

BOGOMOLET'S NATIONAL MEDICAL UNIVERSITY

Department of human anatomy

GUIDELINES

<i>Academic discipline</i>	HUMAN ANATOMY
Module №	1
Content module №	2
The theme of the lesson	The frontal, parietal, occipital, ethmoid bones
Course	1
The number of hours	3

Kyiv-2017

1. Specific objectives:

As a result of the classes a student should know and be able to:

- 1.1 Explain the basic laws of the cranial bones and origin, forming this skull.
- 1.2. Classify the cranial bones.
- 1.3. To determine the drug and the X-ray location in the skull bones of the cranial.
- 1.4. Describe the details of the structure (parts, surfaces, edges, angles, certain anatomical lesions) occipital, frontal, parietal, lattice bones.
- 1.5. To analyze the place of attachment on the bones of the cranial facial and masticatory muscles.
- 1.6. To analyze which parts of the occipital, frontal, parietal, bones form a lattice wall cranial fossa.
- 1.8. To analyze which parts of the bones of the cranial studied are involved in the formation of the walls of the eye socket, nasal bone, nasal septum.
- 1.9. Identify holes and grooves on the bones of the cranial containing blood vessels and nerves.
- 1.10. Giving characteristic respiratory sinus frontal bone, bone cells lattice. To analyze the ways of infection during their damage purulent process.
- 1.11. Describe features of osteofication bones.
- 1.12. Explain features connections spine to the skull.
- 1.13. Describe the possible defects of the cranial bones.

Basic training level.

Before classes a student should know and be able to:

- 2.1. Describe the structure of bone and its cellular elements (osteoblasts, osteocytes, osteoblasts). Identify the components of bone as the body.
- 2.2. Apply knowledge of the lecture on "The bones and their connections."
- 2.3. Classify bone (in structure and form).
- 2.4. To determine the structure of long and short, flat, spongy and tubular, mixed, pneumatic, atypical bone.
- 2.5. Describe the stages of bone (connective tissue, cartilage, bone). Classify bone development (primary, secondary).
- 2.6. Distinguish between types of osteofication.
- 2.7. Describe areas of the head.
- 2.8. Identify the anatomical planes of the human body and anatomical terms to indicate the location of the bones cranial regarding these planes.

3. Organization of educational content material.

Teaching material is described in a logical sequence with using of anatomical preparations, involving structural logic, tables, figures that reflect the content of the main topics of practical lessons.

4. The content of the material.

The skull (cranium) is constructed from individual bones, which are interconnected (except the mandible and the hyoid bone) using sutures. In the cranial cavity there are organs different in origin and function: brain, organs of sight, hearing, balance, smell and taste; initial digestive and respiratory systems. Skull give them support and protection. The skull is divided into two parts: facial and brain. In cranial (neurocranium) is the brain. Viscerocranium or visceral skull (viscerocranium) forms a bony face basis, beginning the digestive and respiratory tract, there are senses. Adult cranial volume is two times larger than the facial. It is formed of odd bones - frontal, sphenoid, occipital, parietal and pair of lattice and temporal bones. By facial bones of the skull are the bones are paired: nasal, lacrimal, zygomatic, upper jaw, palate, inferior turbinate and odd bones - ploughshare, lower jaw, which is connected via a joint with the skull and hyoid bone.

The frontal bone (os frontale) in adults odd, is involved in the formation of the anterior cranial vault and the anterior cranial fossa. The frontal bone consists of four parts: the frontal scales, pair orbital and nasal parts.

Frontal scales (squama frontalis) has a convex outer surface (facies externa) and concave inner surface (facies interna). At the bottom of the scales separates the right and left parts of the orbital pair nadochnoyamkovyy edge (margo supraorbitalis), which is closer to the bow of the frontal bone is nadochnoyamkova tenderloin (incisura supraorbitalis), and sometimes - nadochnoyamkovyy hole (foramen supraorbitale). Because these structures are nadochnoyamkovi artery and nerve. In the medial edge of the visible area nadochnoyamkovoho recess - frontal notch (incisura frontalis), through which the same nerve and blood vessels. On each side edge nadochnoyamkovi end zygomatic appendix (processus zygomaticus), which is connected to the zygomatic bone. From the zygomatic bone and back up to the surface is temporal scales line (linea temporalis) - insertion of the temporal fascia covering the temporal muscle.

