

Skull as a whole

pp.43-54 from Anatomy of human locomotor systém (Páč-Horáčková-Nechutová), Brno 2010

Cavities and spaces of the skull

Please notice the borders as well, see the surfaces and all structures, which go there
do not remember as a faire tale!

- Skull cavity *Cavitas (cavum) cranii*.
- Vault of cranium. *Calvaria cranii*
- Skull basis. *Basis cranii*

the internal plane (*basis cranii interna*)

the external plane (*basis cranii externa*).

Basis cranii interna

anterior, middle and posterior skull fossa (*fossa cranii anterior, media and posterior*).

- ***fossa cranii anterior: (anterior cranial fossa)***

- *canalis opticus*
- *foramina in lamina cribrosa*
- *openings of foramen ethmoidale anterius*

- ***fossa cranii media: (middle cranial fossa)***

- *fossa hypophysialis*
- *sella turcica*
- *sulcus caroticus*
- *sulcus sinus petrosi superioris*
- *impressio trigemini*

- *processus clinoideus posterior*
- *synchondrosis sphenopetrosa*
- *foramen lacerum*
- *fissura orbitalis superior*
- *foramen rotundum*
- *foramen ovale*
- *foramen spinosum*
- *sulci a.meningeae media*
- *hiatus canalis n.petrosi majoris*
- *hiatus canalis n.petrosi minoris*

• **fossa cranii posterior: (posterior cranial fossa)**

- *synchondrosis petrooccipitalis*
- *protuberantia occipitalis interna*
- *eminentia cruciformis*
- *sulcus sinus sagitalis superioris*
- *sulcus sinus transversi*
- *sulcus sinus sigmoidei*
- *sulcus sinus petrosi superioris*
- *sulcus sinus petrosi inferioris*
- *porus acusticus internus*
- *canalis facialis*
- *apertura externa aqueductus vestibuli*
- *foramen jugulare*
- *foramen magnum*
- *canalis hypoglosi*
- *foramen mastoideum*

BASIS CRANII EXTERNA:

- *foramen ovale*
- *foramen spinosum- crista infratemporalis*

- *spina ossis sphenoidalis*
- *processus pterygoideus- lamina lateralis, medialis,*
- *hamulus pterygoideus*
- *processus pyramidalis ossis palatini*
- *canalis pterygoideus*
- *foramen lacerum*
- *canalis acroticus*
- *canalis musculotubarius*
- *fossa jugularis*
- *fossula petrosa*
- *canaliculus tympanicus*
- *apertura externa canaliculi cochlae*
- *canaliculus mastoideus*
- *fossa mandibularis*
- *tuberculum articulare*
- *os tympanicum*
- *fissura petrotympanica*
- *fissura petrosquamosa*
- *fissura petrotympanica*
- *fissura tympanomastoidea*
- *processus styloideus*
- *processus mastoideus*
- *foramen stylomastoideum*
- *incisura mastoidea*
- *sulcus a.occipitalis*
- *foramen jugulare*
- *foramen magnum*
- *tuberculum pharyngeum*
- *condyli occipitales*
- *canalis hypoglosi*
- *canalis condylaris*
- *crista occipitalis externa*
- *protuberantia occipitalis externa*
- *linea nuchae*

- *planum nuchae*

The orbit (*orbita*)

Upper wall:

orbital plate of the frontal bone (*pars orbitalis ossis frontalis*) and lesser wings of the sphenoid bone (*ala minor ossis sphenoidalis*)

Medial wall:

frontal process of the maxilla (*processus frontalis maxillae*)

lacrimal bone (*os lacrimale*)

orbital plate of the ethmoid bone (*lamina orbitalis ossis ethmoidalis*)

lesser wings of the sphenoid bone (*ala minor ossis sphenoidalis*)

Lateral wall:

orbital surface of the zygomatic bone (*facies orbitalis ossis zygomatici*)

orbital surface of the greater wings of the sphenoid bone (*facies orbitalis alae majoris ossis sphenoidalis*)

Caudal wall:

orbital surface of the maxillar body (*facies orbitalis corporis maxillae*)

orbital surface of the zygomatic bone (*facies orbitalis ossis zygomatici*)

