

IMMANUEL KANT BALTIC FEDERAL UNIVERSITY
DEPARTMENT OF FUNDAMENTAL MEDICINE

E. S. Chernomortseva

ANATOMY: OSTEOSYNDESMOLOGY

Methodological recommendations
for students of medicine

Immanuel Kant Baltic Federal University Press
2024

UDK 611.71=111(075.8)
BBK 28.706я73
C51

Reviewers

Dr hab. V. A. Ivanov, Professor at the Department of Human Anatomy,
Kursk State Medical University;

Dr hab. V. A. Izranov, Professor, Head of the Department of Basic
Medical Research, Immanuel Kant Baltic Federal University

Printed by approval of the editorial board of the Federal State Autonomous Educational Institution of Higher Education «Immanuel Kant Baltic Federal University».

Chernomortseva, E. S.

C51 Anatomy: Osteosyndesmology : methodological recommendations for students of medicine / E. S. Chernomortseva. — Kaliningrad : Immanuel Kant Baltic Federal University Press, 2024. — 65 p.
ISBN 978-5-9971-0853-3

The manual is prepared according to requirements of the working program of the discipline “Anatomy” and contains methodical indications for the section Osteosyndesmology according to the existing curriculum. The manual is intended for the English-speaking students of medical faculty studying on specialties 31.05.01 “General medicine”.

UDK 611.71=111(075.8)
BBK 28.706я73

ISBN 978-5-9971-0853-3

© Chernomortseva E. S., 2024
© IKBFU, 2024

CONTENTS

Topic 1. Anatomical terminology, axes and planes. The structure of the vertebra. Structure of cervical, thoracic, lumbar, sacral and coccygeal vertebrae	4
Topic 2. General information about the connections of bones. Connection of vertebrae, atlantooccipital joint, atlantoaxial joints. Vertebral column as a whole	11
Topic 3. Ribs. Sternum. The connection of the ribs with the sternum and vertebrae. Chest as a whole. The bones of the shoulder girdle. The clavicle. The scapula. Joints between the bones of the shoulder girdle. X-ray anatomy	16
Topic 4. The structure of the humerus, bones of forearm and hand. Shoulder joint. Connection of the forearm and hand bones	25
Topic 5. The structure of the pelvis and femur. The connections of the pelvis and femur. The pelvis as a whole. Differences between the male and female pelvis. Dimensions of the female pelvis.....	39
Topic 6. Structure of the leg and foot bones. The connection between the leg and foot bones.....	48
Topic 7. Control: osteosyndesmology	61

Topic 1

ANATOMICAL TERMINOLOGY, AXES AND PLANES. THE STRUCTURE OF THE VERTEBRA. STRUCTURE OF CERVICAL, THORACIC, LUMBAR, SACRAL AND COCCYGEAL VERTEBRAE

INTRODUCTION TO THE TOPIC

To understand the topics of each lesson, students should know the general anatomical terms in Latin and the common properties of the vertebrae. Doctors often have to deal with various pathologies of the components of the spinal column, such as trauma, bone tuberculosis, tumors, curvature of the spinal column, etc. Knowledge of this section anatomy is essential for the practical work of traumatologists, surgeons, doctors involved in osteoarticular tuberculosis, and physical therapy.

SELF-STUDY GOALS

After independently studying the topic, the student should be able to: name all the vertebrae and their structures in English and Latin; describe all the formations on the vertebrae and on the spinal column as a whole; distinguish between vertebrae; and palpate protruding parts of the skeleton on a live person.

TOPIC CONTENT

- Description of the axes and planes used in anatomy.
- The main terms used for the spatial description of anatomical objects.
- The main parts and functions of the skeleton.
- The main parts and functions of the vertebral column.
- Structure of the typical vertebra: vertebral body; articular, transverse, and spinous processes; vertebral foramen; vertebral canal; intervertebral notches and foramina.
- Features of the cervical vertebrae: small-sized bodies, the presence of holes in the transverse processes, the transverse process is fused with a rib rudi-

ment, anterior and posterior tubercles at the ends of the transverse processes, absence of a body in 1 vertebra, bifurcation of the spinous processes in 1—6 vertebrae, protruding spinous process in the 7th vertebra, a highly developed carotid tubercle on the transverse process of the 6th vertebra.

- Features of the thoracic vertebrae: the costal half-facets on the superior and inferior body edges of Th2—9. Th1 — the upper complete costal facet and lower half-facet. The 10th vertebra has only an upper half-facet, Th11—12 have only one complete facet; the size of the bodies increases from Th1 to Th12; the articular processes are positioned frontally; the transverse processes are directed to the sides and back; Th1—10 have costal facets on the transverse process for articulation with the rib tubercle; spinous processes are long and inclined downwards.

- Features of the lumbar vertebrae: the body is massive, the spinous processes are short, wide and directed straight back, the articular processes directed sagittally, the transverse process consists of a fused rudiment of a rib and an accessory process; presence of the mammillary processes.

- Sacral vertebrae: sacrum, base, apex, promontory, pelvic and dorsal surfaces, transverse lines, anterior sacral foramina, posterior sacral foramina, median crest, intermediate crests, lateral crests, lateral parts, auricular surfaces, sacral canal, foramen and hiatus, sacral horns.

- Coccygeal vertebrae: coccyx, coccygeal horns.

METHODOLOGICAL RECOMMENDATIONS FOR STUDYING THE MATERIAL

Activity	Step Description
Read the introduction to the topic	—
Study the corresponding section in literature sources and get the corresponding bone preparations	—
Define the functionality of the bone and visualize its location among other bones of the body and limbs	Identify which part of the skeleton this bone belongs to: the bones of the trunk, limbs, or skull; function: support, movement, labor, protection
Compare the structural description of the bone to the corresponding details on the bone preparation	Use a pointer to demonstrate the specific anatomical details of each bone as outlined in the textbook Refer to the list of practical skills

Activity	Step Description
Revise the studied material while showing bone parts on the preparation	While revising the topic, check the following: a) English and Latin names of the bone; b) location of the bone in the skeleton; c) type of bone (tubular, spongy, long or short, mixed); d) functions; e) main parts of the bone; f) anatomical formations of each part of the surface, processes, ridges, etc.
Write down new Latin terms	Put down new Latin terms in your notebook (see the list of Practical skills)
Identify specific features to determine the bone's side (right or left)	Identify the side of the bone you are studying
Determine the details of the bone that can be felt on a live person. Find them on your body	Palpate the superficial bone projections on a person
Check your knowledge with self-control questions	Answer the questions given in the assignment

QUESTIONS FOR SELF-CONTROL

1. Name and describe the axes and planes, used in anatomy.
2. Name the main terms which are used for the spatial description of the anatomical objects.
3. How many parts does the vertebral column consist of? How many vertebrae are in each of them?
4. What are the functions of the vertebral column?
5. What parts of the skeleton do you know?
6. Name the vertebral structures, typical of almost all the vertebrae.
7. Describe the distinctive features of the cervical vertebrae.
8. Which cervical vertebra is known as the prominent vertebra? Why does it have such a name?
9. What cervical vertebra carries the carotid tubercle? Where is it located? Why does it have such a name?
10. The spinous processes of which cervical vertebrae are bifurcated?

11. What is the function of the transverse foramina? Which cervical vertebrae have these foramina?
12. Describe the characteristics of the atlas, noting the absence of typical vertebral components and identifying the structures that take their place. Explain the specific functions of the atlas. Describe the distinctive features of the axis.
13. What is the function of the axial dens?
14. What is the function of the C1, C2 articular surfaces?
15. Describe the thoracic vertebrae distinctive features.
16. What are the differences between the I, X, XI, XII thoracic vertebrae and others?
17. Enumerate the distinctive features of the lumbar vertebrae.
18. Describe the sacrum. What structures of the sacrum are formed by the fusion of the sacral vertebrae?
19. What is the function of the pelvic and dorsal sacral foramina?
20. What is the function of the sacral auricular surfaces?
21. What is the significance of the sacral tuberosity?
22. What is the function of the sacral articular processes and horns?
23. How to differentiate the pelvic and dorsal sacral surfaces?
24. Where is upper part of the sacrum (base) and where is its lower part (apex)?
25. How is the sacrum arranged in the whole pelvis?
26. Describe the anatomy of coccyx. How many vertebrae does the coccyx include? What is the function of the coccygeal horns?
27. Describe the normal curves of the vertebral column. Why and when are they formed? In what plane are they arranged? How many curves does the regular vertebral column have? What are the kyphoses and lordoses? Which parts of the vertebral column are curved as kyphoses and which are as lordoses?
28. How does the formation of the curves of the vertebral column occur? Name the time of the appearance of the curves.
29. Define scoliosis, its causes, and methods for preventing its development.
30. Explain the terms “sacralization” and “lumbalization”.

PRACTICAL SKILLS

1. Vertebral body, *corpus vertebrae*; тело позвонка.
2. Vertebral arch, *arcus vertebrae*; дуга позвонка.
3. Pedicle of vertebral arch, *pediculus arcus vertebrae*; ножка дуги позвонка.
4. Vertebral foramen, *foramen vertebrale*; позвоночное отверстие.
5. Vertebral canal, *canalis vertebralis*; позвоночный канал.
6. Spinous process, *processus spinosus*; остистый отросток.

7. Transverse processes, *processus transversus*; поперечный отросток.
8. Superior articular process, *processus articularis superior*; верхний суставной отросток.
9. Inferior articular process, *processus articularis inferior*; нижний суставной отросток.
10. Superior vertebral notch, *incisura vertebralis superior*; верхняя позвоночная вырезка.
11. Inferior vertebral notch, *incisura vertebralis inferior*; нижняя позвоночная вырезка.
12. Intervertebral foramen, *foramen intervertebrale*; межпозвоночное отверстие.

Cervical Vertebrae

1. Transverse foramen, *foramen transversarium*; поперечное отверстие.
2. Groove for spinal nerve, *sulcus nervi spinalis*; борозда спинномозгового нерва.
3. Anterior tubercle of transverse process, *tuberculum anterius*; передний бугорок поперечного отростка.
4. Posterior tubercle of transverse process, *tuberculum posterius*; задний бугорок поперечного отростка.
5. Carotid tubercle, *tuberculum caroticum*; сонный бугорок.
6. Anterior arch of atlas, *arcus anterior atlantis*; передняя дуга атланта.
7. Posterior arch of atlas, *arcus posterior atlantis*; задняя дуга атланта.
8. Anterior tubercle of atlas, *tuberculum anterius*; передний бугорок атланта.
9. Posterior tubercle of atlas, *tuberculum posteriu*; задний бугорок атланта.
10. Superior articular surface of atlas, *facies articularis superioris*; верхняя суставная поверхность атланта.
11. Inferior articular surfaces of atlas, *facies articulares inferiores*; нижняя суставная поверхность атланта.
12. Groove for vertebral artery, *sulcus arteriae vertebralis*; борозда позвоночной артерии.
13. Dens, *dens axis*; зуб осевого позвонка.
14. Anterior articular facet of dens, *facies articularis anterior*; передняя суставная поверхность зуба.
15. Posterior articular facet of dens, *facies articularis posterior*; задняя суставная поверхность зуба.
16. Superior articular facet of axis, *facies articularis superior*; верхняя суставная поверхность осевого позвонка.

Thoracic Vertebrae

1. Superior costal facet (half-facet), *fovea costalis superior*; верхняя реберная ямка.
2. Inferior costal facet (half-facet), *fovea costalis inferior*; нижняя реберная ямка.
3. Transverse costal facet, *fovea costalis processus transverse*; реберная ямка поперечного отростка.

Lumbar Vertebrae

1. Mammillary process, *processus mamillaris*; сосцевидный отросток.
2. Accessory process, *processus accessories*; добавочный отросток.
3. Costal process, *processus costalis*; реберный отросток.

Sacrum

1. Base of the sacrum, *basis ossis sacri*; основание крестца.
2. Apex of the sacrum, *apex ossis sacri*; вершина крестца.
3. Pelvic surface, *facies pelvica*; тазовая поверхность.
4. Dorsal surface, *facies dorsalis*; дорсальная поверхность.
5. Superior articular processes, *processus articulares superiores*; верхний суставной отросток.
6. Sacral promontory, *promontorium*; мыс крестца.
7. Transverse line, *linea transversa*; поперечная линия.
8. Anterior sacral foramen, *foramen sacrale anterius*; переднее крестцовое отверстие.
9. Posterior intermediate foramen, *foramen sacrale posterius*; заднее крестцовое отверстие.
10. Median sacral crest, *crista sacralis mediana*; срединный крестцовый гребень.
11. Intermediate sacral crest, *crista sacralis intermedia*; промежуточный крестцовый гребень.
12. Lateral sacral crest, *crista sacralis lateralis*; латеральный крестцовый гребень.
13. Auricular surface, *facies auricularis*; ушковидная поверхность.
14. Sacral tuberosity, *tuberositas ossis sacri*; бугристость крестца.
15. Sacral canal, *canalis caralis*; крестцовый канал.
16. Sacral hiatus, *hiatus sacralis*; крестцовая щель.
17. Sacral horn, *cornu sacrale*; рог крестца.

Соссух

1. Coccygeal horn, *cornu coccygeum*; копчиковый рог.

Literature

1. *Human anatomy* : 2 vol. / M. Prives, N. Lysenkov, V. Bushkovich. — 3^d ed. — Moscow : Mir Publishers, 1989. — Vol. 1 : The weight-bearing and locomotor system. The science of the viscera. The science of the organs of internal secretion. — 3^d ed. — 608 p. ill. (P. 131—149).
2. *Textbook of Human Anatomy*. In 3 vol. Vol. 1. Locomotor apparatus / L. L. Kolesnikov, D. B. Nikitiuk, S. V. Klochkova, I. G. Stelnikova. — Moscow : GEOTAR-Media, 2020. — 288 p.
3. *Sapin, M. R.* Textbook of human anatomy. Vol. 1 : for medical students / M. R. Sapin, L. L. Kolesnikov, D. B. Nikitjuk. — 2nd ed. — Moscow : New Wave Publishing Agency, 2010. — 416 p.
4. *Sinelnikov, R. D.* Atlas of human anatomy / R. D. Sinelnikov. — Moscow : Medicine. — 1996. Vol. 1. — 463 p.
5. *Atlas of Human Anatomy* / Frank H. Netter. — 6th ed. — Philadelphia : Elsevier, 2014. — 531 p.: ill.
6. *Lecture material*.

