- Osteoporosis 17
- Epiphyseal fractures 18
- Degenerative joint disease 22
- Joint replacement 24
- The importance of fascias 25
- Muscle paralysis 26
- Muscle atrophy 26
- Muscle injuries and strains 26
- Atherosclerosis 27
- Varicose veins 28
- Anastomoses and collateral circulation 28
- Lymph nodes 31
- Dermatomes and myotomes 37
- Referred pain 48

Clinical Case

- Appendicitis 50

2 Back

In the Clinic

- Spina bifida 74
- Vertebroplasty 74
- Scoliosis 75
- Kyphosis 76
- Variation in vertebral numbers 76
- The vertebrae and cancer 77
- Osteoporosis 77
- Back pain 79
- Herniation of intervertebral discs 79
- Joint diseases 80
- Ligamenta flava 82
- Vertebral fractures 82
- Surgical procedures on the back 84
- Nerve injuries affecting superficial back muscles 99
- Lumbar cerebrospinal fluid tap 106

- Herpes zoster 109
- Back pain—alternative explanations 110

Clinical Cases

- Sciatica versus lumbago 118
- Cervical spinal cord injury 118
- Psoas abscess 119
- Dissecting thoracic aneurysm 119
- Sacral tumor 120

3 Thorax

In the Clinic

- Axillary tail of breast 141
- Breast cancer 141
- Cervical ribs 150
- Collection of sternal bone marrow 152
- Rib fractures 152
- Surgical access to the chest 160
- Thoracostomy (chest) tube insertion 160
- Intercostal nerve block 160
- Pleural effusion 167
- Pneumothorax 167
- Imaging the lungs 178
- High-resolution lung CT 178
- Bronchoscopy 178
- Lung cancer 179
- Pericarditis 184
- Pericardial effusion 184
- Constrictive pericarditis 184
- Valve disease 197
- Clinical terminology for coronary arteries 201
- Heart attack 202
- Classic symptoms of heart attack 203
- Are heart attack symptoms the same in men and women? 203
- Common congenital heart defects 203
- Cardiac auscultation 204
- Cardiac conduction system 206
- Ectopic parathyroid glands in the thymus 212
- Venous access for central and dialysis lines 215
- Using the superior vena cava to access the inferior vena cava 215
- Coarctation of the aorta 217

- Thoracic aorta 217
- Aortic arch and its anomalies 217
- Abnormal origin of great vessels 217
- The vagus nerves, recurrent laryngeal nerves, and hoarseness 221
- Esophageal cancer 224
- Esophageal rupture 225

Clinical Cases

- Cervical rib 241
- Lung cancer 242
- Chest wound 242
- Myocardial infarction 243
- Broken pacemaker 246
- Coarctation of the aorta 247
- Aortic dissection 247
- Pneumonia 249
- Esophageal cancer 250
- Venous access 251

4 Abdomen

In the Clinic

- Surgical incisions 278
- Laparoscopic surgery 279
- Cremasteric reflex 299
- Masses around the groin 301
- Peritoneum 305
- The greater omentum 308
- Epithelial transition between the abdominal esophagus and stomach 315
- Duodenal ulceration 315
- Examination of the upper gastrointestinal tract 316
- Examination of the bowel lumen 316
- Examination of the bowel wall and extrinsic masses 316
- Meckel's diverticulum 318
- Computed tomography (CT) scanning and magnetic resonance imaging (MRI) 318
- Carcinoma of the stomach 318
- Appendicitis 322
- Congenital disorders of the gastrointestinal tract 325
- Bowel obstruction 326
- Diverticular disease 327
- Ostomies 327
- Annular pancreas 336

- Pancreatic cancer 336
- Segmental anatomy of the liver 339
- Gallstones 341
- Jaundice 341
- Spleen disorders 342
- Vascular supply to the gastrointestinal system 351
- Hepatic cirrhosis 356
- Surgery for obesity 365
- Psoas muscle abscess 371
- Diaphragmatic hernias 372
- Hiatus hernia 373
- Urinary tract stones 380
- Urinary tract cancer 381
- Nephrostomy 382
- Kidney transplant 383
- Investigation of the urinary tract 385
- Abdominal aortic stent graft 389
- Inferior vena cava filter 391
- Retroperitoneal lymph node surgery 393

