

*BOGOMOLETS NATIONAL MEDICAL UNIVERSITY*

*Department of human anatomy*

**GUIDELINES**

**Student's independent work during the preparation to practical lesson**

<i>Academic discipline</i>	<i>HUMAN ANATOMY</i>
<i>Module №</i>	<i>1</i>
<i>Content module</i>	<i>12</i>
<i>The topic of the lesson</i>	<b>Joints of skull.</b>
<i>Course</i>	<i>1</i>
<i>Faculties</i>	<i>Medical 1, 2, 3, 3, 4, military, Dental</i>
<i>Number of hours</i>	<i>3</i>

*Kiev 2017*

### **1. Specific objectives:**

*After completing the course, the student must know and be able to:*

- 1) Demonstrate and identify types of joints of the skull bones.*
- 2) Describe and name the main basis of the skull. Explain the functional significance and timing of ossification.*
- 3) Describe and demonstrate the temporo-mandibular joint. Explain the nature of the movements associated with its structure.*
- 4) Describe and demonstrate the combination of the skull with the spine on the drug.*
- 5) Describe and demonstrate the compound of the first and second cervical vertebrae on the drug.*
- 6) Describe and demonstrate the combination of vertebrae with each other on the drug.*
- 7) Describe and demonstrate the compound of the fifth lumbar vertebra with sacral bone and sacral bone with coccyx.*
- 8) Identify and demonstrate the combination of ribs with thoracic vertebrae and thymus.*
- 9) Describe and demonstrate the physiological bends of the spine on the preparation.*
- 10) Be able to determine the age-specific features of the spine.*

### **2. Basic level of training.**

*Students must know and be able to:*

*Identify and demonstrate:*

- 1) Basic axes and planes of the human body.*
  - 2) General structure of the vertebrae.*
  - 3) Features of the vertebrae of the cervical, thoracic and lumbar spine of the vertebral column, sacral bone and coccyx;*
  - 4) Edges and thorax building;*
  - 5) The structure of the skull bones and the skull in general.*
- Classify types of compounds for bone development, structure and function.*
  - Give the characteristics of each type of connection.*
  - Name the three mandatory features anatomical joint.*
  - Be able to classify discontinuous types of connections by the number of joint surfaces, the shape of the articular surfaces.*
  - Determine the functionality of all kinds of joints and biomechanics of movements.*

### **3. Organization of educational content material.**

*Study material is studied using: human corpse, skeleton, sagittal opening of the head and neck, moist preparations;*

- Tables, drawings on the topic of class.*

### **4. Content of educational material.**

#### 4.1. Continuous Joints of skull (*juncturae cranii*):

- **syndesmoses** (*sutures, fontanels, ligaments, membranes*);
- **Synchondrosis** (*permanent and non-permanent*);
- **Synostosis**

**Semiseparated connection** (*in the skull missing*).

**Discontinuous connections** (*Temporo-mandibular mandibular, atlanto-occipital joint*).

#### **SYNDESMOSES OF THE CROWN (Syndesmosis)**

**Fontanel** (*fonticuli*):

The peculiarity of the infant skull is the presence **fontanels** (*fonticuli*), which are remnants of the first (*membranous*) ossification stage bones. They are located at the intersection of the seams. The presence of the fontanels has a great functional significance, since it allows the bones of the skull's arch to be significantly displaced, so that the skull during childbirth adapts to the form and size of the delivery path.

**There are the following types of fontanels :**

**1)The front fontanel** (*fonticulus anterior*), rhomboid shape is the median line in place of the crossroads of four chasers: sagittal, frontal and two halves coronary. It is overgrown in the second year of life;

**2)The rear fontanel** (*fonticulus posterior*), triangular, located at the rear end of the sagittal suture between the parietal bone in front and behind the occipital bone scales. Overgrown in the second month after birth;

**3)Side Fontanel** (*fonticuli sphenoidales et mastoideus*), steam rooms, two on each side. A wedge-shaped fontanel located at the point of the ascent of the wedge-shaped angle of the parietal bone, frontal bone, the large wing of the wedge-shaped bone and the temporal bone; Overgrown for 2 to 3 months of life. Pineal bridge is angulus mastoideus of parietal bone, the basis of the pyramid of the temporal bone and scalene of the occipital bone. The wedge-shaped and pustular fistulae are more common in premature infants.