Topic 2

GENERAL INFORMATION ABOUT THE CONNECTIONS OF BONES. CONNECTION OF VERTEBRAE, ATLANTOCCIPITAL JOINT, ATLANTOAXIAL JOINTS. VERTEBRAL COLUMN AS A WHOLE

INTRODUCTION TO THE TOPIC

Knowledge of the joints (and their additional structures) is important for various specialists. In joint diseases, conservative and operative treatments are used. Surgical interventions are used in joint injuries, intra-articular fractures, and damage to the intra-articular ligaments, discs, and menisci. Follow-up activities, associated with the restoration of motion in joints (physiotherapy), require the knowledge of the joint structure and its biomechanical characteristics. Frequent injuries and degenerative-dystrophic diseases of the spine and related surgical interventions require knowledge of the ligamentous apparatus of the vertebral columns, the axes, and the range of motion in its joints.

SELF-STUDY GOALS

After independently studying the topic, the student should know: the definitions of contiguous and interrupted articulations, their types; classification of joints by the number of articular surfaces, shape, and number of axes of movements. Students should know: connections between the atlas with the skull, vertebrae with each other, the formation of curves of the spine in the process of ontogenesis, and English and Latin terminology. Demonstrate the ability to locate and identify all joints and the associated ligaments within anatomical preparations.

TOPIC CONTENT

- Classification of bone connections.
- Contiguous connections (connections of two or more bones using any tissues. Depending on the tissue, contiguous articulations can be connected by bony tissue, connective tissue, muscular tissue, and cartilage).
- Joints (this type of bone connection includes the articular surfaces, the articular capsule, and the articular cavity. The fourth element of the joint is optional — the presence of additional intra-articular formations: discs, menisci, ligaments, folds, lips, and bursae).

- Classification of joints: by shape — spherical, flat, ellipsoid, trochoid, hinge, saddle-shaped, condylar; by the number of axes of movement -uniaxial, biaxial, multi-axial; according to the number of articular surfaces — simple, complex, compound, combine.
- An intermediate type of bone connection is cartilaginous joint, which cartilage between the bones contains a gap (connection of the pubic bones).
- Atlantoaxial joints — median and lateral, their characteristics.
- Atlanto-occipital joint, ligaments of the atlanto-occipital joint — anterior and posterior atlanto-occipital membranes.
- Features of the vertebral column connections; intervertebral joints.
- Formation of cervical lordosis, thoracic kyphosis, lumbar lordosis, sacrococcygeal kyphosis.

METHODOLOGICAL RECOMMENDATIONS FOR STUDYING THE MATERIAL

Activity	Step Description
Read the introduction to the topic	—
Study the corresponding section in literature sources and get the corresponding bone preparations	—
Revise the studied material, while showing bone formations on the preparations, slides and tables	<p>While revising the topic, check the following:</p> <p>a) connection name (English and Latin);</p> <p>b) type of connection (contiguous, interrupted, half-joint).</p> <p>For diarthrosis:</p> <p>a) English and Latin name of the joint;</p> <p>b) articular surfaces;</p> <p>c) additional structures (discs, menisci);</p> <p>d) joint classification:</p> <ul style="list-style-type: none"> • by the number of articular surfaces; • according to the shape of the articular surfaces; • by number of the movement axes; <p>e) possible types of movement, axes along which these movements occur;</p> <p>f) joint ligaments.</p> <p>For contiguous connections: (syndesmosis, synchondrosis, synostosis), its description</p>

The end of Table

Activity	Step Description
Define the possible movements in the joints on your body, determine the axes of these movements	Based on the shape of the joint and the number of axes of movement, check the movements around the frontal, sagittal, and vertical axis
Write down new Latin terms	Write down the terms in your notebook (see the list of Practical skills)
Check your knowledge with self-control questions	Answer the questions given in the assignment

QUESTIONS FOR SELF-CONTROL

1. What types of bone articulations do you know?
2. Give the characteristics of contiguous bone connections.
3. What types of contiguous bone connections do you know? Provide examples.
4. Give a definition of the half-joint.
5. Define synovial joints.
6. List three primary characteristics that define a synovial joint.
7. How are joints classified: by shape, by the number of axes of movement, or by the number of articular surfaces? Provide examples.
8. What categorizes joints as simple, compound, complex, or combined?
9. What factors determine the range of movements at synovial joints?
10. What are the types of joints between individual vertebrae? How are vertebral bodies, arches, and processes interconnected?
11. Describe the synovial joints between the atlas and the skull based on classifications. Which joints are they combined with? Which articular surfaces of the atlas and the skull form these joints? What movements are possible at these joints? Which ligaments reinforce these joints? Describe their attachment.
12. Describe the diarthroses between the atlas and the axis according to classifications. Which joints are they combined with? Which parts of the atlas and the axis take parts in these joints formation? What movements occur at these joints? Describe the names, position and attachment ligaments reinforce them.
13. Describe the intervertebral joints according to synovial joint classifications.
14. What types of movements can occur in the vertebral column?

PRACTICAL SKILLS

1. Intervertebral disc, *discus intervertebralis*; межпозвоночный диск.
2. Anterior longitudinal ligament, *ligamentum longitudinale anterius*; передняя продольная связка.
3. Posterior longitudinal ligament, *ligamentum longitudinale posterius*; задняя продольная связка.
4. Yellow ligament, *ligamentum flavum*; желтая связка.
5. Nuchal ligament, *ligamentum nuchae*; выйная связка.
6. Supraspinous ligament, *ligamentum supraspinale*; надостная связка.
7. Intertransverse ligament, *ligamentum intertransversarium*; межпоперечная связка.
8. Interspinous ligament, *ligamentum interspinale*; межкостистая связка.
9. Intervertebral (zygapophyseal) joints, *articulationes intervertebrales (zygapophyseales)*; межпозвоночные суставы.
10. Median atlantoaxial joint, *articulatio atlantoaxialis mediana*; срединный атлanto-осевой сустав.
11. Cruciate ligament of atlas, *ligamentum cruciforme atlantis*; крестообразная связка атланта.
12. Apical ligament of dens, *ligamentum apicis dentis*; связка вершины зуба.
13. Alar ligaments, *ligamenta alaria*; крыловидные связки.
14. Tectorial membrane, *membrana tectoria*; покровная мембрана.
15. Lateral atlantoaxial joints, *articulationes atlantoaxiales laterales dextra et sinistra*; латеральные атлanto-осевые суставы.
16. Atlantooccipital joints, *articulationes atlantooccipitales*; атлanto-затылочные суставы.
17. Anterior atlantooccipital membrane, *membrana atlantooccipitalis anterior*; передняя атлanto-затылочная мембрана.
18. Posterior atlantooccipital membrane, *membrana atlantooccipitalis posterior*; задняя атлanto-затылочная мембрана.
19. Transverse atlantal ligament, *ligamentum transversum atlantis*; поперечная связка атланта.
20. Cervical and lumbar lordosis, *lordosis cervicalis et lumbalis*; шейные и поясничные лордозы.
21. Thoracic and sacrococcygeal kyphoses, *kyphoses thoracicus et sacrococcygeus*; грудной и крестцово-копчиковый кифозы.

Literature

1. *Human anatomy* : 2 vol. / M. Prives, N. Lysenkov, V. Bushkovich. — 3^d ed. — Moscow : Mir Publishers, 1989. — Vol. 1 : The weight-bearing and locomotor system. The science of the viscera. The science of the organs of internal secretion. — 3^d ed. — 608 p. ill. (P. 115—131).

2. *Textbook of Human Anatomy*. In 3 vol. Vol. 1. Locomotor apparatus / L. L. Kolesnikov, D. B. Nikitiuk, S. V. Klochkova, I. G. Stelnikova. — Moscow : GEOTAR-Media, 2020. — 288 p.

3. *Sapin, M. R.* Textbook of human anatomy. Vol. 1 : for medical students / M. R. Sapin, L. L. Kolesnikov, D. B. Nikitjuk. — 2nd ed. — Moscow : New Wave Publishing Agency, 2010. — 416 p.

4. *Sinelnikov, R. D.* Atlas of human anatomy / R. D. Sinelnikov. — Moscow : Medicine. — 1996. Vol. 1. — 463 p.

5. *Atlas of Human Anatomy* / Frank H. Netter. — 6th ed. — Philadelphia : Elsevier, 2014. — 531 p.: ill.

6. *Lecture material*.

Topic 3

RIBS. STERNUM. THE CONNECTION OF THE RIBS WITH THE STERNUM AND VERTEBRAE. CHEST AS A WHOLE. THE BONES OF THE SHOULDER GIRDLE. THE CLAVICLE. THE SCAPULA. JOINTS BETWEEN THE BONES OF THE SHOULDER GIRDLE. X-RAY ANATOMY

INTRODUCTION TO THE TOPIC

The chest contains vital organs and is actively involved in breathing. For proper therapeutic and surgical treatment of diseases of the chest organs, understanding the mechanism of breathing, the doctor needs knowledge of the anatomy of the ribs, sternum, and chest as a whole. It is important to know the structure of the clavicle and scapula for the study of the next anatomy topics, the courses in radiology, surgery, and traumatology. Without the knowledge of these bones structure and articulation the diagnosis and treatment of their damages are impossible.

SELF-STUDY GOALS

After independently studying the topic, the student should know the structure of the ribs, sternum, and chest as a whole; be able to navigate the structure of the chest bones on preparations and radiographs; determine the shape of the chest; palpate the ribs, sternum, intercostal spaces, xiphoid process, costal arches. Students should know the structure of the clavicle and scapula, be able to find all anatomical formations on a preparation, be able to distinguish right bones from left ones, be able to find corresponding bone structures on radiographs.

TOPIC CONTENT

- The sternum, its parts, and individual formations (manubrium, body, xiphoid process).
- Ribs (classification of ribs, rib structure, features of ribs 1, 2, 10, 11, 12).
- The chest as a whole (parts, structures, shape, function of the chest).
- X-ray image of the chest.

- Features of the connection of true ribs with the sternum, false ribs with the lower edges of the overlying ribs, between the cartilages of 6, 7, 8, and sometimes 9 ribs.
- Connections between ribs and vertebrae, ribs with the sternum, and connections of the false ribs.
- Anatomy of the clavicle: its sternal and acromial ends, and tubercles, learn to distinguish the right clavicle from the left.
- Structure of the scapula: edges — medial, lateral, and superior; angles — upper, lower, lateral; glenoid cavity, neck, tubercles, coracoid and acromial processes; supraspinous, infraspinous and subscapular fossae; difference between the right shoulder blade and the left one.
- The sternoclavicular joint. Study the classification by shape (saddle-shaped), by function (multiaxial), and by the number of connecting surfaces (combined). Joint ligaments: in front and behind — sternoclavicular anterior and posterior, below — costoclavicular, above — interclavicular. Movements in the joint along the axes: sagittal — raising and lowering the clavicle, vertical — moving the clavicle forward and backward, frontal — rotation. You should know that the scapula also moves along with the collarbone, and therefore the entire shoulder girdle on the corresponding side begins to move. It is necessary to understand how the scapula moves: up and down, forward and backward, and, finally, the scapula can rotate around the anteroposterior axis.
- Acromioclavicular joint. Study the classification by shape (flat), by function (multi-axial), and by the number of articulating surfaces (combined). Study how it is formed: the articular surface of the acromial end of the clavicle and the articular surface of the scapular acromion. The joint is strengthened by the following ligaments: acromioclavicular, and coracoclavicular. Movements in the joint are limited and occur in three axes.
- Ligaments of the scapula. You need to know that in addition to the ligamentous apparatus connecting the clavicle to the scapula, the scapula has its own ligaments: coracoacromial, superior transverse, and inferior transverse.
- X-ray image of the shoulder girdle.

METHODOLOGICAL RECOMMENDATIONS FOR STUDYING THE MATERIAL

Activity	Step Description
Read the introduction to the topic	—
Study the corresponding section in literature sources and get the corresponding bone preparations	—

Activity	Step Description
Define the functionality of the bone and visualize its location among other bones of the body and limbs	Identify which part of the skeleton this bone belongs to: the bones of the trunk, limbs; function of support, movement, labor, and protection for internal organs
Read the relevant paragraph in the textbook, and identify the bone features on the bone preparation	Demonstrate each bone detail found in the textbook with a pointer
Revise the studied material while showing bone formations on the preparations, slides and tables	<p>While revising the topic, check the following:</p> <ol style="list-style-type: none"> English and Latin names of the bone; location of the bone in the skeleton; type of bone (tubular, spongy, long or short, mixed); main parts of the bone; anatomical formations of each part: surfaces, processes, ridges, grooves, etc.; radiograph of the bone. <p>When revising the synovial joint, check the following:</p> <ol style="list-style-type: none"> English and Latin name of the joint; articular surfaces; additional structures (discs, menisci), joint classification: <ul style="list-style-type: none"> by the number of articular surfaces; according to the shape of the articular surfaces; by number of the movement axes; possible types of movement, axes along which these movements occur; joint ligaments
Write down new Latin terms	Write down the terms in your notebook (see the list of Practical skills)
Check your knowledge with self-control questions	Answer the questions given in the assignment

QUESTIONS FOR SELF-CONTROL

1. What are the components of the sternum?
2. What anatomical structures are located on the sternum?
3. Can you classify ribs into true, false, and floating? How many ribs are present on each side?
4. Describe the parts of a rib. How can you distinguish the anterior part of a rib from the posterior part, the inferior border from the superior border, and the inner surface from the outer surface? How can you differentiate between the right and left ribs?
5. Explain the differences between ribs I, X, XI, XII, and the others. What specific features do these ribs have, and why?
6. Describe the structure of the thorax, its functions, and the organs it encases. Which bones make up the thorax? What defines the superior and inferior thoracic apertures, and which organs pass through the superior aperture? What muscle closes the inferior aperture? What are the pulmonary grooves, the infra-sternal angle, the costal arch, and the intercostal spaces? What ribs form the costal arch? What are the intercostal spaces? How will you count the ribs and intercostal spaces in a live person?
7. What types of thoracic cages are there, and what characteristics help determine the type of thorax? How are these types associated with different body types, and what practical importance do they hold?
8. What structures can be visualized on an X-ray of the thorax?
9. Describe the joints between the ribs and vertebrae based on their classifications. How are these joints connected with other joints? What articular surfaces of the ribs and vertebrae form these joints? What movements are possible at these joints? Which ligaments reinforce these joints?
10. Describe all types of connections between the true ribs and the sternum. Give the characteristic of the diarthroses. Which ligaments reinforce these joints, and what movements are possible at these joints?
11. How are the false and floating ribs connected to other bones?
12. Provide a detailed description of the clavicle. What type of bone is the clavicle according to bone classification? What features can help distinguish the right clavicle from the left one, and what functions do the sternal and acromial facets of the clavicle serve? Describe the functions of clavicular projections, such as tubercles, lines, and tuberosities.
13. Describe the scapula. What type of bone is the scapula according to bone classification? How can you distinguish between the right and left scapulae, and what are the surfaces, borders, and angles of the scapula? Explain the peculiarity of the lateral angle and the functions of the glenoid cavity, scapular notch, and the muscles occupying scapular fossae. How does the acromion function?