Just above each nadochnoyamkovoho edge of the visible bulging roller - brow arch (arcus superciliaris), midway between them is noticeable smooth plane - nadperenissya (glabella). Above eyebrows noticeable frontal hump (tuber frontale).

There is the midline groove upper boom sinus on the inner surface of the scales (sulcus sinus sagittalis superioris), which goes down in the frontal crest (crista frontalis). At the core of the ridge is a blind hole (foramen caecum), which is fixed appendage dura mater of the brain.

The outer edge of the frontal scales jagged, has the following sections: top and sides - parietal edge (margo parietalis), combined with the parietal bone, and the bottom two sides - wedge-shaped edge (margo sphenoidalis), which is connected to the large

wing of sphenoid bone.

The orbital part (*pars orbitalis*) frontal bone bath provided a thin plate lying horizontally. The right and left orbital ethmoid of separating tenderloin (*incisura ethmoidalis*), in which the perforated plate lattice bones. At the top - the inner surface (*facies interna*) orbital parts are visible paltsepodibni vtysnennya (*impressiones digitatae*) and brain protrusion (*juga cerebralia*). Lower - orbital surface (*facies orbitalis*) is smooth, concave, it forms the upper wall of the eye socket (orbit). At the lateral orbital angle of the hole contained lacrimal gland (*fossa glandulae lacrimalis*), and near the pit nadochno- cutting small concavity - block pit (*fovea trochlearis*). Near the fossa is neve- bark block awn (*spina trochlearis*), which zrosta- etsya cartilage block (*trochlea*) for the upper oblique muscle tendon eye.

The nasal part (*pars nasalis*) frontal bone is shaped like a horseshoe. Located between the orbital part, it restricts the front and sides latticed tenderloin (*incisura ethmoidalis*). The front section of the bow of jagged, combined with nosovy- we bones and frontal processes of the maxilla. On the midline of the bow goes down absence comb, ending a sharp nose ostyu (*spina nasalis*). It is involved in the formation of bone nasal septum. To the right and left of the comb are openings frontal sinus (*aperturae sinus frontalis*). Frontal sinus (*sinus frontalis*) in adults has a different value, containing air and divided frontal sinus wall (*septum sinuum frontaliium*). In the posterior part of the nasal bone is lobo- ing holes, covering an open cell lattice up bones. **Потилічна кістка (*os occipitale*)** утворює задньонижній відділ мозкового черепа. У ній розрізняють основну частину, дві бічні частини і потилічну луску. Усі ці частини оточують великий отвір (*foramen magnum*), за допомогою якого порожнина черепа сполучається з хребтовим каналом.

The *main part* (*pars basilaris*) is located in front of a big hole. At the age of 18-20 years it merges with the body of the sphenoid bone. The upper surface of the main body and forms concave slope (*clivus*). On the side edges of the main part of the groove bottom is rocky sinus (*sulcus sinus petrosi inferioris*). At the bottom of the main part is the middle pharyngeal tubercle (*tuberculum pharyngeum*), which is attached to the back wall of the pharynx.

The side part (*pars lateralis*) steam at the side of the big hole. Gradually expanding, it goes back to the odd occipital scales. At the bottom of each side part is a pronounced occipital grown-up ellipsoid form (*condylus occipitalis*). Its condyles articulate with the convex surface and superior articular surfaces of the atlas. Because each side of the condyle passes over the channel hypoglossal nerve (*canalis nervi hypoglossi*), which is hypoglossal nerve (XII cranial nerve). Just behind the occipital condyle contained vyrostkova fossa (*fossa condylaris*), which opens at the bottom of the hole is not constant - vyrostkovyy channel (*canalis condylaris*), which is vyrostkova graduation vein.