Optic canal (*canalis opticus*)

Superior orbital fissure (*fissura orbitalis superior*)

Inferior orbital fissure (*fissura orbitalis inferior*)

- *fossa sacci lacrimalis*
- *canalis nasolacrimalis*
- *foramen ethmoidale anterius*
- *foramen ethmoidale posterius*

- *fossa gl.lacrimalis*
- *fovea trochlearis*
- *foramen zygomaticoorbitale*
- *sulcus et canalis infraorbitalis*
- *fissura orbitalis superior*
- *fissura orbitalis inferior*

Bone nasal cavity. *CAVUM NASI OSSEUM*

- *apertura piriformis (foramen piriforme)*
- *choanae*
- *concha nasalis superior*
- *concha nasalis media*
- *concha nasalis inferior*
- *meatus nasi superior*
- *meatus nasi medius*
- *meatus nasi inferior*
- *meatus nasopharyngeus*

Upper (superior) wall:

nasal bones (ossa nasalia)

nasal part of the frontal bone (pars nasalis ossis frontalis)

cribriform plate of the ethmoidal bone (lamina cribrosa ossis ethmoidalis)

body of the sphenoid bone (corpus ossis sphenoidalis)

Caudal(inferior) wall:

hard palate (palatum durum) – palatine process of the maxilla

(processus palatinus maxillae) and horizontal plate of the palatine bone

(lamina horizontalis ossis palatini)

Lateral wall: 3layers!!!

frontal process of maxilla (processus frontalis maxillae)

nasal surface of maxillary body (facies nasalis corporis maxillae)

medial plate of pterygoid process (lamina medialis processus pterygoidei)

lacrimal bone (os lacrimale)

perpendicular plate of palatine bone (lamina perpendicularis ossis ethmoidalis)

ethmoidal labyrinth with both superior and middle conchae (concha nasalis superior and media)

inferior nasal concha (concha nasalis inferior)

Nasal septum (septum nasi)

perpendicular lamina of the ethmoid bone

(lamina perpendicularis ossis ethmoidalis)

+ vomer

Meatus nasi superior (Cellulae ethmoidales posteriores open and sinus sphenoidalis)

Meatus nasi medius (cellulae ethmoidales anteriores and mediae, sinus maxillaris and sinus frontalis)

Meatus nasi inferior (Canalis nasolacrimalis)

Meatus nasopharyngeus

Meatus nasi communis

FOSSA TEMPORALIS - temporal fossa

Medial wall:

superior temporal line (*linea temporalis superior*)

temporal surface of the greater wing

of the sphenoid bone (*facies temporalis alae*

majoris ossis sphenoidalis)

squamous part of the temporal bone

(pars squamosa ossis temporalis)

Ventral wall:

temporal surface of the zygomatic bone (*facies temporalis ossis zygomatici*)

zygomatic process of the frontal bone (*processus zygomaticus ossis frontalis*)

Lateral wall:

zygomatic arch – (*arcus zygomaticus*)

Content: temporal muscle, vessels and nerves

- *foramen zygomaticotemporale*

***FOSSA INFRATEMPORALIS* - infratemporal fossa**

Upper wall:

infratemporal crest of the greater wing of the sphenoid bone

(*crista infratemporalis alae majoris ossis sphenoidalis*)

Medial wall:

lateral lamina of the pterygoid process

(*lamina lateralis processus pterygoideus*)

Ventral wall:

infratemporal surface of the maxillar body

(*facies infratemporalis corporis maxillae*)

Lateral wall:

mandibular ramus (*ramus mandibulae*) !

- foramen ovale

- foramen spinosum

- spina ossis sphenoidalis

- foramen mandibulare

- tuber maxillae

- foramina alveolaria
- fissura orbitalis inferior

FOSSA PTERYGOPALATINA - Pterygopalatine fossa

upper wall:

maxillar surface of the greater wing of the sphenoid bone (facies maxillaris alae majoris ossis sphenoidalis)

Medial wall:

*perpendicular lamina of the palatine bone
(lamina perpendicularis ossis palatini)*

Ventral wall:

tuberosity of maxilla (tuber maxillae)

Dorsal wall:

pterygoid process (processus pterygoideus)

- foramen rotundum
- canalis pterygoideus
- foramen sphenopalatinum
- fissura orbitalis inferior
- canalis palatinus major
- foramen palatinum majus
- foramina palatina minora

ORAL CAVITY - *Cavitas oris*

cranial side (*palatum durum*)

lateral and **frontal** (anterior) sides (*processus alveolares maxillarum* and *processus alveolaris mandibulae*, and *corpus mandibulae*).