14. Describe the attachment and function of the proper scapular ligaments.
15. Provide a detailed description of the sternoclavicular joint in terms of joint classifications. What parts of the sternum and clavicle form this joint, and what accessory structures are associated with it? Which ligaments reinforce this joint, and what movements are possible at the joint?
16. Describe the acromioclavicular joint according to joint classifications. How do parts of the scapula and clavicle form this joint, and what accessory structures can be present? Which ligaments strengthen this joint, and what movements are possible at the joint?

PRACTICAL SKILLS

Sternum

1. Body of sternum, *corpus sterni*; тело грудины.
2. Manubrium of sternum, *manubrium sterni*; рукоятка грудины.
3. Xiphoid process, *processus xiphoideus*; мечевидный отросток.
4. Jugular notch, *incisura jugularis*; яремная вырезка.
5. Clavicular notch, *incisura clavicularis*; ключичная вырезка.
6. Costal notch, *incisura costalis*; реберная вырезка.
7. Sternal angle, *angulus sterni*; угол грудины.

Ribs

1. Costal cartilage, *cartilago costalis*; реберный хрящ.
2. Costal bone, *os costale*; реберная кость.
3. True ribs, *costae verae*; истинные ребра.
4. False ribs, *costae spuriae*; ложные ребра.
5. Floating ribs, *costae fluctuantes*; колеблющиеся ребра.
6. Head of rib, *caput costae*; головка ребра.
7. Crest of head of rib, *crista capitis costae*; гребень головки ребра.
8. Neck of rib, *collum costae*; шейка ребра.
9. Crest of neck of rib, *crista colli costae*; гребень шейки ребра.
10. Body (shaft) of rib, *corpus costae*; тело ребра.
11. Articular surface of rib tubercle, *facies articularis tuberculi costae*; суставная поверхность ребра.
12. Angle of rib, *angulus costae*; угол ребра.
13. Groove of rib, *sulcus costae*; борозда ребра.
14. Scalene tubercle of i rib, *tuberculum musculi scaleni anterioris*; борозда передней лестничной мышцы.
15. Groove for the subclavian artery of first rib, *sulcus arteriae subclaviae*; борозда подключичной артерии.

16. Groove for subclavian vein of first rib, *sulcus venae subclaviae*; борозда подключичной вены.

17. Anterior end of rib, *extremitas anterior*; передний конец ребра.

18. Posterior end of rib, *extremitas posterior*; задний конец ребра.

Thorax

1. Costal arch, *arcus costalis*; реберная дуга.

2. Infrasternal angle, *angulus infrasternalis*; подгрудинный угол.

3. Superior thoracic aperture, *apertura thoracis superior*; верхняя грудная апертура.

4. Inferior thoracic aperture, *apertura thoracis inferior*; нижняя грудная апертура.

5. Pulmonary grooves, *sulci pulmonales*; легочные борозды.

6. Intercostal spaces, *spatia intercostali*; межреберья.

Connections of the ribs. Chest as a whole

1. Joint of the costal head, *articulatio capitis costae*; сустав головки ребра.

2. Radiate ligament of costal head, *ligamentum capitis costae radiatum*; лучистая связка головки ребра.

3. Costotransverse joint, *articulatio costotransversaria*; реберно-поперечный сустав.

4. Costotransverse ligament, *ligamentum costotransversarium*; реберно-поперечная связка.

5. Sternocostal joints, *articulationes sternocostales*; грудино-реберный сустав.

6. Radiate sternocostal ligaments, *ligamenta sternocostalia radiata*; лучистые грудино-реберные связки.

7. Sternal membrane, *membrana sterni*; грудинная мембрана.

8. Interchondral joints, *articulationes interchondrales*; межхрящевые суставы.

9. Pulmonary grooves, *sulci pulmonales*; легочные борозды.

10. Costal arch, *arcus costalis*; дуга ребра.

11. Infrasternal angle, *angulus infrasternalis*; подгрудинный угол.

12. Superior thoracic aperture, *apertura thoracis superior*; верхняя грудная апертура.

13. Inferior thoracic aperture, *apertura thoracis inferior*; нижняя грудная апертура.

14. Intercostal spaces, *spatia intercostalia*; межреберья.

Scapula

1. Inferior angle, *angulus inferior*; нижний угол.
2. Superior angle, *angulus superior*; верхний угол.
3. Lateral angle, *angulus lateralis*; латеральный угол.
4. Medial border, *margo medialis*; медиальный край.
5. Lateral border, *margo lateralis*; латеральный край.
6. Superior border, *margo superior*; верхний край.
7. Anterior (costal) surface, *facies anterior seu costalis*; передняя или реберная поверхность.
8. Subscapular fossa, *fossa subscapularis*; подлопаточная ямка.
9. Posterior surface, *facies posterior*; задняя поверхность.
10. Scapular spine, *spina scapulae*; лопаточная ость.
11. Supraspinous fossa, *fossa supraspinata*; надостная ямка.
12. Infraspinous fossa, *fossa infraspinata*; подостная ямка.
13. Glenoid cavity, *cavitas glenoidalis*; суставная впадина.
14. Supraglenoid tubercle, *tuberculum supraglenoidale*; надсуставной бугорок.
15. Infraglenoid tubercle, *tuberculum infraglenoidale*; подсуставной бугорок.
16. Neck of scapula, *collum scapulae*; шейка лопатки.
17. Acromion, *acromion*; акромион.
18. Coracoid process, *processus coracoideus*; клювовидный отросток.
19. Scapular notch, *incisura scapulae*; лопаточная вырезка.

Clavicle

1. Body, *corpus clavicae*; тело ключицы.
2. Sternal end, *extremitas sternalis*; грудинный конец.
3. Acromial end, *extrimitas acromialis*; акромиальный конец.
4. Sternal facet, *facies articularis sternalis*; грудинная суставная поверхность.
5. Acromial facet, *facies articularis acromialis*; акромиальная суставная поверхность.
6. Conoid tubercle, *tuberculum conoideum*; конусовидный бугорок.

Joints

1. Coracoacromial ligament, *ligamentum coracoacromiale*; клювовидно-акромиальная связка.
2. Superior transverse scapular ligament, *ligamentum transversum scapulae superius*; верхняя поперечная связка лопатки.

3. Inferior transverse scapular ligament, *ligamentum transversum scapulae inferius*; нижняя поперечная связка лопатки.

4. Acromioclavicular joint, *articulatio acromioclavicularis*; акромиально-ключичный сустав.

5. Acromioclavicular ligament, *ligamentum acromioclaviculare*; акромиально-ключичная связка.

6. Coracoclavicular ligament, *ligamentum coracoclaviculare*; клювовидно-акромиальная связка.

7. Sternoclavicular joint, *articulatio sternoclavicularis*; грудино-ключичный сустав.

8. Anterior sternoclavicular ligaments, *ligamentum sternoclaviculare anterius*; передняя грудино-ключичная связка.

9. Posterior sternoclavicular ligaments, *ligamentum sternoclaviculare posterius*; задняя грудино-ключичная связка.

10. Costoclavicular ligament, *ligamentum costoclaviculare*; реберно-ключичная связка.

X-ray Skills

Thorax

1. True ribs, *costae verae*; истинные ребра.
2. False ribs, *costae spuriae*; ложные ребра.
3. Floating ribs, *costae fluctuantes*; колеблющиеся ребра.
4. Head of rib, *caput costae*; головка ребра.
5. Neck of rib, *collum costae*; шейка ребра.
6. Body (shaft) of rib, *corpus costae*; тело ребра.
7. Anterior end of rib, *extremitas anterior*; передний конец ребра.
8. Posterior end of rib, *extremitas posterior*; задний конец ребра.
9. Intercostal spaces, *spatia intercostali*; межреберья.

Scapula

1. Inferior angle, *angulus inferior*; нижний угол.
2. Superior angle, *angulus superior*; верхний угол.
3. Lateral angle, *angulus lateralis*; латеральный угол.
4. Lateral border, *margo lateralis*; латеральный край.
5. Superior border, *margo superior*; верхний край.
6. Glenoid cavity, *cavitas glenoidalis*; суставная впадина.
7. Supraglenoid tubercle, *tuberculum supraglenoidale*; надсуставной бугорок.

8. Infraglenoid tubercle, *tuberculum infraglenoidale*; подсуставной бугорок.
9. Neck of scapula, *collum scapulae*; шейка лопатки.
10. Coracoid process, *processus coracoideus*; клювовидный отросток.
11. Acromion, *acromion*; акромион.

Clavicle

1. Body, *corpus claviculae*; тело ключицы.
2. Sternal end, *extremitas sternalis*; грудинный конец.
3. Acromial end, *extrimitas acromialis*; акромиальный конец.

Joints

1. Acromioclavicular joint, *articulatio acromioclavicularis*; акромиально-ключичный сустав.
2. Sternoclavicular joint, *articulatio sternoclavicularis*; грудино-ключичный сустав.

Literature

1. *Human anatomy* : 2 vol. / M. Prives, N. Lysenkov, V. Bushkovich. — 3^d ed. — Moscow : Mir Publishers, 1989. — Vol. 1 : The weight-bearing and locomotor system. The science of the viscera. The science of the organs of internal secretion. — 3^d ed. — 608 p. ill. (P. 149—155, 213—217).
2. *Textbook of Human Anatomy*. In 3 vol. Vol. 1. Locomotor apparatus / L. L. Kolesnikov, D. B. Nikitiuk, S. V. Klochkova, I. G. Stelnikova. — Moscow : GEOTAR-Media, 2020. — 288 p.
3. *Sapin, M. R.* Textbook of human anatomy. Vol. 1 : for medical students / M. R. Sapin, L. L. Kolesnikov, D. B. Nikitjuk. — 2nd ed. — Moscow : New Wave Publishing Agency, 2010. — 416 p.
4. *Sinelnikov, R. D.* Atlas of human anatomy / R. D. Sinelnikov. — Moscow : Medicine. — 1996. Vol. 1. — 463 p.
5. *Atlas of Human Anatomy* / Frank H. Netter. — 6th ed. — Philadelphia : Elsevier, 2014. — 531 p.: ill.
6. *Lecture material*.

Topic 4

THE STRUCTURE OF THE HUMERUS, BONES OF FOREARM AND HAND. SHOULDER JOINT. CONNECTION OF THE FOREARM AND HAND BONES

INTRODUCTION TO THE TOPIC

This topic focuses on the joints of the upper limb, forearm and hand muscles, the topography of the upper limb. This detailed knowledge is required for the practical work of traumatologists and surgeons, as well as doctors dealing with the treatment of osteoarticular tuberculosis.

The hand is constantly in contact with the instrument of production therefore, most often, compared to other parts of the body, is exposed to injury (cuts, bruises, burns, frostbite). These injuries often require surgical interventions. So, the knowledge of this topic allows doctors to properly diagnose and treat such issues.

SELF-STUDY GOALS

After independently studying the topic, the student should know the English and Latin names of all the structures on the humerus, radius, ulna, hand bones; show these formations on preparations; be able to distinguish the left bone from the right; be able to describe the joints of the free upper limb.

TOPIC CONTENT

- Structure of the humerus: head, anatomical and surgical necks, greater and lesser tubercles, crests, intertubercular groove, surfaces of the body: posterior, anterior, lateral, medial; deltoid tuberosity, groove for the radial nerve, condyle: trochlea and capitulum, medial and lateral epicondyles, groove for the ulnar nerve, coronoid, ulnar and radial fossa, difference between the right and the left humerus.
- Ulna: processes, surfaces, borders, processes, notches, head, tuberosity.

- Radius: surfaces, margins, processes, notches, tuberosity, head with articular circumference, neck, carpal articular surface.
- Divisions of the hand: carpus, metacarpus, phalanges of the fingers.
- Proximal row of carpal bones: scaphoid, lunate, triquetrum and pisiform.
- Distal row of carpal bones: trapezium, trapezoid, capitate and hamate (hook on the hamate bone).
- Ossification of the carpal bones.
- Metacarpal bones, their structure (base, body, head).
- Phalanges of the fingers: proximal, middle and distal phalanges (the thumb has two phalanges), tuberosity of the distal phalanx.
- Shoulder joint. It is necessary to study the classification of the joint by shape (spherical), by function (multi-axial), by the number of articulating surfaces (simple). It is formed by the glenoid cavity of the scapula and the head of the humerus. Additional structures: the articular lip (increases the congruence of surfaces); extra-articular synovial protrusions (intertubercular sheath, bursa of the subscapularis muscle). Movements in this joint: frontal — flexion and extension, sagittal — abduction and adduction, vertical — rotation of the limb outward and inward, as well as circumduction. It should be remembered that raising the arm anteriorly and abducting it to the lateral side is possible only to a right angle, since further movement is inhibited by the tension of the articular capsule and coracoacromial ligament. If the movement of the arm continues above horizontal, then the entire limb moves together with the shoulder girdle.
- Elbow joint. It is biaxial by function, compound by the number of articulating surfaces. This joint includes 3 joints (humeroulnar, humeroradial, proximal radioulnar). Each joint needs studying separately.
- Humeroulnar joint: hinge, uniaxial.
- Humeroradial joint: ball-and-socket, multi-axial, but movement is carried out along two axes.
- Proximal radioulnar joint: cylindrical, uniaxial.
- Ligaments of the elbow joint: collateral ulnar, collateral radial, annular ligament of the radius. Movements in this joint: along the frontal axis — flexion and extension, rotation along the vertical axis — pronation, supination.
- Distal radioulnar joint. Its characteristic: cylindrical, uniaxial, combined with proximal one. It is formed by the articular circumference of the head of the ulna and the ulnar notch of the radius. The movements of this joint: rotation.
- Wrist joint. Articular surfaces. Its concave articular surface: carpal articular surface of the radius and the triangular cartilaginous disc; convex articular surface: proximal articular surface of the scaphoid, lunate, triquetral bones. Its classification: ellipsoid by shape, biaxial by function, and compound by the

number of articulating surfaces. Types of the movements: around the frontal axis (flexion, extension) and sagittal axes (adduction and abduction). Circumduction. Ligaments (collateral radial carpal ligament, collateral ulnar carpal ligament, dorsal radiocarpal and palmar radiocarpal ligaments).

- Intercarpal joint. Its characteristic: amphiarthroses. Ligaments: dorsal, palmar and interosseous intercarpal ligaments.

- Carpometacarpal joints. Carpometacarpal joint (I): simple, saddle; bi-axial. The movements at the joints: flexion and extension; abduction and adduction; circumduction of the thumb. Carpometacarpal.