Clinical Cases

- Traumatic rupture of the diaphragm 410
- Chronic thrombosis of the inferior vena cava 410
- Liver biopsy in patients with suspected liver cirrhosis 411
- Hodgkin's lymphoma 412
- Inguinal hernia 413
- Ureteric stone 413
- Intraabdominal abscess 414
- Complications of an abdominoperineal resection 415
- Carcinoma of the head of the pancreas 417
- Caval obstruction 418
- Diverticular disease 418
- Endoleak after endovascular repair of abdominal aortic aneurysm 419
- Metastatic lesions in the liver 420

5 Pelvis and perineum

In the Clinic

- Bone marrow biopsy 444
- Pelvic fracture 446
- Common problems with the sacro-iliac joints 448
- Pelvic measurements in obstetrics 454
- Defecation 456
- Episiotomy 460

Digital rectal examination 462
 Carcinoma of the colon and rectum 462
 Bladder stones 465
 Suprapubic catheterization 466
 Bladder cancer 466
 Bladder infection 469
 Urethral catheterization 469
 Testicular tumors 470
 Vasectomy 472
 Prostate problems 474
 Ovarian cancer 477
 Imaging the ovary 477
 Hysterectomy 478
 Tubal ligation 479
 Carcinoma of the cervix and uterus 480
 The recto-uterine pouch 481
 Pudendal block 491
 Prostatectomy and impotence 495
 Abscesses in the ischio-anal fossae 504
 Hemorrhoids 504
 Urethral rupture 512

Clinical Cases

Varicocele 527
 Sciatic nerve compression 528
 Pelvic kidney 528
 Left common iliac artery obstruction 529
 Iatrogenic ureteric injury 530
 Ectopic pregnancy 530
 Uterine tumor 531
 Uterine fibroids 532

6 Lower limb

In the Clinic

Pelvic fractures 553
 Femoral neck fractures 557
 Intertrochanteric fractures 558
 Femoral shaft fractures 558
 Varicose veins 569
 Deep vein thrombosis 569
 Vascular access to the lower limb 573
 Trendelenburg's sign 577
 Intramuscular injections 581
 Compartment syndrome 590
 Muscle injuries to the lower limb 599
 Peripheral vascular disease 603

Soft tissue injuries to the knee 613
 Degenerative joint disease/osteoarthritis 614
 Examination of the knee joint 614
 Anterolateral ligament of the knee 615
 Achilles tendon rupture 623
 Neurological examination of the legs 625
 Footdrop 633
 Fracture of the talus 638
 Ankle fractures 641
 Bunions 645
 Morton's neuroma 661

Clinical Cases

Varicose veins 672
 Knee joint injury 673
 Fracture of neck of femur 676
 Deep vein thrombosis 677
 Ruptured calcaneal tendon 678
 Popliteal artery aneurysm 679
 Anterior talofibular ligament tear 680

7 Upper limb

In the Clinic

Fracture of the proximal humerus 705
 Fractures of the clavicle and dislocations of the acromioclavicular and sternoclavicular joints 711
 Dislocations of the glenohumeral joint 712
 Rotator cuff disorders 712
 Inflammation of the subacromial (subdeltoid) bursa 713
 Quadrangular space syndrome 720
 "Winging" of the scapula 727
 Imaging the blood supply to the upper limb 737
 Trauma to the arteries of the upper limb 737
 Subclavian/axillary venous access 737
 Injuries to the brachial plexus 747
 Breast cancer 749
 Rupture of biceps tendon 755
 Blood pressure measurement 756
 Radial nerve injury in the arm 763
 Median nerve injury in the arm 763
 Supracondylar fracture of the humerus 766
 Pulled elbow 766
 Developmental changes in the elbow joint 767
 Fracture of the head of radius 768