On the side of the occipital condyle visible jugular notch (*incisura jugularis*) .Pozadutsyuvyrizkuobmezhuye directed upward jugular appendage (*processus*

jugularis). At the edge of the brain is well defined sulcus of sigmoid sinus (sulcus sinus sigmoidei).

Occipital scales (squama occipitalis) presented a broad plate with a concave inner surface and a convex outer. In the center of the outer surface of the external occipital notable performance (protuberantia occipitalis externa), which is down from the midline to the rear edge of the large hole is the external occipital crest (crista occipitalis externa). From the speech occipital right and left is bent down karkova top line (linea nuchae superior). In parallel to the latter at about the middle of the external occipital crest of it goes both ways karkova bottom line (linea nuchae inferior). On the external occipital performance is fickle less noticeable highest karkova line (linea nuchae suprema). Lines and hills are places of attachment neck and fascia.

The inner surface of the occipital scales well marked improvement crosswise (eminentia cruciformis), formed grooves that share the surface of the brain occipital scales to 4 holes. In the center of the cross marked increase in occipital inner speech (protuberantia occipitalis interna).

From the speech goes right and left transverse sinus sulcus (sulcus sinus transversi), passing in the groove of sigmoid sinus. Up from the internal occipital sulcus top performance goes boom sinus (sulcus sinus sagittalis superioris). Internal occipital ledge narrows and goes down in the internal occipital crest (crista occipitalis interna), reaching a large hole. The outer edge of the occipital scales jagged and has the following areas: the top and sides - lambdopodibnyy edge (margo lambdoideus), combined with the parietal bone, and papillary edge (margo mastoideus), which connects with the temporal bone.

Parietal bone (os parietale) even. Parietal bones form the skull vault. Parietal bone looks like a quadrangular plate with a convex outer surface (facies externa) and a concave inner surface (facies interna). It is characterized by four edges, three of which are jagged: front frontal edge (margo frontalis) is connected to the frontal bone; occipital rear edge (margo occipitalis) communicates with the occipital bone; gi top edge (margo sagittalis) connected to the same bone opposite side; scaly bottom edge (margo squamosus) obliquely cut and combined with scaly part of the temporal bone.

Accordingly, there are four angles: anterosuperior - frontal angle (angulus frontalis); anteroinferior - wedge-shaped angle (angulus sphenoidalis); zadnoverhniy - occipital angle (angulus occipitalis); zadnonyzhniy - papillary angle (angulus mastoideus). The outer surface of the parietal bone parietal hump acts (tuber parietale), below which marked two curved lines - upper and lower temporal line (lineae temporales superior et inferior). They begin with the same name fascia and muscle.

The relief of the inner surface of the parietal bone formed by the adjacent dura mater of the brain and its vessels. So, along the upper edge of the parietal bone of the upper boom is groove sinus (sulcus sinus sagittalis superioris). This fissure, coupled with the same groove opposite side, adjacent upper boom sinus dura mater. In the area of the mastoid angle is sigmoid sinus sulcus (sulcus sinus sigmoidei). The inner surface of bone seen numerous arterial grooves (sulci arteriosi) - marks of Obolon arteries.

Ethmoid bone (os ethmoidale) is part of the anterior skull base and facial his department, participating in the formation of the walls of the orbits and nasal bone. In slatted bone distinguish horizontal mounted perforated plate on which the median line goes down perpendicular to the plate. On each side joined to the perforated plate lattice maze, which from the outside orbital plates.

Perforated plate (lamina cribrosa) is a slatted cutting out the frontal bone, participates in the bottom of the anterior cranial fossa and the upper wall of the nasal bone. Perforated plate has multiple holes (foramina cribrosa), through which the cranial cavity to the olfactory filaments (I pair of cranial nerves). Above the perforated plate on the median line rises cockscomb (crista galli). He goes in front paired appendage - wing cock crest (ala cristae galli). These processes, together with the limited frontal bone blind hole (foramen caecum), which is fixed appendage dura mater of the brain.