- Joints (II—V): amphiarthroses. The ligaments stabilizing the joints: dorsal and palmar carpometacarpal ligaments.

- Intermetacarpal joints. Amphiarthroses. The ligaments stabilizing the joint: dorsal, palmar and interosseous metacarpal ligaments.

- Metacarpophalangeal joints. Metacarpophalangeal joint (I) — simple, hinge, uni-axial. Metacarpophalangeal joints (II—V) — ellipsoid; biaxial. The ligaments stabilizing the joints: collateral ligaments; deep transverse metacarpal ligament.

- Interphalangeal joints. Their characteristics: by shape (hinge), by functions (uniaxial), by number of articulating surfaces (simple). Movements along the frontal axis (flexion, extension) are considered. Ligaments: collateral.

METHODOLOGICAL RECOMMENDATIONS FOR STUDYING THE MATERIAL

Activity	Step Description
Read the introduction to the topic	—
Study the corresponding section in literature sources and get the corresponding bone preparations	—
Define the functionality of the bone and visualize its location among other bones of the body and limbs	Identify to which part of the skeleton this bone belongs to: the bones of the trunk, limbs; function of support, movement, labor, protection neurovascular bundles
Read the relevant paragraph in the textbook, and identify the bone features on the bone preparation	Demonstrate each bone detail found in the textbook with a pointer

Activity	Step Description
<p>Revise the studied material while showing bone formations on the preparations, slides and tables</p>	<p>While revising the topic, check the following:</p> <ul style="list-style-type: none"> a) English and Latin names of the bone; b) location of the bone in the skeleton; c) type of bone (tubular, spongy, long or short, mixed); d) main parts of the bone; e) anatomical formations of each part: surfaces, processes, ridges, grooves, etc.; f) radiograph of the bone. <p>When revising the synovial joint, check the following:</p> <ul style="list-style-type: none"> a) English and Latin name of the joint; b) articular surfaces; c) additional structures (discs, menisci); d) joint classification: <ul style="list-style-type: none"> • by the number of articular surfaces; • according to the shape of the articular surfaces; • by number of the movement axes; e) possible types of movement, axes along which these movements occur; f) joint ligaments. <p>For contiguous connections: (syndesmosis, synchondrosis, synostosis), its description</p>
<p>Write down new Latin terms</p>	<p>Write down the terms in your notebook (see the list of Practical skills)</p>
<p>Find specific features to determine which side (right or left) of the bone it is</p>	<p>Identify the proximal and distal ends, bony tubercles, tuberosity, and epicondyles. Find out which of them are located medially and laterally</p>
<p>Check your knowledge with self-control questions</p>	<p>Answer the questions given in the assignment</p>

QUESTIONS FOR SELF-CONTROL

1. Describe the humerus. What is the humerus's bone classification? How can you identify the proximal and distal epiphyses of the humerus? How do you determine the anterior, posterior, medial, and lateral sides of the humerus? What characteristics help distinguish the right humerus from the left one? What is the function of the humeral head? What are the differences between the anatomical and surgical necks? Explain the humeral condyle. What is the function of the humeral trochlea and capitulum? Why are the fossae of the humerus formed (radial, coronoid, olecranon)? Which nerves run along the humerus, and where are they located? What structures are attached to the humeral tubercles and tuberosity, to the humeral body, and to the epicondyles?

2. Describe the shoulder joint based on joint classifications. What parts of the scapula and humerus form the joint? What accessory structures are associated with it? Which ligaments support it, and how are they attached? Explain the movements that occur at the joint. Why are dislocations so common at the shoulder joint?

3. Which bones form the forearm? How are they arranged in the forearm?

4. Describe the radius. What type is the radius according to bone classification? How can you differentiate the right radius from the left one? How do you locate the proximal and distal epiphyses of the radius? How do you determine the anterior, posterior, medial, and lateral sides of the radius? Where is the radial head, and what is its function? How many borders and surfaces does the radial body have? What is the specific function of the interosseous border? What are the functions of the carpal articular surface, articular circumference, and ulnar notch? Which structures are attached to the radial tuberosity and styloid process?

5. Describe the ulna. What is the ulna's bone classification type? How can you differentiate the right ulna from the left one? How do you locate the proximal and distal epiphyses of the ulna? How do you determine the anterior, posterior, medial, and lateral sides of the ulna? Where is the ulnar head, and what is its function? How many borders and surfaces does the ulnar body have? What is the specific function of the interosseous border? What is the function of the trochlear notch, articular circumference, and radial notch? Which structures are attached to the ulnar tuberosity, supinator crest, and styloid process?

6. What parts make up the hand? Show the palmar and dorsal surfaces of the hand, including the lateral and medial sides. Identify the first, second, and remaining fingers. List the carpal bones (both proximal and distal rows) in sequence. Describe the carpal bones according to bone classification.

7. What divisions do you know in the metacarpal bone? Describe the metacarpal bones according to bone classification.

8. How many phalanges are there in each finger? Describe the phalangeal bones according to bone classification. What components make up each phalanx?

9. Which parts of the humerus, ulna and radius form the elbow joint? Describe this joint according to joint classifications. Why is this joint considered compound? What are the three joints included in it? What movements are possible at each of these three joints? What movements are possible at the elbow joint? Why are the movements at the elbow joint not equal to the sum of the movements at those three joints? Which ligaments reinforce the elbow joint? Describe their attachments.

10. How are proximal, middle, distal parts of radius and ulna connected? What parts of the radius and ulna form the radioulnar synovial joints? Describe these joints according to joint classifications. Why are they combined with each other? To which joint is the proximal radioulnar joint also linked? What movements are possible at these joints? Describe the interosseous membrane (shape, attachment). Which type of joints does it belong to?

11. Which parts of the forearm bones and carpal bones form the wrist joint? Describe the joint according to joint classifications. What is the structural feature of the wrist joint? Which joint is it combined with? What movements occur at the wrist joint? Which ligaments reinforce the wrist joint? Describe their attachments.

12. List in sequence all the synovial joints connecting the hand bones, starting from the joints between the carpal bones.

13. Classify the midcarpal joint. What bones form the joint? Which other joints is it associated with? What movements occur at this joint? Why is it considered an amphiarthrosis? Which ligaments reinforce the joint? Describe their attachments.

14. Between which bones do the intercarpal joints form? How many of these joints exist? What movements are possible at these joints? Why are they categorized as amphiarthroses? Which ligaments reinforce these joints? Describe their attachments.

15. Describe the carpometacarpal joints according to joint classification. How many of these joints exist? Which carpal bones articulate with the bases of which metacarpal bones in each carpometacarpal joint? What are the functional distinctions between the carpometacarpal joints? Detail the movements at the carpometacarpal joints (with a specific focus on the I carpometacarpal joint). Which ligaments strengthen these joints? Describe their attachments.

16. Which portions of the metacarpal bones articulate to create the intermetacarpal joints? How many of these joints are present? What movements occur at these joints? Why are they considered amphiarthroses? Which ligaments reinforce these joints? Describe their attachments.

17. Detail the metacarpophalangeal joints according to joint classification. How many of these joints exist? Which parts of the metacarpal bones and phalanges articulate to create the metacarpophalangeal joints? Elaborate on the movements taking place at these joints. Explain which ligaments strengthen these joints and describe their attachments.

18. Elaborate on the interphalangeal joints according to joint classification. How many of these joints are present on each finger? Describe the parts of the phalanges that form the interphalangeal joints. Specify the movements that occur at these joints. Discuss the ligaments that reinforce these joints and provide details about their attachments.

PRACTICAL SKILLS

Humerus

1. Body (shaft), *corpus humeri*; тело плечевой кости.
2. Proximal epiphysis, *epiphysis proximalis*; проксимальный эпифиз.
3. Distal epiphysis, *epiphysis distalis*; дистальный эпифиз.
4. Head of humerus, *caput humeri*; головка плечевой кости.
5. Anatomical neck, *collum anatomicum*; анатомическая шейка.
6. Surgical neck, *collum chirurgicum*; хирургическая шейка.
7. Lesser tubercle, *tuberculum minus*; малый бугорок.
8. Greater tubercle, *tuberculum majus*; большой бугорок.
9. Crest of greater tubercle, *crista tuberculi majoris*; гребень большого бугорка.
10. Crest of lesser tubercles, *crista tuberculi minoris*; гребень малого бугорка.
11. Bicipital groove, *sulcus intertubercularis*; межбугорковая борозда.
12. Anteromedial surface, *facies anteromedialis*; переднемедиальная поверхность.
13. Posterior surface of body, *facies posterior*; задняя поверхность тела.
14. Anterolateral surface, *facies anterolateralis*; переднелатеральная поверхность.
15. Deltoid tuberosity, *tuberositas deltoidea*; дельтовидная бугристость.
16. Groove for radial nerve (spiral groove), *sulcus nervi radialis (sulcus spiralis)*; борозда лучевого нерва (спиральная борозда).
17. Condyle of humerus, *condylus humeri*; мыщелок плечевой кости.
18. Trochlea of humerus, *trochlea humeri*; блок плечевой кости.
19. Capitulum of humerus, *capitulum humeri*; головочка плечевой кости.
20. Olecranon fossa, *fossa olecrani*; локтевая ямка.

21. Coronoid fossa, *fossa coronoidea*; венечная ямка.
22. Radial fossa, *fossa radialis*; лучевая ямка.
23. Medial epicondyle, *epicondylus medialis*; медиальный надмыщелок.
24. Lateral epicondyle, *epicondylus lateralis*; латеральный надмыщелок.
25. Groove for ulnar nerve, *sulcus nervi ulnaris*; борозда локтевого нерва.

Forearm bones

1. Ulnar, *ulna*; локтевая кость.
2. Radius, *radius*; лучевая кость.
3. Interosseous space, *spatium interosseum antebrachii*; межкостное пространство.
4. Posterior surfaces of radius and ulna, *facies posterior*; задняя поверхность (лучевой и локтевой кости).
5. Anterior surfaces of radius and ulna, *facies anterior*; передняя поверхность (лучевой и локтевой кости).
6. Lateral surface of radius, *facies lateralis*; латеральная поверхность.
7. Medial surface of ulna, *facies medialis*; медиальная поверхность.
8. Interosseous borders of radius and ulna, *margo interosseus*; межкостный край (лучевой и локтевой кости).
9. Anterior borders of radius and ulna, *margo anterior*; передний край (лучевой и локтевой кости).
10. Posterior borders of radius and ulna, *margo posterior*; задний край (лучевой и локтевой кости).

Radius

1. Head of radius, *caput radii*; головка лучевой кости.
2. Articular facet, *fovea articularis*; суставная ямка.
3. Articular circumference, *circumferentia articularis*; суставная окружность.
4. Neck of the radius, *collum radii*; шейка лучевой кости.
5. Radial tuberosity, *tuberositas radii*; бугристость лучевой кости.
6. Ulnar notch, *incisura ulnaris*; локтевая вырезка.
7. Radial styloid process, *processus styloideus radii*; шиловидный отросток лучевой кости.
8. Carpal articular surface, *facies articularis carpalis*; запястная суставная поверхность.

Ulna

1. Trochlear notch, *incisura trochlearis*; блоковая вырезка.
2. Coronoid process, *processus coronoideus*; венечный отросток.

3. Olecranon, *olecranon*; локтевой отросток.
4. Radial notch, *incisura radialis*; лучевая вырезка.
5. Supinator crest, *crista m. supinatoris*; гребень мышцы супинатора.
6. Tuberosity of ulna, *tuberositas ulnae*; локтевая бугристость.
7. Head of ulna, *caput ulnae*; головка локтевой кости.
8. Articular circumference, *circumferentia articularis*; суставная окружность.
9. Ulnar styloid process, *processus styloideus ulnae*; шиловидный отросток локтевой кости.

Bones of the hand

1. Palmar surface of the hand, *facies palmaris*; ладонная поверхность кисти.
2. Dorsal surface of hand, *facies dorsalis*; тыльная поверхность кисти.
3. Lateral (or radial) side of the hand, *facies lateralis*; латеральная поверхность кисти.
4. Medial (or ulnar) side of the hand, *facies medialis*; медиальная поверхность кисти.
5. Carpal bones, *ossa carpi*; кости запястья.
6. Metacarpal bones (from i to v), *ossa metacarpi*; пястные кости.
7. Phalanges, *phalanges digitorum manus*; фаланги пальцев.
8. Scaphoid, *os scaphoideum*; ладьевидная кость.
9. Lunate, *os lunatum*; полулунная кость.
10. Triquetrum, *os triquetrum*; трехгранная кость.
11. Pisiform, *os pisiforme*; гороховидная кость.
12. Trapezium, *os trapezium*; кость-трапеция.
13. Trapezoid, *os trapezoideum*; трапецевидная кость.
14. Capitate, *os capitatum*; головчатая кость.
15. Hamate, *os hamatum*; крючковидная кость.
16. Carpal groove, *sulcus carpi*; запястная борозда.
17. Base of metacarpal bone, *basis ossis metacarpi*; основание пястной кости.
18. Body of metacarpal bone, *corpus ossis metacarpi*; тело пястной кости.
19. Head of metacarpal bone, *caput ossis metacarpi*; головка пястной кости.
20. Thumb, *pollex (digitus primus)*; большой палец.
21. Index finger, *index (secundus)*; указательный палец.
22. Middle finger, *digitus medius (tertius)*; средний палец.

23. Ring finger, *digitus anonus (quartus)*; безымянный палец.
24. Little finger, *digitus minimus (quintus)*; мизинец.
25. Proximal phalanx, *phalanx proximalis*; проксимальная фаланга.
26. Middle phalanx, *phalanx media*; средняя фаланга.
27. Distal phalanx, *phalanx distalis*; дистальная фаланга.

Joints

1. Humeral (shoulder) joint, *articulatio humeri*; плечевой сустав.
2. Coracohumeral ligament, *ligamentum coracohumerale*; клювовидно-плечевая связка.
3. Glenohumeral ligaments, *ligamenta glenohumeralia*; плечелопаточная связка.
4. Cubital (elbow) joint, *articulatio cubiti*; локтевой сустав.
5. Humeroulnar joint, *articulatio humeroulnaris*; плечелоктевой сустав.
6. Humeroradial joint, *articulatio humeroradialis*; плечелучевой сустав.
7. Proximal radioulnar joint, *articulatio radioulnaris proximalis*; проксимальный лучелоктевой сустав.
8. Annular ligament of radius, *ligamentum anulare radii*; кольцевидная связка лучевой кости.
9. Ulnar collateral ligament, *ligamentum collaterale ulnare*; локтевая коллатеральная связка.
10. Radial collateral ligament, *ligamentum collaterale radiale*; лучевая коллатеральная связка.
11. Interosseous membrane of forearm, *membrana interossea antebrachii*; межкостная мембрана предплечья.
12. Distal radioulnar joint, *articulatio radioulnaris distalis*; дистальный лучелоктевой сустав.
13. Palmar radioulnar ligaments, *ligamentum radioulnare palmare*; ладонные лучелоктевые связки.
14. Dorsal radioulnar ligaments, *ligamentum radioulnare dorsale*; дорсальные лучелоктевые связки.
15. Radiocarpal (wrist) joint, *articulatio radiocarpalis*; лучезапястный сустав.
16. Radial collateral carpal ligament, *ligamentum collaterale carpi radiale*; лучевая коллатеральная связка запястья.
17. Ulnar collateral carpal ligament, *ligamentum collaterale carpi ulnare*; локтевая коллатеральная связка запястья.
18. Palmar radiocarpal ligament, *ligamentum radiocarpale palmare*; ладонная лучезапястная связка.