- "Tennis" and "golfer's" elbow (epicondylitis) 768
- Elbow arthritis 768
- Ulnar nerve injury at the elbow 768
- Construction of a dialysis fistula 770
- Fractures of the radius and ulna 774
- Transection of the radial or ulnar artery 783
- Fracture of the scaphoid and avascular necrosis of the proximal scaphoid 797
- Carpal tunnel syndrome 798
- Snuffbox 801
- De Quervain's syndrome 802
- Tenosynovitis 802
- Trigger finger 802
- Allen's test 814
- Venipuncture 814
- Ulnar nerve injury 816
- Radial nerve injury 818

Clinical Cases

- Shoulder problem after falling on an outstretched hand 829
- Winged scapula 829
- Brachial plexus nerve block 830
- Complication of a fractured first rib 830
- Median nerve compression 831
- Immobilizing the extensor digitorum muscle 831
- Torn supraspinatus tendon 832
- How to examine the hand 833
- Shoulder joint problem 834

8 Head and neck

In the Clinic

- Medical imaging of the head 871
- Fractures of the skull vault 872
- Hydrocephalus 877
- Cerebrospinal fluid leak 878
- Meningitis 878
- Brain tumors 878
- Stroke 883
- Endarterectomy 885
- Intracerebral aneurysms 885
- Scalp and meninges 890
- Head injury 891
- Types of intracranial hemorrhage 891

- Emissary veins 893
- Concussion 893
- Clinical assessment of patients with head injury 893
- Treatment of head injury 893
- Cranial nerve lesions 901
- Overview of cranial nerves 901
- Parotid gland 913
- Facial nerve [VII] palsy (Bell's palsy) 921
- Trigeminal neuralgia 921
- Scalp laceration 926
- Orbital fracture 928
- Horner's syndrome 931
- Examination of the eye 940
- Glaucoma 948
- Cataracts 948
- Ophthalmoscopy 949
- High-definition optical coherence tomography 951
- Examination of the ear 957
- Swimmer's ear 957
- Surfer's ear 958
- Tympanic membrane perforation 958
- Mastoiditis 961
- Lingual nerve injury 987
- Dental anesthesia 989
- Fascial planes of the head and neck 1004
- Central venous access 1005
- Jugular venous pulse 1013
- Thyroid gland 1020
- Thyroidectomy 1021
- Thyroid gland pathology 1021
- Ectopic parathyroid glands 1022
- Recurrent laryngeal nerve palsy 1034
- Clinical lymphatic drainage of the head and neck 1040
- Tracheostomy 1065
- Laryngoscopy 1065
- Deviated nasal septum 1077

Clinical Cases

- Multinodular goiter 1129
- Parotid duct calculus 1130
- Extradural hematoma 1131
- Stenosis of the internal carotid artery 1132
- Posterior communicating artery aneurysm 1133
- Recurrent epistaxis 1133
- Complication of orbital fracture 1134
- Pituitary macroadenoma 1135