Perpendicular plate (lamina perpendicularis) has an irregular pentagonal shape that goes down from the crest of the cock and located in a gi plane. Perpendicular plate forms the upper part of the nasal septum bone in bone nasal cavity.

Lattice Maze (labyrinthus ethmoidalis) - fresh formation consisting of bone anterior, middle and posterior ethmoid cells (cellulae ethmoidales anteriores, Media et posteriores), which communicate with each other and with the nasal cavity.

Ethmoid labyrinths are located on both sides of the plate and attached perpendicular to the loose ends of the plate. By the medial wall of the ethmoid labyrinth attached to two thin curved bone plate - turbinate, lower edges are hanging freely in the gap between the labyrinth and perpendicular to the plate. Above and behind the fixed upper turbinate (concha nasalis superior), slightly below and in front of it is located the middle turbinate (concha nasalis media). Sometimes a small sink the third - highest turbinate (concha nasalis suprema). Between the upper and middle turbinate is narrow upper nasal passage (meatus nasi superior). Among the middle and inferior turbinate is the middle nasal passage (meatus nasi medius).

The rear end of the middle turbinate has a curved bottom hooked appendage (processus uncinatus), that the whole skull connects to shoot lower lattice shell. Behind hooked on the process in the middle nasal passage stands lattice blister (bulla ethmoidalis) maze. Between this and the blisters are hooked shoot mesh funnel (infundibulum ethmoidale). Through this funnel frontal sinus communicates with the middle turbinate way.

Lateral surface lattice labyrinth represented a thin smooth orbital plate (lamina orbitalis), part of the medial wall of the orbit.

5. During the study of individual bones brain hearth advisable to stick to this plan:

Name of the bone (Ukrainian and Latin).

Location of the bones in the skull.

1. Location of the bones in the skull.
2. The orientation of the bones in the skull to the definition of the right or left (for the pair).
3. Name and show the main part of the bone. Show anatomical structures that differentiate them (edges, corners).
4. Describe the structure of each part (anatomical contour elements on surfaces, holes, grooves, channels, cavities (in the pneumatic bones)).
5. Classification of cranial bones developments.
6. Describe the possible defects of separate cranial bones.

5.1. Professional terminology:

Pars basilaris	Main part
Pars lateralis	Lateral part
Squama occipitalis	Occipital scales

Parts of os occipitale:

Os occipitale	Occipital bone
Foramen magnum	Great hole
Pars basilaris	Main part
Clivus	Slope
Tuberculum pharyngeum	Pharyngeal tubercle
Pars lateralis	Lateral part
Squama occipitalis	Occipital scales
Margo mastoideus	Mastoid edge
Margo lambdoideus	Lambdoid edge
Condylus occipitalis	Occipital stripling
Fossa condylaris	Condylar hole
Tuberculum jugulare	Jugular tubercle
Incisura jugularis	Jugular notch
Processus jugularis	Jugular process
Processus intrajuguanus	Intrajuguan process
Protuberantia occipitalis externa	The external occipital protuberance
(Crista occipitalis externa)	(External occipital crest)
Linea nuchalis suprema	The highest nuchal line
Linea nuchalis superior	The top nuchal line
Linea nuchalis inferior	The lower nuchal line
Planum occipitale	Occipital plane
Eminentia cruciformis	Cruciform eminence
Protuberantia occipitalis interna	Internal occipital protuberance
(Crista occipitalis interna)	(Internal occipital crest)
Fossa cerebralis	Cerebral fossa

Os frontale	The frontal bone
Squama frontalis	Frontal scales
Facies externa	External surface
Tuber frontale; Eminentia frontalis	Frontal tuber; Frontal increase
Arcus superciliaris	Brow arch
Glabella	Glabella
Margo supraorbitalis	Supraorbital edge
Incisura supraorbitalis/ Foramen supraorbitale	Supraorbital notch / Supraorbital opening
Incisura frontalis / Foramen frontale	Frontal notch / Frontal opening
Facies temporalis	Temporal surface
Margo parietalis	Parietal edge
Linea temporalis	Temporal line
Processus zygomaticus	Zygomatic process
Facies interna	The inner surface
Foramen caecum	Blind hole
Pars nasalis	Nasal part
Spina nasalis	Nasal spine
Margo nasalis	The nasal edge
Pars orbitalis	The orbital part
Facies orbitalis	The orbital surface
Fovea trochlearis	Trochlear hole
Fossa glandulae lacrimalis	Fossa of lacrimal gland
Margo sphenoidalis	Sphenoidal edge
Incisura ethmoidalis	Ethmoid incisura
Sinus frontalis	Frontal sinus
Apertura sinus frontalis	Hole of the frontal sinus