19. Dorsal radiocarpal ligament, *ligamentum radiocarpale dorsale*; тыльная лучезапястная связка.
20. Midcarpal joint, *articulatio mediocarpalis*; среднезапястный сустав.
21. Dorsal intercarpal ligaments, *ligamenta intercarpalia dorsalia*; тыльные межзапястные связки.
22. Radiate carpal ligament, *ligamentum carpi radiatum*; лучистая связка запястья.
23. Palmar intercarpal ligaments, *ligamenta intercarpalia palmaria*; ладонные межзапястные связки.
24. Pisohamate ligament, *ligamentum pisohamatum*; гороховидно-крючковидная связка.
25. Pisometacarpal ligament, *ligamentum pisometacarpale*; гороховидно-пястная связка.
26. Carpometacarpal joints, *articulationes carpometacarpales*; запястно-пястные суставы.
27. Dorsal carpometacarpal ligaments, *ligamenta carpometacarpalia dorsalia*; тыльные запястно-пястные суставы.
28. Palmar carpometacarpal ligaments, *ligamenta carpometacarpalia palmaria*; ладонные запястно-пястные связки.
29. Intermetacarpal joints, *articulationes intermetacarpales*; межпястные суставы.
30. Dorsal metacarpal ligaments, *ligamenta metacarpalia dorsalia*; тыльные пястные связки.
31. Palmar metacarpal ligaments, *ligamenta metacarpalia palmaria*; ладонные пястные связки.
32. Metacarpophalangeal joints, *articulationes metacarpophalangeae*; пястно-фаланговые суставы.
33. Collateral ligaments, *ligamenta collateralia*; коллатеральные связки.
34. Deep transverse metacarpal ligament, *ligamentum metacarpale transversum profundum*; глубокая поперечная пястная связка.

X-ray Skills

Humerus

1. Body (shaft), *corpus humeri*; тело плечевой кости.
2. Proximal epiphysis, *epiphysis proximalis*; проксимальный эпифиз.
3. Distal epiphysis, *epiphysis distalis*; дистальный эпифиз.
4. Head of humerus, *caput humeri*; головка плечевой кости.
5. Anatomical neck, *collum anatomicum*; анатомическая шейка.

6. Lesser tubercle, *tuberculum minus*; малый бугорок.
7. Greater tubercle, *tuberculum majus*; большой бугорок.
8. Surgical neck, *collum chirurgicum*; хирургическая шейка.
9. Condyle of humerus, *condylus humeri*; мыщелок плечевой кости.
10. Trochlea of humerus, *trochlea humeri*; блок плечевой кости.
11. Capitulum of humerus, *capitulum humeri*; головочка плечевой кости.
12. Olecranon fossa, *fossa olecrani*; локтевая ямка.
13. Medial epicondyle, *epicondylus medialis*; медиальный мыщелок.
14. Lateral epicondyle, *epicondylus lateralis*; латеральный мыщелок.

Bones of the forearm

1. Ulnar, *ulna*; локтевая кость.
2. Radius, *radius*; лучевая кость.
3. Interosseous space, *spatium interosseum antebrachii*; межкостное пространство.

Ulna

1. Trochlear notch, *incisura trochlearis*; блоковая вырезка.
2. Coronoid process, *processus coronoideus*; венечный отросток.
3. Olecranon, *olecranon*; локтевой остеросток.
4. Tuberosity of ulna, *tuberositas ulnae*; бугристость локтевой кости.
5. Head of ulna, *caput ulnae*; головка локтевой кости.
6. Ulnar styloid process, *processus styloideus ulnae*; шиловидный отросток локтевой кости.

Radius

1. Head of radius, *caput radii*; головка лучевой кости.
2. Neck of the radius, *collum radii*; шейка лучевой кости.
3. Radial tuberosity, *tuberositas radii*; бугристость лучевой кости.
4. Radial styloid process, *processus styloideus radii*; шиловидный отросток лучевой кости.

Bones of the hand

1. Carpal bones, *ossa carpi*; кости запястья.
2. Metacarpal bones (from i to v), *ossa metacarpi*; пястные кости.
3. Phalanges, *phalanges digitorum manus*; фаланги пальцев.

4. Scaphoid, *os scaphoideum*; ладьевидная кость.
5. Lunate, *os lunatum*; полулунная кость.
6. Triquetrum, *os triquetrum*; трехгранная кость.
7. Pisiform, *os pisiforme*; гороховидная кость.
8. Trapezium, *os trapezium*; кость-трапеция.
9. Trapezoid, *os trapezoideum*; трапецевидная кость.
10. Capitate, *os capitatum*; головчатая кость.
11. Hamate, *os hamatum*; крючковидная кость.
12. Base of metacarpal bone, *basis ossis metacarpi*; основание пястной кости.
13. Body of metacarpal bone, *corpus ossis metacarpi*; тело пястной кости.
14. Head of metacarpal bone, *caput ossis metacarpi*; головка пястной кости.
15. Thumb, *pollex (digitus primus, digitus secundus)*; большой палец.
16. Proximal phalanx, *phalanx proximalis*; проксимальные фаланги.
17. Middle phalanx, *phalanx media*; медиальные фаланги.
18. Distal phalanx, *phalanx distalis*; дистальные фаланги.

Joints

1. Cubital (elbow) joint, *articulatio cubiti*; локтевой сустав.
2. Humeroulnar joint, *articulatio humeroulnaris*; плечелоктевой сустав.
3. Humeroradial joint, *articulatio humeroradialis*; плечелучевой сустав.
4. Proximal radioulnar joint, *articulatio radioulnaris proximalis*; проксимальный лучелоктевой сустав.
5. Radiocarpal (wrist) joint, *articulatio radiocarpalis*; лучезапястный сустав.
6. Midcarpal joint, *articulatio mediocarpalis*; среднезапястный сустав.
7. Carpometacarpal joints, *articulationes carpometacarpales*; запястно-пястные суставы.
8. Intermetacarpal joints, *articulationes intermetacarpales*; межпястные суставы.
9. Metacarpophalangeal joints, *articulationes metacarpophalangeae*; пястно-фаланговые суставы.
10. Interphalangeal joints, *articulationes interphalangeae*; межфаланговые суставы.

Literature

1. *Human anatomy* : 2 vol. / M. Prives, N. Lysenkov, V. Bushkovich. — 3^d ed. — Moscow : Mir Publishers, 1989. — Vol. 1 : The weight-bearing and locomotor system. The science of the viscera. The science of the organs of internal secretion. — 3^d ed. — 608 p. ill. (P. 213—238).

2. *Textbook of Human Anatomy*. In 3 vol. Vol. 1. Locomotor apparatus / L. L. Kolesnikov, D. B. Nikitiuk, S. V. Klochkova, I. G. Stelnikova. — Moscow : GEOTAR-Media, 2020. — 288 p.

3. *Sapin, M. R.* Textbook of human anatomy. Vol. 1 : for medical students / M. R. Sapin, L. L. Kolesnikov, D. B. Nikitjuk. — 2nd ed. — Moscow : New Wave Publishing Agency, 2010. — 416 p.

4. *Sinelnikov, R. D.* Atlas of human anatomy / R. D. Sinelnikov. — Moscow : Medicine. — 1996. Vol. 1. — 463 p.

5. *Atlas of Human Anatomy* / Frank H. Netter. — 6th ed. — Philadelphia : Elsevier, 2014. — 531 p.: ill.

6. *Lecture material*.

Topic 5

THE STRUCTURE OF THE PELVIS AND FEMUR. THE CONNECTIONS OF THE PELVIS AND FEMUR. THE PELVIS AS A WHOLE. DIFFERENCES BETWEEN THE MALE AND FEMALE PELVIS. DIMENSIONS OF THE FEMALE PELVIS

INTRODUCTION TO THE TOPIC

The knowledge of the structure of the pelvic girdle and femur is essential for the study of subsequent anatomy topics and for clinical practice. The pelvic bones serve as attachment points for numerous muscles that act on the hip and knee joints. Understanding the structure of the femur is crucial for comprehending the dynamics of the hip and knee joints.

Comprehensive knowledge of the pelvis as a whole is particularly important in obstetrics. The pelvic cavity houses the organs of the urogenital system and serves as the birth canal. Without an understanding of the normal pelvis size, predicting delivery would be impossible.

SELF-STUDY GOALS

Having studied the topic, the student should be able to: identify the key structural components of the pelvic and femur bones; recognize age and gender-related characteristics of the pelvis, along with its primary dimensions; demonstrate the structural details of these bones on anatomical preparations; identify the individual joints of the lower limb, understand how they are formed, and classify them by shape and the number of axes of movement; understand the ligaments that reinforce these joints and their associated movements; interpret radiographs of skeletal bones and their joints.

TOPIC CONTENT

- Structure of the ilium: wing, body, crest, anterior and posterior spines, tuberosities; pubic bone: body, branches; ischium: body, spine, tuber, notches.

- Gender characteristics of the pelvis, dimensions of the greater and lesser female pelvis (true conjugate, anatomical conjugate; external dimensions: distance between anterior superior iliac spines, iliac crests, greater trochanters).
- Structure of the femur: ends, body, head, neck, trochanters, lines, tuberosity of the gluteal muscle.
- Sacroiliac joint: articular surfaces (ear-shaped surfaces of the sacrum and ilium); classification (amphiarthrosis); ligaments.
- Pubic symphysis: type of joint (half-joint), joint ligaments (upper, lower).
- Pelvic ligaments (sacrospinous, sacrotuberous).
- Hip joint: articular surfaces (femoral head, articular surface of the acetabulum); intra-articular ligaments (ligament of the femoral head, transverse acetabular ligament), extra-articular (iliofemoral, ischiofemoral and pubofemoral ligaments, zona orbicularis); joint classification (simple, cotyloid, multiaxial); movements of the joint.

METHODOLOGICAL RECOMMENDATIONS FOR STUDYING THE MATERIAL

Activity	Step description
Read the introduction to the topic	—
Study the corresponding section in literature sources and get the corresponding bone preparations	—
Define the functionality of the bone and visualize its location among other bones of the body and limbs	Identify which part of the skeleton this bone belongs to: the bones of the trunk, limbs; function of support, movement, labor, protection neurovascular bundles
Read the relevant paragraph in the textbook, and identify the bone features on the bone preparation	Demonstrate each bone detail found in the textbook with a pointer
Revise the studied material while showing bone parts on the preparation, slides and tables	While revising the topic, check the following: a) English and Latin names of the bone; b) location of the bone in the skeleton; c) type of bone (tubular, spongy, long or short, mixed); d) main parts of the bone; e) anatomical formations of each part: surfaces, spines, crests, tubers, grooves, etc.; f) radiograph of the bone.

The end of Table

Activity	Step description
	<p>When revising the synovial joint, check the following:</p> <p>a) English and Latin name of the joint</p> <p>b) articular surfaces;</p> <p>c) additional structures (discs, menisci);</p> <p>d) classification:</p> <ul style="list-style-type: none"> • by the number of articular surfaces; • according to the shape of the articular surfaces; • by number of the movement axes; <p>e) possible types of movement, axes along which these movements occur;</p> <p>f) joint ligaments.</p> <p>For contiguous connections: (syndesmosis, synchondrosis, synostosis), its description</p>
Write down new Latin terms	Write down the terms in your notebook (see the list of Practical skills)
Find the specific features to determine which side (right or left) of the bone it is	Identify the proximal and distal ends, bony tubercles, tuberosity, epicondyles. Find out which of them are located medially and or laterally
Determine the details of the bone that can be felt on a live person. Find them on your body	Palpate the bone protrusions lying superficially under the skin
Check your knowledge with self-control questions	Answer the questions given in the assignment

QUESTIONS FOR SELF-CONTROL

1. Describe the hip bone. What type is the hip bone according to the bone classification?
2. How to differentiate the right pelvic bone from the left one?
3. How to identify the internal and external surfaces of the pelvic bone?
4. What are 3 distinctive parts of the pelvic bone? Where do the bodies of all three bones comprising the hip bone fuse together?

5. Give the characteristic of the ilium. What divisions does it include?
6. Enumerate all the iliac spines.
7. What is the function of the auricular surface?
8. What is the function of the iliac crest?
9. Describe the structures of the ischium. What components does it include? To which ligaments are the ischial spine and ischial tuberosity attached?
10. Describe the pubis. What components does it include? Which ligament is the pubic tubercle attached to? What is the function of the obturator groove? What is the purpose of the symphyseal surface?
11. Describe the acetabulum. What is its function? What parts does it consist of? What is the function of the lunate surface and acetabular fossa? What ligament bridges over the acetabular notch?
12. Which membrane closes the obturator foramen? How is the obturator canal formed? What is its function?
13. What bones form the pelvis? What is the greater (lesser) pelvis? What is the border between them? What structures form the terminal line? What organs lie in the greater pelvis and in the lesser pelvis in males and in females? Describe the structure of the pelvic inlet and outlet. What name does the musculature closing the pelvic outlet have? Describe the main pelvic conjugate: the points, between which they are measured, and their average length. Why are the sizes of the pelvis important for women?
14. What types of articulations are in the pelvis? What bones are connected by the synovial joints? Describe the sacroiliac joints according to the joint classifications. What ligaments reinforce them? Describe the attachment of the ligaments. Where is the amphiarthrosis in the pelvis?
15. Describe the pubic symphysis. How is it formed? What is its function? What ligaments reinforce it?
16. Name the proper syndesmoses of the pelvis and their attachment.
17. What is the function of the sacrospinous and sacrotuberous ligaments?
18. How are the sacrospinous and sacrotuberous foramina formed? What is their function?
19. Describe the femur. What type of bone is it? How to differentiate the right femur from the left one? How to differentiate the proximal and distal epiphyses of the femur? How will you find the anterior and posterior, medial and lateral sides of the femur? What is the function of the femoral head? What is the function of the greater and lesser trochanters? What ligament is attached to the fovea of the femoral head? How many borders and surfaces are there in the femoral body? What is the function of the linea aspera? What ligaments are attached to the femoral epicondyles? What is the function of the femoral condyles? Why are the surfaces of the femoral distal epiphysis called popliteal and patellar?