#### **Sutures (suturae)**

The bones of the cranial vault interconnected via **joints**:

**1. Comb** (*suturae serratae*):

-*Sutura sagittalis* - between the medial edges of the parietal bones;

-*Sutura coronalis*- between the anterior margins of the parietal bones and the posterior edge of the frontal bone;

-*Sutura lambdoidea* - between the posterior edges of the parietal bones and the anterior margin of the occipital scales.

**2. The scale-like** (*sutura squamosa*) - between scaly part of the temporal bone that connects to the parietal bone and a large wing of sphenoid bone.

**3. Flat** (*sutura plana*) - between the bones of the facial skull.

#### **Membranes (membranae)**

Part of the reinforcement system Atlanto-occipital joint the rear and front Atlanto-occipital membrane (*membranae atlantooccipitales anterior et posterior*) and the coating membrane (*membrana tectoria*).

### **Connections (ligamenta)**

They are part of the temporomandibular and atlanto-occipital joints as an auxiliary fixing device.

They are:

- Long, short;
- Guides holding;
- Intraarticular, non-articular.

### **Synchondrosis bones of the skull (synchondrosis)**

**Temporary Synchondrosis** - a cartilaginous phase of bone. They transform **synostosis** in 17 years.

- spheno- occipital Synchondrosis (*synchondrosis sphenooccipitalis*);
- rear and front of an intraoccipital (*Synchondrosis intraoccipitalis anterior et posterior*);
- spheno-ethmoidal synchondrosis (*synchondrosis spheno ethmoidalis*)

**Permanent Synchondrosis** - the same names contained in the cracks and torn holes:

- spheno-petrosus synchondrosis (*synchondrosis spheno-petrosa*);
- petro-occipital synchondrosis (*synchondrosis petrooccipitalis*).

### **1. Skronevo-mandibular joint (*articulatio temporomandibularis*):**

-Articular surface - the articular surface of the head of the mandible and the articular tubercle of the temporal bone (**articulatio simplex**);

-Articular cavity - contains articular disc (*discus articularis*), which divides the joint into the two floors (**articulatio complexa**);

The articular capsule is fastened along the edge of the articular surface of the head of the mandible in the front, and behind it - by 0.5 cm. Below it, covering the neck of the mandible.

The shape of the **ellipse** (Two-axis), movements are possible around two axes: the front - lowering and lifting the lower jaw and around the vertical axis - displacement of the lower jaw to the right and left.

#### **Joint strengthen such ties:**

- lateral ligament (*lig. laterale*);
- medial ligament (*lig. mediale*);
- mandibular ligament (*lig. stilomandibulare*);
- wedge - mandibular ligament (*lig. sphenomandibulare*).

### **2. Connection of the spine and skull carried out through the right and left atlanto - occipital joint (artt. Atlantooccipitales Dexter That sinister):**

-The articular surfaces are the upper articular holes of the atlanta and the occipital bone marrow.

-Articulated capsule - attached to the edges of the articular surfaces and strengthened by the front and back atlanto - occipital membranes. Joints: vertebral, combined, dual axis (front axial rotation: flexion, extension and shaking: withdrawal, reduction).

These joints are combined with three Atlanta - axial, forming functional "**spherical**" joint five joints.

#### **4.2.A connection of the spine.**

##### **SINGLE SYNDISMOSIS (sindesmosis):**

##### **Ties (ligamenta)**

-Anterior longitudinal ligament (*ligamentum longitudinale anterius*) - runs along the front surface of the spine from the front to the mound Atlanta pelvic surface of sacrum.

-The rear longitudinal ligament (*ligamentum longitudinale posterius*) - lying on the back surface of the vertebral bodies.

-Yellow ties (*ligamenta flava*) - connect the vertebral arch built of elastic fibers.