Os parietale	Parietal bone
Facies interna	The inner surface
Facies externa	External surface
Linea temporalis superior	Superior temporal line
Linea temporalis inferior	Inferior temporal line
Tuber parietale; Eminentia parietalis	Parietal hump; parietal increase
Margo occipitalis	Occipital edge
Margo squamosus	Squamosal edge
Margo sagittalis	Sagittal end
Margo frontalis	Frontal edge
Angulus frontalis	Frontal angle
Angulus occipitalis	Occipital angle
Angulus sphenoidalis	Sphenoidal angle
Angulus mastoideus	Mastoid angle
Foramen parietale	Parietal hole

Os ethmoidale	Ethmoid bone
Lamina cribrosa	Perforated plate
Foramina cribrosa	Perforated holes
Crista galli	Crista galli
Ala cristae galli	Wing of crista galli
Lamina perpendicularis	Perpendicular plate
Labyrinthus ethmoidalis	Ethmoid labyrinth
Cellulae ethmoidales anteriores	Anterior ethmoidal cells
Cellulae ethmoidales mediae	Medial ethmoid cells
Cellulae ethmoidales posteriores	Posterior ethmoid cells
Lamina orbitalis	The orbital plate
Concha nasalis suprema	The highest turbinate
Concha nasalis superior	The upper turbinate
Concha nasalis media	Middle turbinate
Bulla ethmoidalis	Ethmoid bulla
Processus uncinatus	Uncinate process
Infundibulum ethmoidale	Ethmoid infundibulum
Hiatus semilunaris	Semilunar hiatus

Questions to control the entry level of students' knowledge

1. Which bones form the skull brain?
2. List the even and odd cranial bones. What is a bone sulcus upper sagittal sinus?
3. Name and show grooves sinuses on the bones. On the surface of which bone are they located?
4. Specify skull with scales.
5. Which of the cranial bone forms a big hole?
6. Which of the cranial bone forms a slope?
7. What cranial bones are pneumatic?
8. What cranial bones have emisarial holes?
9. What cranial bone has lateral parts?
10. How many corners does parietal bone have? Name them.
11. Which of the frontal bone is involved in the formation of the walls of the eye socket?
12. What cranial bone has turbinate?
13. Which of the frontal, occipital bone participate in the formation of the inner surface of the cranial bases?
14. What part of the occipital bone is defined on the outer surface of the skull base?

Questions to control the final level of training

1. Name and show bones of the skull and frontal part.
2. Show the details of the structure of frontal scales on the skull.
3. Show the details of the skull structure of the nasal and orbital parts of the frontal bone.
4. Name and show the skull parietal bone, its edges and corners.
5. Name the skull and show details of the structure of external and internal surfaces of the parietal bone.
6. Name and show the skull occipital bone and its parts.
7. Name the skull and show details of the structure of scales occipital bone.
11. Name and show crista galli on the skull .
12. Name and show the channel hypoglossal nerve on the skull.
13. Name and show large foramen magnum on the skull.
16. Describe and show lesions on the side of the occipital bone.
19. Consider the features of the cranial bones.
20. Describe the age characteristics of the cranial bones.

<http://nmu.ua/zagalni-vidomosti/kafedri/kafedra-anatomyy-cheloveka/informatsiya-dlya-studentiv-6/>

www.anatom.ua

Tests "STEP - I"

1. In the hospital was a man with a brain injury. The doctor set the bone fracture of the skull. Fracture line passes through the upper karkovu line (linea nuchalis superior). What bone injured?