20. Describe the hip joint according to joint classifications. Which parts of the femur and the pelvic bone form this joint? What accessory structures are associated with it? What movements are possible at this joint? Which ligaments reinforce the joint? Describe their attachments.

PRACTICAL SKILLS

Pelvic bone

1. Ilium, *os ilium*; подвздошная кость.
2. Ischium, *os ischii*; седалищная кость.
3. Pubis, *os pubis*; лобковая кость.
4. Acetabulum, *acetabulum*; вертлужная впадина.
5. Body of ilium, *corpus ossis ilii*; тело подвздошной кости.
6. Wing of ilium, *ala ossis ilii*; крыло подвздошной кости.
7. Arcuate line, *linea arcuata*; дугообразная линия.
8. Iliac crest, *crista iliaca*; подвздошный гребень.
9. Anterior superior iliac spine, *spina iliaca anterior superior*; передняя верхняя подвздошная ость.
10. Posterior superior iliac spine, *spina iliaca posterior superior*; задняя верхняя подвздошная ость.
11. Anterior inferior iliac spine, *spina iliaca anterior inferior*; передняя нижняя подвздошная ость.
12. Posterior inferior iliac spine, *spina iliaca posterior inferior*; задняя нижняя подвздошная ость.
13. Iliac fossa, *fossa iliaca*; подвздошная ямка.
14. Auricular surface, *facies auricularis*; ушковидная поверхность.
15. Iliac tuberosity, *tuberositas iliaca*; подвздошная бугристость.
16. Body of ischium, *corpus ossis ischii*; тело седалищной кости.
17. Ramus of ischium, *ramus ossis ischii*; ветвь седалищной кости.
18. Obturator foramen, *foramen obturatum*; запирающее отверстие.
19. Ischial tuberosity, *tuber ischiadicum*; седалищный бугор.
20. Ischial spine, *spina ischiadica*; седалищная ость.
21. Greater sciatic notch, *incisura ischiadica major*; большая седалищная вырезка.
22. Lesser sciatic notch, *incisura ischiadica minor*; малая седалищная вырезка.
23. Body of pubis, *corpus ossis pubis*; тело лобковой кости.
24. Superior pubic ramus, *ramus superior ossis pubis*; верхняя ветвь лобковой кости.
25. Inferior pubic ramus, *ramus inferior ossis pubis*; нижняя ветвь лобковой кости.

26. Symphyseal surface, *facies symphysealis*; симфизальная поверхность.
27. Iliopubic eminence, *eminentia iliopubica*; подвздошно-лобковое возвышение.
28. Pubic crest, *pecten ossis pubis*; лобковый гребень.
29. Pubic tubercle, *tuberculum pubicum*; лобковый бугорок.
30. Obturator groove, *sulcus obturatorius*; запирающая борозда.

Femur

1. Body of femur, *corpus femoris*; тело бедренной кости.
2. Head of femur, *caput femoris*; головка бедренной кости.
3. Neck of femur, *collum femoris*; шейка бедренной кости.
4. Fovea for ligament of head, *fovea capitis ossis femoris*; ямка головки бедра.
5. Greater trochanter, *trochanter major*; большой вертел.
6. Lesser trochanter, *trochanter minor*; малый вертел.
7. Trochanteric fossa, *fossa trochanterica*; вертельная ямка.
8. Intertrochanteric line, *linea intertrochanterica*; межвертельная линия.
9. Intertrochanteric crest, *crista intertrochanterica*; межвертельный гребень.
10. Linea aspera, *linea aspera*; шероховатая линия.
11. Lateral and medial lips, *labium laterale et labium mediale*; латеральная и медиальная губы.
12. Pectineal line, *linea pectinea*; гребенчатая линия.
13. Gluteal tuberosity, *tuberositas glutea*; ягодичная бугристость.
14. Popliteal surface, *facies poplitea*; подколенная поверхность.
15. Lateral condyle, *condylus lateralis*; латеральный мыщелок.
16. Medial condyle, *condylus medialis*; медиальный мыщелок.
17. Intercondylar fossa, *fossa intercondylaris*; межмыщелковая ямка.
18. Patellar surface, *facies patellaris*; надколенниковая поверхность.
19. Lateral epicondyle, *epicondylus lateralis*; латеральный надмыщелок.
20. Medial epicondyle, *epicondylus medialis*; медиальный надмыщелок.

Joints, pelvis as a whole

1. Sacroiliac joint, *articulatio sacroiliaca*; крестцово-подвздошный сустав.
2. Anterior sacroiliac ligament, *ligamentum sacroiliacum anterius*; передняя крестцово-подвздошная связка.
3. Posterior sacroiliac ligament, *ligamentum sacroiliacum posterius*; задняя крестцово-подвздошная связка.
4. Iliolumbar ligament, *ligamentum iliolumbale*; подвздошно-поясничная связка.

5. Pubic symphysis, *symphysis pubica*; лобковый симфиз.
6. Superior pubic ligament, *ligamentum pubicum superius*; верхняя лобковая связка.
7. Inferior pubic ligament, *ligamentum pubicum inferius*; нижняя лобковая связка.
8. Sacrotuberous ligament, *ligamentum sacrotuberale*; крестцово-бугорная связка.
9. Sacrospinous ligament, *ligamentum sacrospinale*; крестцово-остистая связка.
10. Obturator membrane, *membrana obturatoria*; запирающая мембрана.
11. Obturator canal, *canalis obturatorius*; запирающий канал.
12. Greater pelvis, *pelvis major*; большой таз.
13. Lesser pelvis, *pelvis minor*; малый таз.
14. Terminal line, *linea terminalis*; пограничная линия.
15. Pelvic inlet, or superior aperture, *apertura pelvis superior*; вход в таз или верхнее тазовое отверстие.
16. Pelvic outlet, or inferior aperture, *apertura pelvis inferior*; выход из таза или нижнее тазовое отверстие.
17. Greater sciatic foramen, *foramen ischiadicum majus*; большое седалищное отверстие.
18. Lesser sciatic foramen, *foramen ischiadicum minus*; малое седалищное отверстие.
19. Anatomical conjugate, *conjugata anatomica*; анатомическая конъюгата.
20. True, or gynecological conjugate, *conjugata vera seu gynecologica*; истинная или гинекологическая конъюгата.
21. Diagonal conjugate, *conjugata diagonalis*; диагональная конъюгата.
22. Interspinous distance, *distantia interspinosa*; межостный размер.
23. Intercristal distance, *distantia intercrystalis*; межгребневый размер.
24. Intertrochanteric distance, *distantia intertrochanterica*; межвертельный размер.
25. Coxal (hip) joint, *articulatio coxae (coxofemoralis)*; тазобедренный сустав.
26. Acetabular labrum, *labrum acetabuli*; вертлужная губа.
27. Transverse acetabular ligament, *ligamentum transversum acetabuli*; поперечная связка вертлужной впадины.
28. Ligament of femoral head, *ligamentum capitis femoris*; связка головки бедра.
29. Iliofemoral ligament, *ligamentum iliofemorale (bertini)*; подвздошно-бедренная связка.
30. Pubofemoral ligament, *ligamentum pubofemorale*; лобково-бедренная связка.

31. Ischiofemoral ligament, *ligamentum ischiofemorale*; седалищно-бедренная связка.

32. Zona orbicularis, *zona orbicularis*; круговая зона.

X-ray skills

Pelvic bone

1. Ilium, *os ilium*; подвздошная кость.
2. Ischium, *os ischii*; седалищная кость.
3. Pubis, *os pubis*; лобковая кость.
4. Acetabulum, *acetabulum*; вертлужная впадина.
5. Wing of ilium, *ala ossis ilii*; крыло подвздошной кости.
6. Arcuate line, *linea arcuata*; дугообразная линия.
7. Iliac crest, *crista iliaca*; подвздошный гребень.
8. Anterior superior iliac spine, *spina iliaca anterior superior*; передняя верхняя ость подвздошной кости.
9. Anterior inferior iliac spine, *spina iliaca anterior inferior*; передняя нижняя ость подвздошной кости.
10. Iliac fossa, *fossa iliaca*; подвздошная ямка.
11. Superior pubic ramus, *ramus superior ossis pubis*; верхняя ветвь лобковой кости.
12. Inferior pubic ramus, *ramus inferior ossis pubis*; нижняя ветвь лобковой кости.
13. Iliopubic eminence, *eminentia iliopubica*; подвздошно-лобковое возвышение.
14. Pubic tubercle, *tuberculum pubicum*; лобковый бугорок.
15. Obturator groove, *sulcus obturatorius*; запирающая борозда.
16. Ramus of ischium, *ramus ossis ischii*; ветвь седалищной кости.
17. Obturator foramen, *foramen obturatum*; запирающее отверстие.
18. Ischial tuberosity, *tuber ischiadicum*; седалищный бугор.
19. Ischial spine, *spina ischiadica*; седалищная ость.
20. Greater sciatic notch, *incisura ischiadica major*; большая седалищная вырезка.
21. Lesser sciatic notch, *incisura ischiadica minor*; малая седалищная вырезка.

Femur

1. Body of femur, *corpus femoris*; тело бедренной кости.
2. Head of femur, *caput femoris*; головка бедренной кости.
3. Neck of femur, *collum femoris*; шейка бедренной кости.

4. Greater trochanter, *trochanter major*; большой вертел.
5. Lesser trochanter, *trochanter minor*; малый вертел.
6. Intertrochanteric line, *linea intertrochanterica*; межвертельная линия.
7. Intertrochanteric crest, *crista intertrochanterica*, межвертельный гребень.
8. Lateral condyle, *condylus lateralis*; латеральный мыщелок.
9. Medial condyle, *condylus medialis*; медиальный мыщелок.
10. Lateral epicondyle, *epicondylus lateralis*; латеральный надмыщелок.
11. Medial epicondyle, *epicondylus medialis*, медиальный надмыщелок.

Joints

1. Sacroiliac joint, *articulatio sacroiliaca*; крестцово-подвздошный сустав.
2. Greater pelvis, *pelvis major*; большой таз.
3. Lesser pelvis, *pelvis minor*; малый таз.
4. Terminal line, *linea terminalis*; пограничная линия.
5. Pelvic inlet (superior pelvic aperture), *apertura pelvis superior*; вход в таз или верхнее тазовое отверстие.
6. Pelvic outlet (inferior pelvic aperture), *apertura pelvis inferior*; выход из таза или нижнее тазовое отверстие.
7. Coxal (hip) joint, *articulatio coxae (coxofemoralis)*; тазобедренный сустав.

Literature

1. *Human anatomy* : 2 vol. / M. Prives, N. Lysenkov, V. Bushkovich. — 3^d ed. — Moscow : Mir Publishers, 1989. — Vol. 1 : The weight-bearing and locomotor system. The science of the viscera. The science of the organs of internal secretion. — 3^d ed. — 608 p. ill. (P. 238—247).
2. *Textbook of Human Anatomy*. In 3 vol. Vol. 1. Locomotor apparatus / L. L. Kolesnikov, D. B. Nikitiuk, S. V. Klochkova, I. G. Stelnikova. — Moscow : GEOTAR-Media, 2020. — 288 p.
3. *Sapin, M. R.* Textbook of human anatomy. Vol. 1 : for medical students / M. R. Sapin, L. L. Kolesnikov, D. B. Nikitjuk. — 2nd ed. — Moscow : New Wave Publishing Agency, 2010. — 416 p.
4. *Sinelnikov, R. D.* Atlas of human anatomy / R. D. Sinelnikov. — Moscow : Medicine. — 1996. Vol. 1. — 463 p.
5. *Atlas of Human Anatomy* / Frank H. Netter. — 6th ed. — Philadelphia : Elsevier, 2014. — 531 p.: ill.
6. *Lecture material*.

Topic 6

STRUCTURE OF THE LEG AND FOOT BONES. THE CONNECTION BETWEEN THE LEG AND FOOT BONES

INTRODUCTION TO THE TOPIC

Knowledge of this topic material helps diagnose injuries and diseases of the leg and foot bones.

Diseases of the joints in the lower limb often occur in clinical practice, both as independent conditions and as complications. To treat these joint-related diseases, a physician requires knowledge of the anatomy and function of this part of the musculoskeletal system. Understanding the X-ray anatomy of bones and joints (fractures, injuries, dislocations, etc.) holds significant practical importance.

SELF-STUDY GOALS

Having studied the material, the student should be able to: name the leg and foot bones in both English and Latin; and identify the studied joints, bones, and their anatomical structures on specimens and radiographs. The student must identify individual joints of the lower limb, understand their formation, classify them by shape, axes of movement, and the number of articular surfaces, and have knowledge of the ligaments that reinforce the joints, as well as the possible joint movements.

TOPIC CONTENT

Leg bones

- Tibia: proximal end (medial and lateral condyles, their articular surfaces, eminence, tubercles, areas), body (surfaces, shape, edges), distal end (medial malleolus, its groove and articular surface, inferior articular surface, fibular notch).
- Fibula: proximal end (head, neck, articular surface, apex of the head), body (shape, axial torsion, interosseal margin), distal end (lateral malleolus, its articular surface).

Foot bones

- Divisions: tarsus, metatarsus, phalanges.
- Talus — body, neck, head (articular surface of the head, trochlea, lateral articular surfaces of the trochlea, talar groove).
 - Calcaneal bone (articular surfaces, sustentaculum tali, groove, calcaneal tuber: its tubercles).
 - Navicular bone (articular surfaces).
 - Cuneiform bones (medial, intermedial, lateral).
 - Cuboid bone (articular surfaces).
 - Metatarsal bones (base, body, head).
 - Bones of toes (phalanges, tuberositas phalangis distalis).
 - Knee joint: articular surfaces (femoral and tibial condyles, patella); additional structures: menisci, intraarticular ligaments, synovial folds, synovial bursae; joint classification (complex, condylar, biaxial); movements in the joint (flexion-extension, rotation, circumduction); ligaments (collateral, patellar, popliteal).
 - Connections of the leg bones (proximally — diarthrosis, distally — syndesmosis, membrane is between the bodies (syndesmosis)).
 - Ankle joint (surfaces, classification, movements).
 - Calcaneocuboid and talonavicular joints (Chopard's joint). Their structure, movements, and key of the foot.
 - Talocalcaneonavicular joint. Structure, practical significance.
 - Subtalar joint. Structure, practical significance.
 - Cuneonavicular joints (classification, and practical significance).
 - Tarsometatarsal joints (surfaces, classification, movements).
 - Intermetatarsal joints (surfaces, classification, movements).
 - Metatarsophalangeal joints (surfaces, classification, movements).
 - Interphalangeal joints (surfaces, classification, movements).
 - The foot as a whole.
 - Arches of the foot, practical significance.