Contents

1 The body

What is anatomy? 2

How can gross anatomy be studied? 2

Important anatomical terms 2

Imaging 5

Diagnostic imaging techniques 5

Nuclear medicine imaging 8

Image interpretation 10

Plain radiography 10

Computed tomography 10

Magnetic resonance imaging 11

Nuclear medicine imaging 11

Safety in imaging 11

Body systems 12

Skeletal system 12

Cartilage 12

Bone 13

Joints 18

Skin and fascias 24

Skin 24

Fascia 24

Muscular system 25

Cardiovascular system 27

Lymphatic system 29

Lymphatic vessels 29

Lymph nodes 30

Lymphatic trunks and ducts 30

Nervous system 31

Central nervous system 31

Functional subdivisions of the CNS 32

Somatic part of the nervous system 33

Visceral part of the nervous system 38

Other systems 48

Clinical case 50

2 Back

Conceptual overview 53

General description 53

Functions 54

Support 54

Movement 54

Protection of the nervous system 55

Component parts 56

Bones 56

Muscles 57

Vertebral canal 59

Spinal nerves 60

Relationship to other regions 61

Head 61

Thorax, abdomen, and pelvis 62

Limbs 62

Key features 62

Long vertebral column and short spinal cord 62

Intervertebral foramina and spinal nerves 63

Innervation of the back 63

Regional anatomy 64

Skeletal framework 64

Vertebrae 64

Intervertebral foramina 72

Posterior spaces between vertebral arches 73

Joints 77

Joints between vertebrae in the back 77

Ligaments 80

Anterior and posterior longitudinal ligaments 80

Ligamenta flava 80

Supraspinous ligament and ligamentum nuchae 81

Interspinous ligaments 82

Back musculature 84

Superficial group of back muscles 84

Intermediate group of back muscles 90

Deep group of back muscles 92

Suboccipital muscles 97

Spinal cord 99

Vasculature 100

Meninges 103

Arrangement of structures in the vertebral canal 104

Spinal nerves 106

Surface anatomy 111

Back surface anatomy 111

Absence of lateral curvatures 111

Primary and secondary curvatures in the sagittal plane 112

Useful nonvertebral skeletal landmarks 112

How to identify specific vertebral spinous processes 114

Visualizing the inferior ends of the spinal cord and subarachnoid space 115

Identifying major muscles 116

Clinical cases 118

3 Thorax

Conceptual overview 123

General description 123

Functions 124

- Breathing 124
- Protection of vital organs 124
- Conduit 124

Component parts 124

- Thoracic wall 124
- Superior thoracic aperture 126
- Inferior thoracic aperture 126
- Diaphragm 127
- Mediastinum 128
- Pleural cavities 128

Relationship to other regions 130

- Neck 130
- Upper limb 130
- Abdomen 130
- Breast 131

Key features 132

- Vertebral level TIV/V 132
- Venous shunts from left to right 132
- Segmental neurovascular supply of thoracic wall 134
- Sympathetic system 136
- Flexible wall and inferior thoracic aperture 136
- Innervation of the diaphragm 138

Regional anatomy 139

Pectoral region 139

- Breast 139
- Muscles of the pectoral region 142

Thoracic wall 143

- Skeletal framework 143
- Intercostal spaces 150

Diaphragm 161

- Arterial supply 162
- Venous drainage 162
- Innervation 162

Movements of the thoracic wall and diaphragm during breathing 162

Pleural cavities 162

- Pleura 163
- Lungs 167

Mediastinum 180

- Middle mediastinum 180
- Superior mediastinum 210
- Posterior mediastinum 222
- Anterior mediastinum 230

Surface anatomy 231

Thorax surface anatomy 231

How to count ribs 231

Surface anatomy of the breast in women 232

Visualizing structures at the TIV/V vertebral level 232

Visualizing structures in the superior mediastinum 234

Visualizing the margins of the heart 235

Where to listen for heart sounds 236

Visualizing the pleural cavities and lungs, pleural recesses, and lung lobes and fissures 236

Where to listen for lung sounds 238

Clinical cases 241

4 Abdomen

Conceptual overview 255

General description 255

Functions 256

- Houses and protects major viscera 256
- Breathing 258
- Changes in intraabdominal pressure 258

Component parts 259

- Wall 259
- Abdominal cavity 260
- Inferior thoracic aperture 262
- Diaphragm 262
- Pelvic inlet 263

Relationship to other regions 263

- Thorax 263
- Pelvis 263
- Lower limb 264

Key features 265

- Arrangement of abdominal viscera in the adult 265
- Skin and muscles of the anterior and lateral abdominal wall and thoracic intercostal nerves 268
- The groin is a weak area in the anterior abdominal wall 269
- Vertebral level LI 271
- The gastrointestinal system and its derivatives are supplied by three major arteries 271
- Venous shunts from left to right 273
- All venous drainage from the gastrointestinal system passes through the liver 274
- Abdominal viscera are supplied by a large prevertebral plexus 276