- A. The frontal bone (os frontale),
- B Occipital bone (os occipitale).
- C. Parietal bone (os parietale).
- D. Temporal bone (os temporale).
- E. Ethmoid bone (os ethmoidale).

2. Ambulance brought a man with a brain injury. The doctor set the bone fracture of the skull. The line of fracture passes through its saggittal end. What bone injured?

- A. The frontal bone (os frontale),
- B. occipital bone (os occipitale).
- C. ethmoid bone (os ethmoidale).
- D. Temporal bone (os temporale).
- E. Tim'yana bone (os parietale).

3. After an accident a woman was hospitalized with a fracture of the temporal bone, which was complicated by bleeding from sinus dura mater of the brain. The break came sinus wall in the place where it is adjacent to the grooves on the inside (brain) surface of the mastoid process. In the area of grooves which damaged sinus dura mater brain?

- A. furrows upper boom sinus (sulcus sinus sagittalis superioris).
- B. furrows rocky bottom sinus (sulcus sinus petrosi inferioris).
- C. stony furrows upper sinus (sulcus sinus petrosi superioris).
- D. furrows transverse sinus (sulcus sinus transversi).

4. The man was taken to hospital with a brain injury. The hospital installed sinus damage of dura mater (sinus durae matris) in a place where it is adjacent to the grooves on the inner surface of the frontal scales (squama frontalis). In the area of grooves which damaged sinus dura mater brain?

- A. furrows transverse sinus.
- B. furrows rocky top.
- C. furrows upper boom sinus.
- D. furrows rocky bottom sinus.
- E. furrows sigmoid sinus.

5. The man hospitalized with a brain injury. After the X-ray inspection a doctor set the bone fracture hearth. Fracture line passes through the crista occipitalis externa. What bone injured?

- A. The frontal bone (os frontale).
- B. Temporal bone (os temporale).
- C. parietal bone (os parietale).
- D. occipital bone (os occipitale).
- E. ethmoid bone (os ethmoidale).

6. The woman was hospitalized to a neurosurgical clinic with a brain tumor. The woman underwent surgery. During the operation, together with the tumor was removed cockscomb (crista galli). Of which the skull removed in this case?

- A. occipital bone (os occipitale).
- B. ethmoid bone (os ethmoidale).
- C. sphenoid bone (os sphenoidale).

- D. parietal bone (os parietale).
 E. frontal bone (os frontale).
7. Examining women. 39 years old, the doctor discovered a brain tumor. The tumor is located on the perforated plate (lamina cribrosa). Which is adjacent bone tumor?
 A. frontal bone (OS frontale).
 B. Potyishchnoyi bone (os occipitale).
 C. parietal bone (os parietale).
 D. ethmoid bone (os ethmoidale).
 E. sphenoid bone (os sphenoidale).
8. oncology department made woman with a tumor located in the bow of the pharynx. Upon further examination the doctor found that the tumor had grown to the pharyngeal tubercle (tuberculum pharyngeum). What struck bone tumor?
 A. The frontal bone (os frontale).
 B. occipital bone (os occipitale).
 C. parietal bone (os parietale).
 D. Temporal bone (os temporale).
 E. ethmoid bone (os ethmoidale).
9. hospital car ambulance brought the boy with head trauma. After the X-ray doctor set fractured skull. The line of fracture passes through nadperenissya (glabella). What bone injured?
 A. parietal bone (os parietale).
 B. The frontal bone (os frontale).
 C. occipital bone (os occipitale).
 D. ethmoid bone (os ethmoidale).
 E. nasal bone (os nasale).
10. y hospital was a man with a knife wound to the eye. After the examination, the doctor also found the skull and damage in the area fossa lacrimal gland. What the skull is damaged?
 A. occipital bone (os occipitale).
 B. ethmoid bone (os ethmoidale).
 C. parietal bone (os parietale).
 D. frontal bone (os frontale).
 E. Skroneva bone (os temporale).

1.	B	6.	B
2.	E	7.	D
3.	B	8.	B
4.	C	9.	D
5.	D	10.	D