METHODOLOGICAL RECOMMENDATIONS FOR STUDYING THE MATERIAL

Activity	Step description
Read the introduction to the topic	—
Study the corresponding section in literature sources and get the corresponding bone preparations	—

The continuation of Table

Activity	Step description
Define the functionality of the bone and visualize its location among other bones of the body and limbs	Identify which part of the skeleton this bone belongs to: the bones of the trunk, limbs; function of support, movement, labor, protection neuro-vascular bundles
Compare the structural description of the bone to the corresponding details on the bone preparation	Demonstrate each bone detail found in the textbook with a pointer
Revise the studied material while showing bone parts on the preparation, slides, and tables	<p>While revising the topic, check the following:</p> <ol style="list-style-type: none"> English and Latin names of the bone; location of the bone in the skeleton; type of bone (tubular, spongy, long or short, mixed); main parts of the bone; anatomical formations of each part: surfaces, spines, crests, tubers, grooves, etc.; radiograph of the bone. <p>When revising the synovial joint, check the following:</p> <ol style="list-style-type: none"> English and Latin name of the joint; articular surfaces; additional structures (discs, menisci); joint classification: <ul style="list-style-type: none"> by the number of articular surfaces; according to the shape of the articular surfaces; by number of the movement axes; possible types of movement, axes along which these movements occur; joint ligaments. <p>For contiguous connections: (syndesmosis, synchondrosis, synostosis), its description</p>
Write down new Latin terms	Write down the terms in your notebook (see the list of Practical skills)

Activity	Step description
Find the specific features to determine which side (right or left) of the bone it is	Identify the proximal and distal ends, bony trochanters, condyles, epicondyles, tuberosity, epicondyles. Find out which of them are located medially and which are located laterally
Determine the details of the bone that can be felt on a live person. Find them on your body	Palpate the bone protrusions lying superficially under the skin
Check your knowledge with self-control questions	Answer the questions given in the assignment

QUESTIONS FOR SELF-CONTROL

1. Which bones form the leg, and how are they arranged in the leg?
2. Describe the patella.
3. Describe the tibia. What is the type of the tibia according to bone classification? What are the differences in between right and left tibia? How will you find the proximal and distal epiphyses of the tibia? How will you identify the anterior and posterior, medial and lateral sides of the tibia? What is the function of the tibial condyles? What ligaments are attached to the intercondylar areas? What is the function of the intercondylar eminence? What ligament attaches to the tibial tuberosity? How many borders and surfaces does the tibial body have? What structures attaches to the interosseous border? What are the functions of the inferior articular surface and the articular surface of the medial malleolus? What is the function of the fibular notch? What ligaments are attached to the medial malleolus?
4. Describe the fibula, including its bone classification, and explain how to differentiate the right fibula from the left? How will you find the proximal and distal epiphyses of the fibula? How will you identify the anterior and posterior, medial and lateral sides of the fibula? Where is the fibula's head? What is its function? How many borders and surfaces does the fibular body have? What is the specific function of the interosseous border? What is the function of the articular surface of the lateral malleolus? Which ligaments are attached to the lateral malleolus?
5. What parts does the foot consist of? Show the plantar and dorsal surfaces of the foot. do you know Show the first, second, and other toes. Name the tarsal

bones (of the proximal and distal rows) in sequence. What is the type of tarsal bones according to bone classification? What parts does each metatarsal bone consist of? What is the type of the metatarsal bones according to bone classification? How many phalanges does each toe have? What is the type of phalanges according to the bone classification? What parts does each phalanx consist of?

6. Describe the talus. What parts does it include? What is the function of its trochlea? What are the functions of its articular surfaces? Describe the calcaneus. What are the functions of its articular surfaces? How is the tarsal sinus formed? Describe the navicular, cuneiform, and cuboid bones and the functions of their articular surfaces.

7. Which bones form the knee joint? Describe the joint according to joint classifications. What accessory structures are in the knee joint? Describe the intra-articular ligaments and their attachments. Describe the synovial bursae, their locations, and functions. What movements are possible at the knee joint? What external ligaments of the knee joint do you know? Describe their attachments.

8. What types of bone connections are between the tibia and fibula? What parts of the tibia and fibula form the tibiofibular joint? Describe this diarthrosis according to joint classifications. What movements are possible at this joint? What ligaments reinforce this joint? What parts of the tibia and fibula are connected by the tibiofibular syndesmosis? Enumerate its ligaments. Describe the interosseous membrane (position, shape, attachment). What type of connection does it belong to?

9. Which bones form the ankle joint? Describe this diarthrosis according to joint classifications. Which joint is it combined with? What movements occur at the ankle joint? What ligaments reinforce the ankle joint? Describe their attachments.

10. Name in sequence all the synovial joints connecting the foot bones, beginning from the joints between the tarsal bones.

11. Describe the subtalar joint. What bones form this joint? Which joints is it combined with? What movements occur at this joint?

12. Give the description of the talocalcaneonavicular joint. Which bones form this joint? Which joints is it combined with? What movements occur at this joint? Enumerate its ligaments. Describe their attachment.

13. Describe the calcaneocuboid joint. Which bones form this joint? Which joint is it combined with? What movements occur at this joint? Enumerate its ligaments. Describe their attachment.

14. What is the transverse tarsal joint (of Chopart)? Which bones form this joint? What is its clinical importance?

15. Describe the cuneonavicular joint. Which bones form this joint? How many cuneonavicular joints exist? Which joint is it combined with? What movements occur at this joint? Enumerate its ligaments. Describe their attachment.

16. What parts of the metatarsal bones form the intermetatarsal joints? How many such joints exist? What movements occur at these joints? Why are they amphiarthroses? Enumerate its ligaments. Describe their attachment.

17. Describe the tarsometatarsal (Lisfranc) joints according to the joint classification. How many such joints exist? What is their clinical importance? Which tarsal bones and bases of which metatarsal bones form each tarsometatarsal joint? What movements occur at these joints? Enumerate its ligaments. Describe their attachment.

18. Describe the metatarsophalangeal joints according to the joint classification. How many such joints exist? Which parts of the metatarsal bones and the phalanges form these joints? Describe the movements at these joints. What ligaments reinforce the joints? Describe their attachment.

19. Describe the interphalangeal joints according to the joint classification. How many such joints does each toe have? Which parts of the phalanges form interphalangeal joints? What movements occur at these joints? What ligaments reinforce the joints? Describe their attachment.

20. Describe the normal shape of the foot. What arches are distinguished in the foot? What ligaments help to maintain the foot arches? How does flat foot disorder affect the functions of the foot? How does flat foot affect the joints of the lower limbs and the vertebral column?

PRACTICAL SKILLS

Patella

1. Apex of patella, *apex patellae*; верхушка надколенника.
2. Base of patella, *basis patellae*; основание надколенника.
3. Anterior surface, *facies anterior*; передняя поверхность.
4. Articular surface, *facies articularis*, суставная поверхность.

Fibula

1. Body of fibula, *corpus fibulae*; тело малоберцовой кости.
2. Head of fibula, *caput fibulae*; головка малоберцовой кости.
3. Apex of head, *apex capitis fibulae*; верхушка головки малоберцовой кости.
4. Articular facet of head, *facies articularis capitis fibulae*; суставная поверхность головки малоберцовой кости.
5. Neck of fibula, *collum fibulae*; шейка малоберцовой кости.

6. Anterior border, *margo anterior*; передний край.
7. Posterior border, *margo posterior*; задний край.
8. Interosseous border, *margo interosseus*; межкостный край.
9. Lateral malleolus, *malleolus lateralis*; латеральная лодыжка.
10. Articular facet of lateral malleolus, *facies articularis malleoli lateralis*; суставная поверхность латеральной лодыжки.
11. Malleolar fossa, *fossa malleoli lateralis*; ямка латеральной лодыжки.

Tibia

1. Body of tibia, *corpus tibiae*; тело большеберцовой кости.
2. Lateral condyle, *condylus lateralis*; латеральный мыщелок.
3. Medial condyle, *condylus medialis*; медиальный мыщелок.
4. Superior articular surface, *facies articularis superior*; верхняя суставная поверхность.
5. Intercondylar eminence, *eminentia intercondylaris*; межмыщелковое возвышение.
6. Anterior intercondylar area, *area intercondylaris anterior*; переднее межмыщелковое поле.
7. Posterior intercondylar area, *area intercondylaris posterior*; заднее межмыщелковое поле.
8. Fibular articular facet, *facies articularis fibularis*; малоберцовая суставная поверхность.
9. Anterior border, *margo anterior*; верхний край.
10. Medial border, *margo medialis*; медиальный край.
11. Interosseous border, *margo interosseus*; межкостный край.
12. Tibial tuberosity, *tuberositas tibiae*; большеберцовая кость.
13. Inferior articular surface, *facies articularis inferior*; нижняя суставная поверхность.
14. Fibular notch, *incisura fibularis*; малоберцовая вырезка.
15. Medial malleolus, *malleolus medialis*; медиальная лодыжка.
16. Articular facet of medial malleolus, *facies articularis malleoli medialis*; суставная поверхность медиальной лодыжки.

Foot bones

1. Tarsal bones, *ossa tarsi*; кости плюсны.
2. Metatarsal bones, *ossa metatarsi*; кости предплюсны.
3. Phalanges, *phalanges digitorum pedis*; фаланги пальцев стопы.
4. Talus, *talus*; таранная кость.

5. Head of talus, *caput tali*; головка таранной кости.
6. Neck of talus, *collum tali*; шейка таранной кости.
7. Trochlea of talus, *trochlea tali*; блок таранной кости.
8. Calcaneus, *calcaneus*; пяточная кость.
9. Calcaneal tuberosity, *tuber calcanei*; пяточный бугор.
10. Sustentaculum tali (talar shelf), *sustentaculum tali*; опора таранной кости.
11. Tarsal sinus, *sinus tarsi*; синус предплюсны.
12. Navicular bone, *os naviculare*; ладьевидная кость.
13. Middle cuneiform bone, *os cuneiforme mediale*; медиальная клиновидная кость.
14. Intermediate cuneiform bone, *os cuneiforme intermedium*; промежуточная клиновидная кость.
15. Lateral cuneiform bone, *os cuneiforme laterale*; латеральная клиновидная кость.
16. Cuboid bone, *os cuboideum*; кубовидная кость.
17. Body of metatarsal bone, *corpus ossis metatarsi*; тело плюсневой кости.
18. Head of metatarsal bone, *caput ossis metatarsi*; головка плюсневой кости.
19. Base of metatarsal bone, *basis ossis metatarsi*; основание плюсневой кости.
20. Tuberosity of the first metatarsal bone, *tuberositas ossis metatarsi I*; бугристость первой плюсневой кости.
21. Tuberosity of the V metatarsal bone, *tuberositas ossis metatarsi V*; бугристость пятой плюсневой кости.
22. Proximal phalanx, *phalanx proximalis*; проксимальная фаланга.
23. Middle phalanx, *phalanx media*; средняя фаланга.
24. Distal phalanx, *phalanx distalis*; дистальная фаланга.

Joints

1. Genual (knee) joint, *articulatio genus*; коленный сустав.
2. Medial meniscus, *meniscus medialis*; медиальный мениск.
3. Lateral meniscus, *meniscus lateralis*; латеральный мениск.
4. Transverse genual ligament, *ligamentum transversum genus*; поперечная связка колена.
5. Anterior cruciate ligament, *ligamentum cruciatum anterius*; передняя крестообразная связка.
6. Posterior cruciate ligament, *ligamentum cruciatum posterius*; задняя крестообразная связка.

7. Patellar ligament, *ligamentum patellae*; связка надколенника.
8. Fibular collateral ligament, *ligamentum collaterale fibulare*; малоберцовая коллатеральная связка.
9. Tibial collateral ligament, *ligamentum collaterale tibiale*; большеберцовая коллатеральная связка.
10. Arcuate popliteal ligament, *ligamentum popliteum arcuatum*; дугообразная подколенная связка.
11. Oblique popliteal ligament, *ligamentum popliteum obliquum*; косая подколенная связка.
12. Medial patellar retinacula, *retinaculum patellae mediale*; медиальный удерживатель надколенника.
13. Lateral patellar retinacula, *retinaculum patellae laterale*; латеральный удерживатель надколенника.
14. Suprapatellar bursa, *bursa suprapatellaris*; наднадколенниковая сумка.
15. Deep infrapatellar bursa, *bursa infrapatellaris profunda*; глубокая поднадколенниковая сумка.
16. Tibiofibular joint, *articulatio tibiofibularis*; большеберцово-малоберцовый сустав.
17. Anterior ligament of fibular head, *ligamentum capitis fibulae anterius*; передняя связка головки малоберцовой кости.
18. Posterior ligament of fibular head, *ligamentum capitis fibulae posterius*; задняя связка головки малоберцовой кости.
19. Tibiofibular syndesmosis, *syndesmosis tibiofibularis*; большеберцово-малоберцовый синдесмоз.
20. Anterior tibiofibular ligament, *ligamentum tibiofibulare anterius*; передняя большеберцово-малоберцовая связка.
21. Posterior tibiofibular ligament, *ligamentum tibiofibulare posterius*; задняя большеберцово-малоберцовая связка.
22. Interosseous membrane of leg, *membrana interosseaondylesi cruri*; межкостная мембрана голени.
23. Talocrural joint, *articulatio talocruralis*; голеностопный сустав.
24. Medial collateral (deltoid) ligament, *ligamentum collaterale mediale (deltoideum)*; медиальная (дельтовидная) коллатеральная связка.
25. Lateral collateral ligament, *ligamentum collaterale laterale*; латеральная коллатеральная связка.
26. Anterior talofibular ligament, *ligamentum talofibulare anterius*; передняя таранно-малоберцовая связка.
27. Posterior talofibular ligament, *ligamentum talofibulare posterius*; задняя таранно-малоберцовая связка.
28. Calcaneofibular ligament, *ligamentum calcaneofibulare*; пяточно-малоберцовая связка.