Regional anatomy 277

Surface topography 277

- Four-quadrant pattern 277
- Nine-region pattern 278

Abdominal wall 280

- Superficial fascia 280
- Anterolateral muscles 282
- Extraperitoneal fascia 288
- Peritoneum 288
- Innervation 289
- Arterial supply and venous drainage 291
- Lymphatic drainage 292

Groin 292

- Inguinal canal 294
- Inguinal hernias 299

Abdominal viscera 303

- Peritoneum 303
- Peritoneal cavity 304
- Organs 310
- Arterial supply 343
- Venous drainage 354
- Lymphatics 358
- Innervation 358

Posterior abdominal region 366

- Posterior abdominal wall 367
- Viscera 373
- Vasculature 387
- Lymphatic system 392
- Nervous system in the posterior abdominal region 394
- Sympathetic trunks and splanchnic nerves 394

Surface anatomy 402**Abdomen surface anatomy 402****Defining the surface projection of the abdomen 402****How to find the superficial inguinal ring 403****How to determine lumbar vertebral levels 404****Visualizing structures at the L1 vertebral level 405****Visualizing the position of major blood vessels 406****Using abdominal quadrants to locate major viscera 407****Defining surface regions to which pain from the gut is referred 408****Where to find the kidneys 409****Where to find the spleen 409****Clinical cases 410****5 Pelvis and perineum****Conceptual overview 423****General description 423****Functions 423**

- Contain and support bladder, rectum, anal canal, and reproductive tracts 423
- Anchors the roots of the external genitalia 425

Component parts 426

- Pelvic inlet 426
- Pelvic walls 426
- Pelvic outlet 428
- Pelvic floor 429
- Pelvic cavity 429
- Perineum 430

Relationship to other regions 432

- Abdomen 432
- Lower limb 433

Key features 434

- The pelvic cavity projects posteriorly 434
- Important structures cross the ureters in the pelvic cavity 435
- The prostate in men and the uterus in women are anterior to the rectum 436
- The perineum is innervated by sacral spinal cord segments 436
- Nerves are related to bone 437
- Parasympathetic innervation from spinal cord levels S2 to S4 controls erection 438
- Muscles and fascia of the pelvic floor and perineum intersect at the perineal body 439
- The course of the urethra is different in men and women 440

Regional anatomy 441**Pelvis 441**

- Bones 441
- Joints 446
- Orientation 448
- Differences between men and women 448
- True pelvis 449
- Viscera 460
- Fascia 481
- Peritoneum 481
- Nerves 486
- Blood vessels 495
- Lymphatics 501

Perineum 502

- Borders and ceiling 502
- Ischio-anal fossae and their anterior recesses 504
- Anal triangle 504
- Urogenital triangle 506
- Somatic nerves 513
- Visceral nerves 515
- Blood vessels 516
- Veins 516
- Lymphatics 519

Surface anatomy 520**Surface anatomy of the pelvis and perineum 520****Orientation of the pelvis and perineum in the anatomical position 520**