-Interspinal connections (*ligamenta interspinalia*) - connect the spinous processes

-Intertransversal connections (*ligamenta intertransversaria*) - between the transverse processes of the vertebrae, missing in the cervical spine.

**Intervertebral disks (disci intervertebrales).** Each vertebral disk from the outside is braided with a fibrous ring in the center of which contains a gelatinous core. The first intervertebral disc is between the bodies II and III of the cervical vertebrae, and the last one - between the bodies of the V lumbar and I sacral vertebrae.

**Symphysis** - there are some bodies between the vertebrae of the lumbar athletes, circus performers, and more.

##### **Joints of the spine (articulation f s):**

**Between I and II cervical vertebrae** - formed three joints:

**1. Medial Atlanta - axial joint** (*art Atlantoaxialis mediana*):

-Articular surfaces: the anterior and posterior articular surfaces of the tooth II of the cervical vertebrae, the dentate tooth and the transverse bundle of Atlanta. The tooth is surrounded by a fibrous-bone ring formed by the transverse bundle of Atlanta and its anterior arc.

**2. Two side ATLANTA - axial joints** (*art t atlantoaxialis laterales*):

-Articular surfaces: the lower articular hollow of the atlanta and the upper articular surface of the axial vertebra.

-Articulated capsules: for both data, the joints are separate, and they are attached along the edges of the hyaline articular cartilage.

To the fixing apparatus atlanto - axial joints belong:

- Bundle of tooth tops (*Lig Apices dentis*) - between the tip of the tooth and the front edge of a large hole;
- Alar ligament (*ligg. alaria*) - the side surfaces of the tooth and the inside edges of the occipital condyle bone;
- Longitudinal bundles (*fasciculi longitudinales*) - Atlanta crosses cross-linking. These structures form together a cross-linked link of atlanta.
- Cover membrane (*membrana tectoria*) - goes from the back surface of the body to vertebral axial slope of the occipital bone.
- Middle atlanta - axial joint *lindrychnyy qi*, combined lateral Atlanta - axial joint *plos cues*, combined with limited movements.

### **4.3 Chest connective tissue**

#### **Rebrovo- vertebral joints (art. Costovertebrales):**

1. Joint of the head rib (*art. Apitiss costae*):

-Articular surfaces: Articular surfaces of the head of the rib and edentular fossa of the vertebral bodies. Heads 1, 11, 12 ribs. Are connected only with the bodies of their vertebrae, and the rest of the ribs - with their bodies and higher vertebrae.

-Articular cavity: every joint except the joint heads 1, 11, 12 ribs includes intra-communications head rib (*lig. Capitis Costae intraarticulare*).

-Joint flat, combined, multi-axis.

2. Costo- transverse joint (*art. Costotransversaria*):

-Articular surfaces: fossa of the transverse appendix and articular surface of the tubercle of the rib. In joints 11 and 12 there are no joints.

-Fixing device: costo-transversal ligament (*lig. Costotransversaria*) located between the transverse processes neck and ribs).

Joint flat, combined with the previous, there are movements of lifting and lowering the ribs in the breath.

#### **Sternocostal joints (art. Sternocostales):**

Connecting edges of the sternum, available in the first 7 pairs of ribs. Cartilage of the 1 rib forms a continuous sternum *synchondrosis*.

Joints are flat, combined.

## **5. METHODOLOGY OF THE ORGANIZATION OF THE EDUCATIONAL PROCESS ON PRACTICAL EMPLOYMENT.**

### **5. Preparatory stage.**

**5.1. To form the motivation** for learning activities focused in the study of the anatomy of the skull bones and joints of the body for the purpose of professional activities of doctor:

-The study of the development of joints of the bones of the skull stimulates the further study of the anatomy of these formations with the aim of professional correction of defects in their development;

*The study of the anatomy of the joints of the bones of the skull and trunk is the basis of the interpretation of the normal and pathological function of these structures, expands the purposefulness of finding ways of correction in pathological processes;*

