# Contents

Chapter 1

# THEORETICAL BASES OF CLINICAL ANATOMY

## 1.1. BASIC CONCEPTS AND TERMS OF CLINICAL ANATOMY

***Clinical A*** (Applied A.) is a totality of applied directions and divisions of the modern anatomy studying a structure and topography of organs and regions in norm and pathology for different divisions of clinical medicine.

Clinical Anatomy uses the data of systemic, topographical anatomy, histology, radiology, and other necessary scientific disciplines.

***Topographical A*** (Regional A.) is a morphological scientific and educational discipline: the part of anatomy studying an interposition of organs and anatomic structures in regions of a human body. It is in the same row with terms: systemic A. (normal A, human A, Gross Anatomy), comparative A.

The description of the topography of the body contains three components: holotopy, skeletotopy and syntopy.

***Holotopy*** is a spatial situation of an organ in the part of the body.

***Skeletotopy*** is a projective relation of an organ to skeleton parts (if such relations at the organ exist).

***Syntopy*** is a relation of an organ with other organs and anatomic formations.

**Classification of Clinical (Applied) Anatomy**

| On clinical disciplines | | On diagnostic methods |
|---|---|---|
| Surgical A. | | Endoscopic A. |
| Microsurgical A. | | Radiological A. |
| Neurosurgical A. | | X-ray A. |
| Stomatologic A. | | Computer tomographical A. |
| Sections of clinical A. | | Magneto-resonance-tomographical A. |
| For: | cardiology | |
| | pulmonology | Ultrasonic A. |
| | neurology | |
| | gastroenterology | |
| | nephrology and urology | |
| | endocrinology | |
| | obstetrics and gynecology | |
| | ophthalmology | |
| | otorhinolaryngology | |

The clinical anatomy includes directions and divisions for specific clinical disciplines: surgical, microsurgical, neurosurgical, stomatologic anatomy, ophthalmology, otorhinolaryngology, cardiology, endocrinology, etc.

Several divisions of clinical anatomy are defined by a method on which they are based. They are endoscopic anatomy, radiological anatomy, which concerns already traditional X-ray, and also the computer-tomographical, magneto-resonance-tomographical anatomy, ultrasonic anatomy.

Directions and divisions of clinical anatomy can be united into three basic groups:

- 1st group — surgical A, microsurgical A, neurosurgical A., as directions of anatomy studying and describing features of a structure and topography of organs and regions in norm and pathology with reference to inquiries of surgery, traumatology, microsurgery, neurosurgery, mini-invasive surgery first of all for the basis of operative interventions;
- 2nd group — endoscopic A, X-ray A, computer-tomographical A, magneto-resonance-topographical A, ultrasonic A, reflecting structure and topography of organs and regions in the images received by corresponding lifetime methods of research, and making an anatomic basis of these methods;
- 3rd group — includes divisions containing a complex of data on anatomy and topography of organs and regions in interests for other clinical medicine disciplines: stomatology, cardiology, obstetrics and gynecology, ophthalmology, otorhinolaryngology, and others.

# 1.2. BASES OF DOCTRINE ABOUT ANATOMIC VARIABILITY

## 1.2.1. NOTION ABOUT ANATOMIC VARIABILITY

Variability is understood as a property of live organisms to change the morphofunctional organization, producing various individuals, populations, kinds, races. It underlies the base of animal evolution.

They distinguish interspecies and intraspecies variability.

***Anatomic variability of the person*** is a totality of distinctions in an anatomic structure and position of organs and systems of a human body. It is a display of intraspecies variability.

Anatomic distinctions are divided into three basic groups:

1. ***Age distinctions,*** i.e., anatomic distinctions between different age groups on an extent of postnatal ontogenesis.
2. ***Individual distinctions,*** i.e., anatomic distinctions between individuals within one age group.
3. ***Sexual distinctions,*** i.e., anatomic distinctions between male and female organisms.

## 1.2.2. ESSENTIAL PROVISIONS ABOUT ANATOMIC VARIABILITY OF MAN

The doctrine founder is academician AMS USSR, professor, general lieutenant of m/s Victor Nikolayevich Shevkunenko, the chief of operative surgery and topographical anatomy department in St. Petersburg army medical academy.