Component parts 690

Bones and joints 690

Muscles 692

Relationship to other regions 693

Neck 693

Back and thoracic wall 694

Key points 695

Innervation by cervical and upper thoracic nerves 695

Nerves related to bone 699

Superficial veins 700

Orientation of the thumb 701

Regional anatomy 702**Shoulder 702**

Bones 702

Joints 705

Muscles 713

Posterior scapular region 716

Muscles 717

Gateways to the posterior scapular region 717

Nerves 719

Arteries and veins 719

Axilla 721

Axillary inlet 723

Anterior wall 723

Medial wall 726

Lateral wall 727

Posterior wall 728

Gateways in the posterior wall 730

Floor 731

Contents of the axilla 731

Arm 750

Bones 751

Muscles 754

Arteries and veins 756

Nerves 760

Elbow joint 764**Cubital fossa 768****Forearm 771**

Bones 773

Joints 774

Anterior compartment of the forearm 776

Muscles 776

Arteries and veins 782

Nerves 784

Posterior compartment of the forearm 785

Muscles 785

Arteries and veins 791

Nerves 792

Hand 792

Bones 793

Joints 795

Carpal tunnel and structures at the wrist 798

Palmar aponeurosis 800

Palmaris brevis 800

Anatomical snuffbox 800

Fibrous digital sheaths 801

Extensor hoods 802

Muscles 804

Arteries and veins 810

Nerves 814

Surface anatomy 819**Upper limb surface anatomy 819****Bony landmarks and muscles of the posterior scapular region 819****Visualizing the axilla and locating contents and related structures 820****Locating the brachial artery in the arm 821****The triceps brachii tendon and position of the radial nerve 822****Cubital fossa (anterior view) 822****Identifying tendons and locating major vessels and nerves in the distal forearm 824****Normal appearance of the hand 825****Position of the flexor retinaculum and the recurrent branch of the median nerve 826****Motor function of the median and ulnar nerves in the hand 826****Visualizing the positions of the superficial and deep palmar arches 827****Pulse points 827****Clinical cases 829****8****Head and neck****Conceptual overview 837****General description 837**