Caudal wall (muscles)

PALATUM OSSEUM (*palatum durum*)

- *processus palatini*
- *os incisivum*
- *laminae horizontales ossis palatini*
- *sutura palatina mediana*
- *sutura palatina transversa*
- *sutura incisiva*
- *spina nasalis posterior*
- *foramen incisivum*
- *foramen palatinum majus*
- *foramina palatina minora*

Newborn skull

the dimensions of newborn head:

length - **direct diameter** (frontooccipital) – **11 cm**,

width - biparietal width of head (**great transversal diameter**) – **9 cm**,

circumference about **34 cm**

capacity about **370 ccm**

- large neurocranium (facial without teeth and without paranasal cavities (sinuses))
- instead of sutures flat strips of connective tissue (enable growing, widening))
- fonticuli (greater, lesser, sphenoidal, masseteric) (*fonticulus major, minor, sphenoidalis*)
- low splanchnocranium without alveolar processes (of maxillae and mandible)
- frontal suture (*sutura frontalis*), strip of connective tissue, *sutura metopica*
- tympanic ring (*anulus tympanicus*), not plate only ring
- symphysis menti (strip of cartilage)
- angle of mandible about 140°

Sex differences (male and female skull)

- Fronto-nasal region
- Mastoid process (*processus mastoideus*)
- Frontal and parietal tuberosity (*tuber frontale and parietale*)
- Glabella
- Superciliary arches (*arcus superciliares*)
- External occipital tuberosity (*protuberantia occipitalis externa*)
- Nuchal region
- Mental tuberosity (*protuberantia mentalis*)
- Masseter tuberosity (*tuberositas masseterica*)
- Alveolar processes (*processus alveolares*) of the mandible and Maxell

Gender differences on skull

Characteristic	Male skull	Female skull
Weight (average)	730 g	555 g
Capacity (average)	1450 cm ³	1350 cm ³
Neurocranium	Relative long and wide	Relative short and narrow
General structure	Massive	Gracile
Squama frontalis	Fluently vaulted, fluent transition into vertex	Steep forehead, transition into vertex is angular
Tubera frontalia	More weakly developed	More strongly developed
Tubera parietalia	More weakly developed	Stronger developed
Glabella and arcus superciliares	Strongly developed	Weakly developed
Nasal radix – nasofrontal transition	Angular curve	Fluent transition
Margo supraorbitalis	Curved	Sharp
Tuberosities for muscle attachments	Strongly developed	Weakly developed
Protuberantia occipitalis	Strong prominence	Only indicated

externa Processus mastoidei	Bigger, skull placed on a horizontal desk leans against them	Small, skull placed on a horizontal desk doesn't lean against them
Splanchnocranium	Generally bigger	Generally smaller
Facies	Higher	Lower
Mandible in site of symphysis	High	Low
Position of processus alveolares in incissor area	Vertical	Alveolar prognathia
Dental arch	Bigger, rounded	Smaller, more pointed

Craniometry

width of the skull (eu-eu)-euryon-euryon

length of the skull (g-op): glabella – opisthocranion

height of the face nasion – gnathion

width of the face : zygion-zygion

Cranial index = $\frac{\text{width of the skull (eu-eu)}}{\text{length of the skull (g-op)}} \times 100$

Categories of the cranial index:

Brachycranial skulls (short head) 80 – x

Mesocranial skulls (middle head) 75 – 79,9

Dolichocranial skulls (long head) x – 74.9

Capacity of the skull: about 1350 ccm males

about 1250 ccm females

..

circumference of the skull

Craniometer (kefalometer)

Stronger parts

Opening weaker

Neurocranium

Base – fissure fractures run through openings

Skull X-Rays