The doctrine has arisen as the answer to inquiries of clinical practice, first of all surgical.

### ESSENTIAL REGULATIONS

The ***first regulation. All organs and systems of a human body are subject to individual distinctions.*** This regulation establishes differences practically for all parameters characterizing an anatomic structure and topography of internal organs, topographo-anatomic regions, whole systems of organs.

The ***second regulation. Individual distinctions can be arranged in a variation line, with most different ones on the opposite ends.*** These are extreme forms of individual variability, and all line makes a range of unique distinctions. Components of such a range are variants. Graphically such range is expressed to

Gauss's curve reflecting dynamics of frequency of variants, making all range, i.e., its quantitative characteristics.

The ***third regulation. Individual anatomic distinctions are not the sum of accidents. On the basis, they are determined (i.e., are causally caused) by processes of philo- and ontogenesis.***

Three essential factors define the occurrence of individual anatomic distinctions;

- A. ***By genetic (hereditary) conditionality of individual features of an organism.***
- B. ***By individual distinctions (features) of development, i.e., embryogenesis of each organism.***
- C. ***By individual distinctions (features) of postnatal ontogenesis under the influence of internal and external factors.***

### 1.2.3. CLINICAL VALUE OF ANATOMIC VARIABILITY OF A MAN

In the general view, it is defined by three clinical applications:

- For a correct estimation of inspection data of the patient, taking into account its individual, sexual, and age anatomic features.
- For a substantiation and an explanation of distinctions in a clinical picture of diseases, features of a current of pathological processes, development of complications.
- For an individualization of surgical operations, correct performance of operative interventions, prevention of complications.

## 1.3. BASES OF DOCTRINE ABOUT FASCIAE

### 1.3.1. THE STRUCTURE AND EMBRYOGENESIS OF FASCIAE

***Fasciae*** are sheaths from the dense fibrous connective tissue. They consist of collagenic and elastic fibers of different architectonics. The cellular structure is basically from fibrocytes. Fasciae are blood supplied and innervated.

The source of their development in embryogenesis is mesenchymal turning to the fibrous connective tissue. Fasciae develop around muscles, large blood vessels on walls of cavities. Therefore, by origin, they distinguish muscular, epineurium, and coelomic fasciae.

## 1.3.2. CLASSIFICATION OF FASCIAE AND FASCIAL RECEPTACLES

By the topographical principle, they are distinguished:

1. ***Superficial, or subcutaneous, fasciae.***
2. ***Proprious fasciae.***
3. ***Muscular fasciae.***
4. ***Organic fasciae.***
5. ***Intracavitary fasciae.***

Fasciae of one or several neighbouring regions form various receptacles among which they distinguish four principal types:

1. ***Compartments (Fascial beds).*** These are receptacles for groups of muscles, large salivary glands. They are formed by proprious fasciae and their intermuscular and deep layers. The compartment in which formation, except proprious fascia periosteum, takes part is called an osteofibrous bed.
2. ***Fascial sheaths.*** These are receptacles for muscles, tendons, neurovascular bunches formed by one or several fasciae. They are distinguished muscular, tendinous, neurovascular sheaths.
3. ***Cellulous spaces.*** Volume congestions of fatty tissue in space between fasciae of one or several regions. They can contain blood vessels, nerves, groups of lymph nodes.
4. ***Cellulous hiatuses.*** They are extended in one direction or flat intervals between the fasciae of the next muscles, containing friable tissue. They can contain blood vessels, nerves, some ducts.

## 1.3.3. FUNCTIONS AND CLINICAL VALUE OF FASCIAE

Functions of fasciae:

1. ***Support function*** for muscles and organs.
2. ***Lympho — and haemodynamic function*** promoting the movement of blood and lymph.
3. ***Function of a marker*** helping define a disposition of the main arteries and neurovascular bunches on extremities.
4. ***Delimiting function*** delimiting the pyoinflammatory centres (phlegmons, abscess) or defining the distribution of purulent sources.

***Clinical value***

Fasciae make a topography-anatomic basis and have defining value in purulent surgery.

It has an important part in regional and local anaesthesia, at carrying out Novocain blockade.

In plastic surgery, fasciae are a good material for the strengthening of organ walls, weak places, and defects of walls of cavities, reconstruction of basic structures, replacements of defects of tendons, etc.