Head 837

Neck 839

Functions 841

Protection 841

Contains upper parts of respiratory and digestive tracts 841

Communication 841

Positioning the head 841

Connects the upper and lower respiratory and digestive tracts 841

Component parts 842

Skull 842

Cervical vertebrae 844

Hyoid bone 845

Soft palate 846

Muscles 846

Relationship to other regions 847

Thorax 847

Upper limbs 847

Key features 848

Vertebral levels CIII/IV and CV/VI 848

Airway in the neck 849

Cranial nerves 850

Cervical nerves 851

Functional separation of the digestive and respiratory passages 851

Triangles of the neck 854

Regional anatomy 855

Skull 855

Anterior view 855

Lateral view 857

Posterior view 859

Superior view 860

Inferior view 860

Cranial cavity 864

Roof 864

Floor 865

Meninges 873

Cranial dura mater 873

Arachnoid mater 876

Pia mater 877

Arrangement of meninges and spaces 877

Brain and its blood supply 879

Brain 879

Blood supply 879

Venous drainage 886

Cranial nerves 894

Olfactory nerve [I] 896

Optic nerve [II] 896

Oculomotor nerve [III] 897

Trochlear nerve [IV] 897

Trigeminal nerve [V] 898

Ophthalmic nerve [V₁] 898

Maxillary nerve [V₂] 898

Mandibular nerve [V₃] 898

Abducent nerve [VI] 898

Facial nerve [VII] 898

Vestibulocochlear nerve [VIII] 899

Glossopharyngeal nerve [IX] 899

Vagus nerve [X] 900

Accessory nerve [XI] 900

Hypoglossal nerve [XII] 900

Face 904

Muscles 904

Parotid gland 911

Innervation 914

Vessels 916

Scalp 922

Layers 922

Innervation 924

Vessels 925

Lymphatic drainage 926

Orbit 927

Bony orbit 927

Eyelids 928

Lacrimal apparatus 932

Sensory innervation 933

Fissures and foramina 934

Fascial specializations 935

Muscles 936

Vessels 941

Innervation 942

Eyeball 947

Ear 953

External ear 954

Middle ear 958

Internal ear 965

Temporal and infratemporal fossae 972

Bony framework 973

Temporomandibular joints 975

Masseter muscle 977

Temporal fossa 978

Infratemporal fossa 981

Pterygopalatine fossa 992

Skeletal framework 993

Gateways 994

Contents 994

Neck 1000

Fascia 1000

Superficial venous drainage 1003

Anterior triangle of the neck 1006

Posterior triangle of the neck 1023

Root of the neck 1030

Pharynx 1040

Skeletal framework 1041

Pharyngeal wall 1042

Fascia 1045

Gaps in the pharyngeal wall and structures passing through them 1046

Nasopharynx 1046

Oropharynx 1048

Laryngopharynx 1048

Tonsils 1048

Vessels 1049

Nerves 1051

Larynx 1052

Laryngeal cartilages 1053

Extrinsic ligaments 1056

Intrinsic ligaments 1057

Hyoid bone 845

Soft palate 846

Muscles 846

Relationship to other regions 847

Thorax 847

Upper limbs 847

Key features 848

Vertebral levels CIII/IV and CV/VI 848

Airway in the neck 849

Cranial nerves 850

Cervical nerves 851

Functional separation of the digestive and respiratory passages 851

Triangles of the neck 854

Regional anatomy 855

Skull 855

Anterior view 855

Lateral view 857

Posterior view 859

Superior view 860

Inferior view 860

Cranial cavity 864

Roof 864

Floor 865

Meninges 873

Cranial dura mater 873

Arachnoid mater 876

Pia mater 877

Arrangement of meninges and spaces 877

Brain and its blood supply 879

Brain 879

Blood supply 879

Venous drainage 886

Cranial nerves 894

Olfactory nerve [I] 896

Optic nerve [II] 896

Oculomotor nerve [III] 897

Trochlear nerve [IV] 897

Trigeminal nerve [V] 898

Ophthalmic nerve [V₁] 898

Maxillary nerve [V₂] 898

Mandibular nerve [V₃] 898

Abducent nerve [VI] 898

Facial nerve [VII] 898

Vestibulocochlear nerve [VIII] 899

Glossopharyngeal nerve [IX] 899

Vagus nerve [X] 900

Accessory nerve [XI] 900

Hypoglossal nerve [XII] 900

Face 904

Muscles 904

Parotid gland 911

Innervation 914

Vessels 916

Scalp 922

Layers 922

Innervation 924

Vessels 925

Lymphatic drainage 926

Orbit 927

Bony orbit 927

Eyelids 928

Lacrimal apparatus 932

Sensory innervation 933

Fissures and foramina 934

Fascial specializations 935

Muscles 936

Vessels 941

Innervation 942

Eyeball 947

Ear 953

External ear 954

Middle ear 958

Internal ear 965

Temporal and infratemporal fossae 972

Bony framework 973

Temporomandibular joints 975

Masseter muscle 977

Temporal fossa 978

Infratemporal fossa 981

Pterygopalatine fossa 992

Skeletal framework 993

Gateways 994

Contents 994

Neck 1000

Fascia 1000

Superficial venous drainage 1003

Anterior triangle of the neck 1006

Posterior triangle of the neck 1023

Root of the neck 1030

Pharynx 1040

Skeletal framework 1041

Pharyngeal wall 1042

Fascia 1045

Gaps in the pharyngeal wall and structures passing through them 1046

Nasopharynx 1046

Oropharynx 1048

Laryngopharynx 1048

Tonsils 1048

Vessels 1049

Nerves 1051

Larynx 1052

Laryngeal cartilages 1053

Extrinsic ligaments 1056

Intrinsic ligaments 1057

Laryngeal joints 1058
 Cavity of the larynx 1059
 Intrinsic muscles 1061
 Function of the larynx 1064
 Vessels 1066
 Nerves 1068

Nasal cavities 1069

Lateral wall 1070
 Regions 1071
 Innervation and blood supply 1072
 Skeletal framework 1072
 External nose 1074
 Paranasal sinuses 1074
 Walls, floor, and roof 1076
 Nares 1080
 Choanae 1081
 Gateways 1082
 Vessels 1082
 Innervation 1085

Oral cavity 1087

Multiple nerves innervate the oral cavity 1088
 Skeletal framework 1088
 Walls: the cheeks 1091
 Floor 1092
 Tongue 1095
 Salivary glands 1102

Roof—palate 1105
 Oral fissure and lips 1113
 Oropharyngeal isthmus 1114
 Teeth and gingivae 1114

Surface anatomy 1120

Head and neck surface anatomy 1120

Anatomical position of the head and major landmarks 1120

Visualizing structures at the CIII/CIV and CVI vertebral levels 1121

How to outline the anterior and posterior triangles of the neck 1122

How to locate the cricothyroid ligament 1123

How to find the thyroid gland 1124

Estimating the position of the middle meningeal artery 1124

Major features of the face 1125

The eye and lacrimal apparatus 1126

External ear 1127

Pulse points 1128

Clinical cases 1129