29. Subtalar joint, *articulatio subtalaris*; подтаранный сустав.
30. Talocalcaneonavicular joint, *articulatio talocalcaneonavicularis*; таранно-пяточно-ладьевидный сустав.
31. Plantar calcaneonavicular ligament, *ligamentum calcaneonaviculare plantare*; пяточно-ладьевидная подошвенная связка.
32. Talonavicular ligament, *ligamentum talonaviculare*; таранно-ладьевидная связка.
33. Calcaneocuboid joint, *articulatio calcaneocuboidea*; пяточно-кубовидный сустав.
34. Long plantar ligament, *ligamentum plantare longum*; длинная подошвенная связка.
35. Transverse tarsal joint, *articulatio tarsi transversa (the joint of chopart)*; поперечный сустав предплюсны (шопаров сустав).
36. Bifurcated ligament, *ligamentum bifurcatum*; раздвоенная связка.
37. Cuneonavicular joint, *articulatio cuneonavicularis*; клиноладьевидный сустав.
38. Tarsometatarsal joints, *articulatio tarsometatarsales*; предплюсно-плюсневые суставы.
39. Dorsal tarsometatarsal ligaments, *ligamenta tarsometatarsalia dorsalia*; тыльные предплюсно-плюсневые связки.
40. Plantar tarsometatarsal ligaments, *ligamenta tarsometatarsalia plantaria*; подошвенные предплюсно-плюсневые связки.
41. Intermetatarsal joints, *articulationes intermetatarsae*; межплюсневые суставы.
42. Dorsal metatarsal ligaments, *ligamenta metatarsalia dorsalia*; тыльная межплюсневая связка.
43. Plantar metatarsal ligaments, *ligamenta metatarsalia plantaria*; подошвенные межплюсневые связки.
44. Metatarsophalangeal joints, *articulationes metatarsophalangeae*; плюснефаланговые суставы.
45. Collateral ligaments, *ligamenta collateralia*; коллатеральные связки.
46. Deep transverse metatarsal ligament, *ligamentum metatarsale transversum profundum*; глубокая поперечная плюсневая связка.
47. Interphalangeal joints, *articulationes interphalangeae*; межфаланговые суставы.

X-ray skills

Patella

1. Apex of patella, *apex patellae*; верхушка надколенника.
2. Base of patella, *basis patellae*; основание надколенника.

Tibia

3. Body of tibia, *corpus tibiae*; тело большеберцовой кости.
4. Lateral condyle, *condylusondyles lateralis*; латеральный мыщелок.
5. Medial condyle, *condylusondyles medialis*; медиальный мыщелок.
6. Intercondylar eminence, *eminentia intercondylaris*; межмышцелковое возвышение.
7. Tibial tuberosity, *tuberositas tibiae*; бугристость большеберцовой кости.
8. Medial malleolus, *malleolus medialis*; медиальная лодыжка.

Fibula

9. Body of fibula, *corpus fibulae*; тело малоберцовой кости.
10. Head of fibula, *caput fibulae*; головка малоберцовой кости.
11. Apex of head, *apex capitis fibulae*; верхушка головки малоберцовой кости.
12. Neck of fibula, *collum fibulae*; шейка малоберцовой кости.
13. Lateral malleolus, *malleolus lateralis*; латеральная лодыжка.

Bones of the Foot

14. Tarsal bones, *ossa tarsi*; кости предплюсны.
15. Metatarsal bones, *ossa metatarsi*; кости плюсны.
16. Phalanges, *phalanges digitorum pedis*; фаланги пальцев стопы.
17. Talus, *talus*; таранная кость.
18. Head of talus, *caput tali*; головка таранной кости.
19. Neck of talus, *collum tali*; шейка таранной кости.
20. Trochlea of talus, *trochlea tali*; блок таранной кости.
21. Calcaneus, *calcaneus*; пяточная кость.
22. Calcaneal tuberosity, *tuber calcanei*; пяточный бугор.
23. Navicular bone, *os naviculare*; ладьевидная кость.
24. Middle cuneiform bone, *os cuneiforme mediale*; медиальная клиновидная кость.
25. Intermediate cuneiform bone, *os cuneiforme intermedium*; промежуточная клиновидная кость.
26. Lateral cuneiform bone, *os cuneiforme laterale*; латеральная клиновидная кость.
27. Cuboid bone, *os cuboideum*; кубовидная кость.

28. Body of metatarsal bone, *corpus ossis metatarsi*; тело плюсневой кости.
29. Head of metatarsal bone, *caput ossis metatarsi*; головка плюсневой кости.
30. Base of metatarsal bone, *basis ossis metatarsi*; основание плюсневой кости.
31. Tuberosity of the first metatarsal bone, *tuberositas ossis metatarsi I*; бугристость первой плюсневой кости.
32. Tuberosity of the V metatarsal bone, *tuberositas ossis metatarsi V*; бугристость пятой плюсневой кости.
33. Proximal phalanx, *phalanx proximalis*; проксимальная фаланга.
34. Middle phalanx, *phalanx media*; средняя фаланга.
35. Distal phalanx, *phalanx distalis*, дистальная фаланга.

Joints

36. Genual (knee) joint, *articulatio genus*; коленный сустав.
37. Tibiofibular joint, *articulatio tibiofibularis*; большеберцово-малоберцовый сустав.
38. Talocrural joint, *articulatio talocruralis*; голеностопный сустав.
39. Subtalar joint, *articulatio subtalaris*; подтаранный сустав.
40. Talocalcaneonavicular joint, *articulatio talocalcaneonavicularis*; таранно-пяточно-ладьевидный сустав.
41. Calcaneocuboid joint, *articulatio calcaneocuboidea*; пяточно-кубовидный сустав.
42. Transverse tarsal joint, *articulatio tarsi transversa (the joint of Chopart)*; поперечный сустав предплюсны (Шопаров сустав).
43. Cuneonavicular joint, *articulatio cuneonavicularis*; клиноладьевидный сустав.
44. Tarsometatarsal joints, *articulationes tarsometatarsales*; предплюсне-плюсневые суставы.
45. Intermetatarsal joints, *articulationes intermetatarsae*; межплюсневые суставы.
46. Metatarsophalangeal joints, *articulationes metatarsophalangeae*; плюснефаланговые суставы.
47. Interphalangeal joints, *articulationes interphalangeae*; межфаланговые суставы.

Literature

1. *Human anatomy* : 2 vol. / M. Prives, N. Lysenkov, V. Bushkovich. — 3^d ed. — Moscow: Mir Publishers, 1989. — Vol. 1 : The weight-bearing and locomotor system. The science of the viscera. The science of the organs of internal secretion. — 3^d ed. — 608 p. ill. (P. 247—272).

2. *Textbook of Human Anatomy*. In 3 vol. Vol. 1. Locomotor apparatus / L. L. Kolesnikov, D. B. Nikitiuk, S. V. Klochkova, I. G. Stelnikova. — Moscow : GEOTAR-Media, 2020. — 288 p.

3. *Sapin, M. R.* Textbook of human anatomy. Vol. 1 : for medical students / M. R. Sapin, L. L. Kolesnikov, D. B. Nikitjuk. — 2nd ed. — Moscow : New Wave Publishing Agency, 2010. — 416 p.

4. *Sinelnikov, R. D.* Atlas of human anatomy / R. D. Sinelnikov. — Moscow : Medicine. — 1996. Vol. 1. — 463 p.

5. *Atlas of Human Anatomy* / Frank H. Netter. — 6th ed. — Philadelphia : Elsevier, 2014. — 531 p.: ill.

6. *Lecture material*.

Topic 7

CONTROL: OSTEOSYNDESMOLOGY

INTRODUCTION TO THE TOPIC

This lesson provides a summary and review of the studied material in osteosyndesmology, helping students to reinforce their understanding of key concepts.

SELF-STUDY GOALS

After revising the topic material, the student should be able to complete a major computer test on LMS, identify individual bones and their structures in the skeleton, distinguish between different types of bone articulations, and describe the joints according to the plan of synovial joint description. The student should also be able to identify bones, their formations, and articulations between the bones on radiographs.

TOPIC CONTENT

REVISE:

- The structure of all the bones of the skeleton in accordance with the plan (see the table below)
- Description and characteristics of all the joints of the skeleton in accordance with the plan (see the table below).
- All Latin terms (see the list of practical skills: Topic 1—6).
- Description of skeletal radiographs (see the list of X-ray skills: Topic 3—6).

METHODOLOGICAL RECOMMENDATIONS FOR STUDYING THE MATERIAL

Activity	Step description
Read the introduction to the topic	—
Study the corresponding section in literature sources and get the corresponding bone preparations	—

Activity	Step description
Revise the studied material while showing bone formations on the skeleton	<p>When revising the bones, check the following:</p> <ol style="list-style-type: none"> English and Latin names of the bone; location of the bone in the skeleton; type of bone (tubular, spongy, long or short, mixed); main parts of the bone; anatomical formations of each part: surfaces, spines, crests, tubers, grooves, etc.; radiograph of the bone. <p>When revising the synovial joint, check the following:</p> <ol style="list-style-type: none"> English and Latin name of the joint articular surfaces; additional structures (discs, menisci); joint classification: <ul style="list-style-type: none"> • by the number of articular surfaces; • according to the shape of the articular surfaces; • by number of the movement axes; possible types of movement, axes along which these movements occur; joint ligaments. <p>For contiguous connections: (syndesmosis, synchondrosis, synostosis), its description</p>
Revise Latin terms	Use the material that is regularly assigned to classes
Revise the description of the X-ray images of individual joints and bones	It is necessary to specify the projection in which the X-ray is made. Name in English and Latin the anatomical structures that are visualized in the film and show them
Check your knowledge with self-control questions	Answer the questions given in the assignment

QUESTIONS FOR MAJOR OSTEOSYNDESMOLOGY

1. Give the classification of the bones according to the different principles.
2. List the special features of the cervical vertebrae.
3. Explain the differences between the thoracic vertebrae in the presence of the costal facets. Describe the differences between the ribs in the presence of the costal tubercles and in the features of the facets on the costal head.
4. Describe the vertebral column in whole: the parts, curves, the function, and the time of the appearance of the curves.
5. Give the general classification of the bone articulations; classify the solid (non-synovial, uninterrupted) joint.
6. Classify the syndesmoses and synchondroses. Give examples of each type of the syndesmosis and synchondrosis.
7. Give the characteristic of three obligatory components of a synovial joint.
8. Classify the diarthroses according to the number of the articular surfaces and combination with the other joints.
9. List the structures, that can be situated inside a synovial joint (accessory structures); give examples.
10. Classify the synovial joints according to the number of axes of movements and the shape of articular surfaces; give examples.
11. Give the characteristics of the joints between vertebrae: which types of articulations connect the vertebral bodies, the vertebral arches, and the vertebral processes: articular, transverse, spinous.
12. Describe the connections between the last lumbar vertebra and sacrum; sacrum and coccyx.
13. Give the description of the intervertebral (synovial) joints according to the plan of synovial joints description.
14. Give the description of the atlantoaxial joints (median and laterals) according to the plan of synovial joints description. Name the ligaments reinforcing the joints and describe their attachment.
15. Give the description of the atlantooccipital joints according to the plan of synovial joints description. Name the ligaments reinforcing the joints and describe their attachment.
16. Give the full description of the joints between the vertebrae and ribs. Name the ligaments reinforcing the joints and describe their attachment.
17. Give the full description of the joints between the ribs and sternum. Enumerate the ligaments reinforcing the joints and explain their attachment. Describe the connections between the ribs.
18. Classify the ribs; name the parts of the sternum. Describe the structure of the thorax: which bones form the anterior thoracic wall, laterals, posterior. What

bones limit the superior and inferior thoracic apertures? What types of thoracic cages do you know? How are they distinguished? What is the practical importance of these types?

19. Give the full description of the sternoclavicular joint. Name the ligaments reinforcing the joint and describe their attachment.

20. Give the full description of the acromioclavicular joint. Name the ligaments reinforcing the joint and describe their attachment.

21. Give the full description of the shoulder joint. Name the ligaments reinforcing the joint and describe their attachment.

22. Name the ligaments of the scapula and describe their attachment.

23. Give the full description of the elbow joint. Enumerate the ligaments reinforcing the joint and describe their attachment.

24. Give the full description of the radioulnar joints.

25. Give the full description of the wrist joint. Enumerate the ligaments reinforcing the joint and describe their attachment.

26. Name all the synovial joints of the hand. Give the full description of these joints and describe the principles of the arrangement of the hand ligaments.

27. Describe the pelvis: Which bones comprise the pelvis, and how do these bones articulate with each other? Explain the characteristics of the pelvic inlet and outlet. Define the greater and lesser pelvis. Elaborate on the terminal line and its formation.

28. Give the full description of the sacroiliac joint. Name the ligaments of the pelvis and describe their attachment. Explain, what are the obturator canal, greater and lesser sciatic foramina.

29. Give the full description of the hip joint. Enumerate the ligaments reinforcing the joint and describe their attachment.

30. Give the full description of the knee joint. Name the ligaments reinforcing the joint and describe their attachment.

31. Give the full description of the ankle joint. Name the ligaments reinforcing the joint and describe their attachment.

32. Name all the synovial joints of the foot. Give the full description of these joints and describe the principles of the arrangement of the foot ligaments.

33. Explain the arches of the foot. What structures help to support the normal shape of the foot?

Literature

1. *Human anatomy* : 2 vol. / M. Prives, N. Lysenkov, V. Bushkovich. — 3^d ed. — Moscow : Mir Publishers, 1989. — Vol. 1 : The weight-bearing and locomotor system. The science of the viscera. The science of the organs of internal secretion. — 3^d ed. — 608 p. ill.

2. *Textbook of Human Anatomy*. In 3 vol. Vol. 1. Locomotor apparatus / L. L. Kolesnikov, D. B. Nikitiuk, S. V. Klochkova, I. G. Stelnikova. — Moscow : GEOTAR-Media, 2020. — 288 p.

3. *Sapin, M. R.* Textbook of human anatomy. Vol. 1 : for medical students / M. R. Sapin, L. L. Kolesnikov, D. B. Nikitjuk. — 2nd ed. — Moscow : New Wave Publishing Agency, 2010. — 416 p.

4. *Sinelnikov, R. D.* Atlas of human anatomy / R. D. Sinelnikov. — Moscow : Medicine. — 1996. Vol. 1. — 463 p.

5. *Atlas of Human Anatomy* / Frank H. Netter. — 6th ed. — Philadelphia : Elsevier, 2014. — 531 p.: ill.

6. *Lecture material.*

7. *List of practical skills. Topic 1—6.*

8. *List of X-ray skills. Topic 3—6.*

Учебное издание

Chernomortseva Elena

ANATOMY: OSTEOSYNDESMOLOGY

Methodological recommendations for students of medicine

Редактор *О. И. Бессчастнова*
Компьютерная верстка *Г. И. Винокуровой*

Подписано в печать 18.07.2024 г.

Формат 60×90 ¹/₁₆. Усл. печ. л. 4,1
Тираж 300 экз. (1-й завод 100 экз.). Заказ 67

Издательство Балтийского федерального университета им. Иммануила Канта
236041, г. Калининград, ул. Невского, 14