Chapter 2

# UPPER LIMB

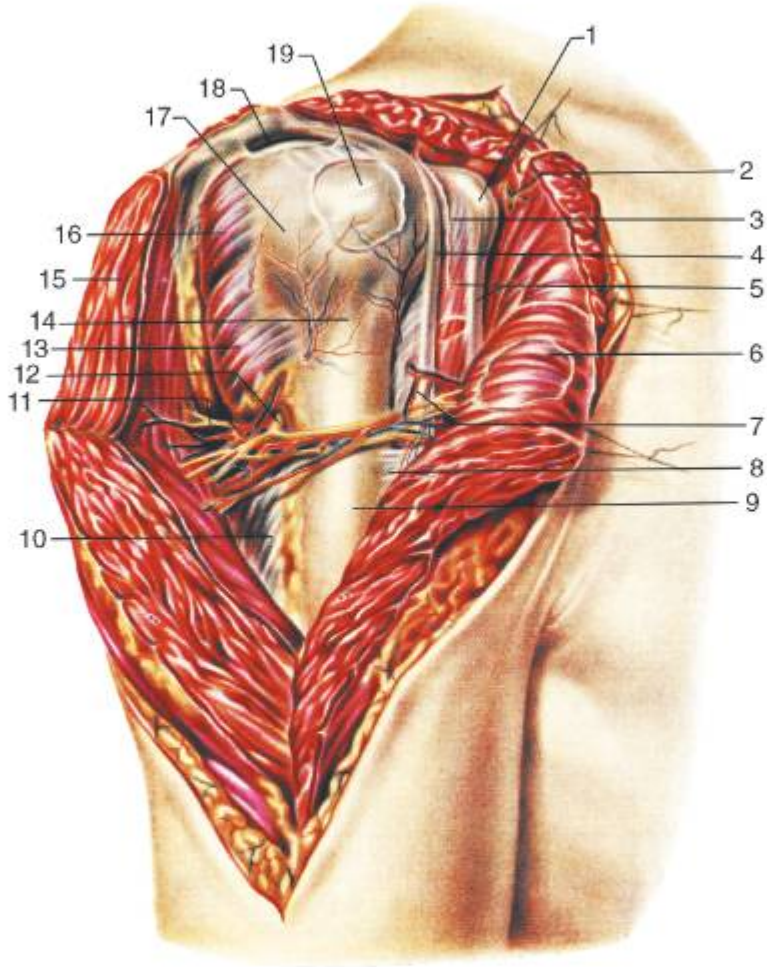


**Fig. 2.1.** Deltoid region: 1 – coracoid process of scapula; 2 – deltoid branch of the thoracoacromial artery; 3 – intertubercular synovial sheath; 4 – tendon of long head of biceps brachii muscle; 5 – short head of biceps brachii muscle and coracobrachialis muscle; 6 – subdeltoid bursa; 7 – posterior circumflex humerus artery and vein; 8 – tendon of greater pectoral muscle; 9 – humerus; 10 – subdeltoid bursa; 11 – subacromial bursa; 12 – head of humerus; 13 – subcostal muscle; 14 – deltoid muscle; 15 – surgical collum; 16 – minor pectoral muscle; 17 – subaxillary nerve; 18 – anterior circumflex humerus artery and vein; 19 – teres major muscle

# 2.1. TOPOGRAPHICAL ANATOMY OF REGIONS

The upper extremity following basic topography-anatomic regions have distinguished: deltoid region, axillary region, brachial region, cubital region, antebrachial region, hand region.

## 2.1.1. DELTOID REGION

***Borders.*** Anterior — deltoid thoracic sulcus, posterior — posterior deltoid sulcus. The region under the form and the location corresponds to deltoid muscle.

***External relief.*** The region has the convex form caused by the head of humerus.

***Layers***

1. *Skin.*
2. *Subcutaneous tissue.* In it, cutaneous branches of supraclavicular and axillary nerves pass.
3. *Superficial fascia.*
4. *Proprior fascia.* It forms the fascial sheath for deltoid muscle. Fascial septa depart deep into the muscle between its muscular bunches.
5. *Muscles.* Deltoid muscle has the convex-triangular form, by the wide basis is turned upwards and medially to the clavicle and acromial process of scapula, by the apex — downwards to deltoid tuberosity of humerus.
6. *Subdeltoid cellulous space.* It contains three mucous bursae: subdeltoid (the most constant), subacromial and subscapular, connected with the cavity of shoulder joint.