*Perfect knowledge of the anatomy of the bones' joints of the skull and trunk extend the possibilities of choosing professional activities in therapy, surgery, otolaryngology, cosmetology.*

**5.2. Practical work of students on the skeleton, wet preparations involves finding and differentiation of certain types of connections bones description of each. Attention is drawn to the volume of movements in each of the types of connections.**

*Oral questioning is accompanied by a demonstration of anatomical structures on wet preparations, skeletons, as well as solving situational tasks and tests that maximally brings students closer to a specific clinical situation. Answers are discussed by both students and the teacher.*

**5.3. Standardized control of the final level of knowledge is carried out.** *We estimate the current progress of each student during classes assigned rating in the Log of visits and student achievement.*

*Estimates are announced and the group leader adds them at the same time to the record of the success of attending classes by students, and the teacher certifies their signature.*

*Students are informed about the topic of the next lesson and methodical methods, as well as preparation for it.*

## APPENDICES

### **Questions to control the initial level of knowledge of students**

- 1. What is the functional value of the skeleton?*
- 2. On what divisions is a vertebral column?*
- 3. Name the number of vertebrae in each division of the spine.*
- 4. Name the general structure of the vertebra.*
- 5. Name the features of the structure of the typical and atypical vertebrae of the cervical spine.*
- 6. Name the features of the structure of the typical and atypical vertebrae of the thoracic department.*
- 7. Name the features of the structure of the vertebrae of the lumbar region.*
- 8. Name the anatomical structure of the sacral bone and coccyx.*
- 9. Name the components of the rib.*
- 10. Describe the anatomical structure of the ribs.*
- 11. Describe the real, false and oscillating edges.*
- 12. Write down the structure of the puddings.*
- 13. Name the bones of the skull: face and brain.*

14. Name the bones of the vault and the base of the skull.
15. Demonstrate the planes and axes around which movements take place.
16. How are the types of bone joints divided?
17. What kind of compounds is syndesmosis?
18. What types of connections pass with the age of skull syndesmosis?
19. Imagine what types of movements are possible around the sagittal, frontal and vertical axes.
20. Describe the articular surfaces of the bones.
21. Name the structure of the articular surfaces of vertebrae, ribs, and udder.
22. Name the structure between the vertebral discs.
23. Name three binding components of the joint.
24. What tissue is a yellow bundle built?

**Control questions and tasks to check the final level of training of students.**

1. Show and demonstrate on the drug combination of the skull.
2. What syndesmoses connect the bones of the brain skull in infants and in adults?
3. Replicate and demonstrate the basis of synchondrophy on the preparation skulls.
4. What bone skull connects sutura coronalis: to name and show ?
5. To speak and demonstrate on the preparation of bone of the skull which connects sutrum lambdoidea?
6. What bone skull connects sutura sagittalis: to name and show on the drug?
7. To speak and demonstrate on a preparation of a bone of a skull, which connects sutura squamosa.
8. Which of the permanent synchondrosis of the skull fills part of the ruptured hole: to name and demonstrate on the drug?
9. What additional education corrects incongruity articular surfaces of temporomandibular joint?
10. Demonstrate and name the constituents of the communication apparatus temporomandibular joint.
11. For which particular simple movements are composed of complex movements of the lower one jaw during chewing?
12. Demonstrate on the drug and call the combination of the spinal cord the pillar
13. To impart and demonstrate on a preparation fibrous synchondrosis, which connects the body of the vertebrae.
14. To impart and demonstrate on a syndesmosis preparation that connect the body of the vertebrae.
15. What parts of the vertebrae are connected exclusively with syndesmoses:

*name and show on the drug?*

*16. To give an example of amphiarthrosis among joints of vertebrae with each other:*

*name and show on the drug.*

*17. How many joints connect I and II cervical vertebrae: to name and show on the drug?*

*18. The part of the connection is membrana tectoria: to name and show on the drug.*

*19. Clasify chest combinations: to name and show on the drug.*

*20. How many joints form ribs with vertebrae: call joints, describe their articular surfaces, showing them on drugs, to determine the biomechanics of movements.*

*21. To describe the features of the structure of the joints of the edges of the edges of I, XI and XII ribs.*

*22. What ribs do not form rib-transverse joints ?.*

*23. To write and demonstrate on the preparation the structure of breast-rib joint.*

*24. What a rib does not form with a thoracic joint synchondrosis*

*25. What is the thoracic-rectus joint has intra-articular communication: to name and demonstrate on the drug?*

*26. To impart and demonstrate the syndesmosis that connects on the drug the body of the ribs between them.*

*27. Define the notion of "rib arch", to name the edges that are it form, demonstrate on the drug.*

*28. Describe the structure of the interstitial joints, to describe it form of the articular surface, function.*

### **TEST TASKS "KROK-1"**

*1. At the fall of the boy, 1 year was injured front breeches. What kind of connection of skull bones has been damaged?*

*A. Syndesmosis.*

*B. Synchondrosis*

*C. Synostosis.*

*D. Diarrhosis.*

*E. Hemyarthrosis.*

*2. The patient has arthrosis of the temporomandibular joint. Movement in the joints are sharply limited. to which joints is temporal- mandibular joint in the form of articular surfaces and number of axes of rotation?*

*A. Two-legged, combined.*

*B. Saddle-shaped, two-legged, combined.*

*C. Elliptical, biaxial, combined.*

*D. Spherical, multisided.*

*E. Flat.*

*3. In the patient after a fall, the bone fracture is detected radiologically skulls in the area of the occipital-coma suture. To what type connection is occipital-coma suture?*

*A. Diarrhosis.*

*B. Synostosis.*

*C. Syncorcosis.*

*D. Synchrondrosis.*

*E. Sindesmosis.*

*4. A man, 45 years old, injured the thoracic spine. Carriage ambulance delivered to the trauma ward. Radiologically revealed fracture of the articular processes of VII thoracic vertebrae. What is the joint in the form of articular surfaces damaged?*

*A. Flat joint.*

*B. Cylindrical joint.*

*C. Saddle joint.*

*D. The cultured joint.*

*E. Blood joint.*

*5. A woman, 29 years old, injured a sacrum. In the emergency room, where she brought her a carriage of emergency medical care, radiologically The fracture of the mid crest of the sacral bone was diagnosed. Which the type of sacrum is damaged?*

*A. Syncondrosis.*

*B. Synostosis.*

*C. Syndesmosis.*

*D. Diarrhosis.*

*E. Hemyarthrosis.*

*6. A man, 66, turned to a traumatologist with complaints about pain in the lumbar spine. At examination revealed damage to the cross-section of the lumbar spine. What type of compounds form the transverse bonds?*

*A. Synostosis.*

*B. Syncarkosis.*

*D. Syndesmosis.*

*E. Intrusion.*

*7. A doctor called a neurologist, 35 years old, with complaints about pain and limitation of movements in the cervical spine. At inspection the keel of the third between the vertebral disk is detected. What kind of connection? between vertebrae forms between vertebral disk?*

*A. Syncondrosis.*

*B. Syndesmosis.*

*C. Syncorcosis.*

*D. Synostosis.*

*E. Intrusion*

*8. A woman, 29 years old, fell and injured a sacrum.*

*Radiologically diagnosed lesions of sacro-coccyx the connection What kind of connection is this?*

*A. Syncondrosis.*

*B. Synostosis.*

*C. Syndesmosis.*

*D. Diarrhosis.*

*E. Hemyarthrosis.*

*9. A man, 45, was hospitalized with a neck injury traumatological department of the hospital. Radiologically detected damage to the articular processes of the third cervical vertebra. Which the form of the joint forms the articular surfaces of the third cervix vertebra?*

*A. Diarrhosis.*

*B. Syndesmosis.*

*C. Syncorcosis.*

*D. Synchronrosis.*

*E. Synostosis.*

*10. A woman, 49, turned to a surgeon with complaints of pain in the thoracic spine. The examination revealed damage joints of ridges with vertebrae.*