***Blood vessels and nerves.*** Posterior circumflex humeral artery and axillary nerve enter into the subdeltoid space through a quadrilateral foramen. Anterior circumflex humeral artery enters scapular region through a trilateral foramen. Axillary nerve innervates deltoid muscle.

***Clinical considerations.*** In a shoulder dislocation, the deltoid region is flattening because of displacement of the humerus head in an axillary hollow. The atrophy of deltoid muscle and the infringement of assignment of the upper extremity can develop after damage or compression of the axillary nerve. In subdeltoid space, purulent phlegmons can be localized.

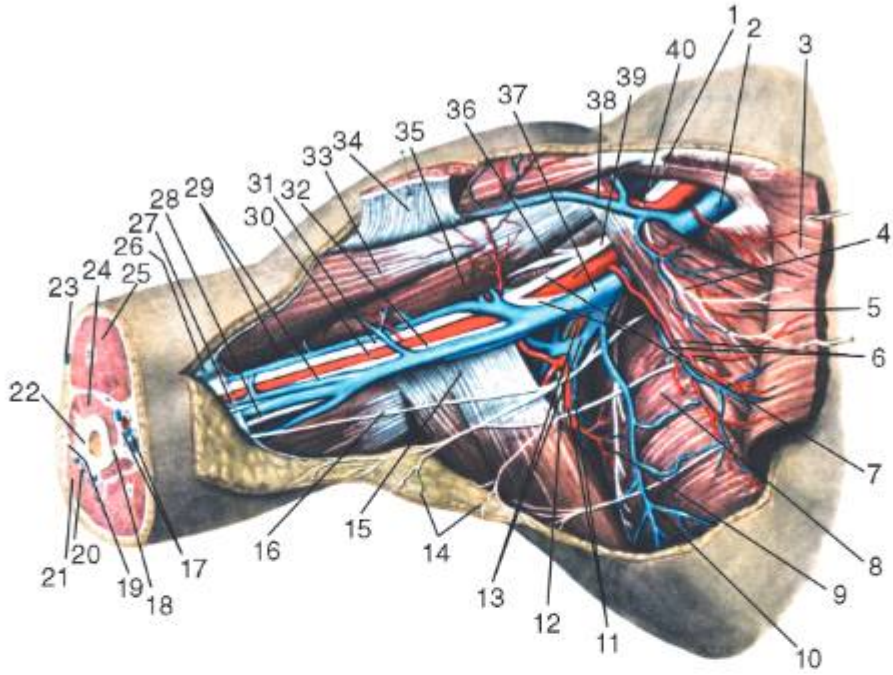


**Fig. 2.2.** Topography of axillary cavity: 1 — subclavicular muscle; 2 — superior thoracic artery; 3 — pectoralis major muscle; 4 — lateral thoracic nerve; 5 — pectoralis minor muscle; 6 — lateral thoracic artery and vein; 7 — lateral and medial roots of median nerve; 8 — serratus anterior muscle; 9 — long thoracic nerve; 10 — thoracoepigastral veins; 11 — thoracodorsal artery and vein; 12 — thoracodorsal nerve; 13 — subscapular artery and veins; 14 — anterior cutaneous thoracic branches; 15 — latissimus dorsi muscle; 16 — intercostobrachial nerve; 17 — vasonerval fascicle of brachial region; 18 — medial intermuscular brachial septum; 19 — lateral intermuscular brachial septum; 20 — radial nerve; 21 — triceps brachii muscle; 22 — humerus; 23, 38 — cephalic vein; 24 — brachialis muscle; 25, 33 — biceps brachii muscle; 26 — brachial fascia; 27 — medial cutaneous nerve of forearm; 28 — medial cutaneous nerve of arm; 29 — brachial veins; 30 — brachial artery; 31 — median nerve; 32 — ulnar nerve; 34 — tendon of pectoralis major muscle; 35 — coracobrachialis muscle; 36 — musculocutaneous nerve; 37 — axillary artery and vein; 39 — lateral cord of brachial plexus; 40 — thoraco-acromial artery