*What kind of connection form the edges with vertebrae?*

*A. Syncondrosis.*

*B. Syncarkosis.*

*C. Diartrosis.*

*D. Syndesmosis.*

*E. Synostosis.*

*11. A patient, 30 years old, with complaints of unbearable pain in the knee the joint is examined by the doctor. After the inspection the decision was made*

*operate and remove the formation that is a sign of the complex joint.*

*What is the sign of a complex joint?*

*A. There are more than two joint surfaces.*

*B. Villi.*

*C. Articular meniscus or disk.*

*D. Synovial folds.*

*E. Intraarticular ligaments.*

*12. The doctor performs a puncture cerebellum-cerebral tanks at the point in the place the intersection of the median line and the line connecting the lower edges mosquito-bearing branches of the temporal bone. The doctor shakes his needle atlanto-occipital membrane. What type of compounds is related to*

*atlanto-occipital membrane?*

*A. Syncondrosis.*

*B. Syndesmosis.*

*C. Syncorcosis.*

*D. Synostosis*

*E. Diarthros.*

*13. Puncture of the lateral ventricles of the skull in newborns the children are performed through the skin in the lateral corner of the fonticulus frontalis.*

*What kind of compounds ?*

*A. Syncondrosis.*

*B. Syndesmosis.*

*C. Symphysis.*

*D. Synostosis*

*E. Intrusion.*

*14. In the patient after the fall from height revealed compression fracture in the cervical spine. On radiograph, except line fractures on the vertebrae, the doctor found damage between the vertebrae disks. What kind of connection are formed between the vertebral discs?*

*A. Diarrhosis.*

*B. Syndesmosis.*

*C. Syncorcosis.*

*D. Synostosis.*

*E. Syncondrosis.*

*15. During a jump in water, the athlete was injured by the cervix spine department. On the X-ray, the doctor found damage articular surfaces of atlanto-occipital joint. To which the joints are atlanto-occipital joint in shape articular surfaces and number of axes of rotation?*

*A. Elliptical, biaxial, combined.*

*B. Saddle-shaped, combined.*

*S. Two-branch, two-legged, combined.*

*D. Spherical, multisided.*

*E. Flat*

*16. A male, 65 years old, with complaints of pain, turned to a surgeon in the cervical spine, which increases when the neck is unfastened.*

*On the patient's examination, pathological changes in syndesmosis have been established the anterior surface of the cervical vertebrae. What kind of bond is formed this syndesmosis?*

*A. Rear longitudinal bundle.*

*B. Front longitudinal bundle.*

*C. An abundant connection.*

*D. Card line .*

*E. Yellow bundle.*

*17. A woman, 45 years old, with complaints turned to a traumatologist*

for pain and limitation of movements in the cervical spine. At the examination revealed damage to the interstitial ligaments of the cervix spine department. What kind of connection form the mesothelium ligaments?

- A. Syncondrosis.
- B. Synostosis.
- C. Syncorcosis.
- D. Syndesmosis.
- E. Diarthros.

18. A woman, 47, turned to a surgeon with complaints after traumatic pains in the area of the coccyx. At examination revealed damage to the ligament of the sacrum-coccygeal compound, which is in structure similar to false and yellow ties. What bundle has suffered damage?

- A. Deep posterior sacro-cougin bundle.
- B. The superficial rear sacral-coccygeal bundle.
- C. Lateral sacro-cougin bundle.
- D. Front sacral-cougar bundle.
- E. Deep bundle.

19. A woman, 60, with chest trauma delivered to traumatic point. What kind of connection forms II ribs with dill?

- A. Diarrhosis.
- B. Synostosis.
- C. Symphysis.
- D. Synchrondrosis.
- E. Sindesmosis.

20. A man, 41 years old, fell from the second floor and injured his chest cage During X-ray examination, damage was detected the connection of the bovine appendix and the body of the udder. What kind the joints form a bovine fever?

- A. Synostosis.
- B. Synchrondrosis
- C. Syndesmosis.
- D. Symphysis.
- E. Intrusion.

### Answers

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	C	E	A	B	D	A	D	A	C	C	B	B	E	C	B	D	B	A	D