

VENTRICLES

Canalis centralis

Ventriculus quartus (IV. ventricle)

Fossa rhomboidea (formed by dorsal part of medulla oblongata and pons Varoli)

Pars inferior (between pedunculi cerebellares inferiores)

Pars intermedia (between pedunculi cerebellares medii)

Pars superior (between pedunculi cerebellares superiores)

Sulcus medianus

Eminentia medialis

Sulci limitantes – finished by fovea superior (with locus coeruleus, V. cranial nerve) and fovea inferior (over sensory nerves of IX. and X. CN)

Trigonum nervi vagi

Trigonum nervi hypoglossi

Colliculus facialis (ncl.o.n VI., genu n.VII)

Striae medullares (tractus pontocerebellares)

Area vestibularis

Tuberculum acusticum (ncl. cochlearis dors.)

Tegmen (roof) of ventriculi quarti:

Velum medullare inferius (between nodulus vermis and pedunculi flocculi, with tela chorioidea ventriculi quarti; apertura mediana ventriculi quarti – foramen Magendi, aperturae laterales – Luschkae – CSF taken by them to subarachnoideal space)

Fastigium of cerebellum

Velum medullare superius (between pedunculi cerebellares superiores)

Aquaeductus mesencephali (Sylvii) connects the IV. ventricle with the III.

Ventriculus tertius

(through foramina interventricularia /Monroi/ is connected with lateral ventricles)

Ant. wall: partes liberae columnae fornicis, commissura anterior, lamina terminalis, recessus triangularis

Post. wall: commissura habenularum and posterior, recessus suprapinealis and pinealis

Inf. wall: hypothalamus, recessus opticus, chiasma opticum, recessus infundibuli

Sup. wall: tela chorioidea ventriculi tertii (attached to stria medullaris thalami)

Lat. wall: med. surface of thalamus, sulcus hypothalamicus, adhesio interthalamica

Ventriculus lateralis

Cornu anterius: med.- septum pellucidum, upper wall – corpus callosum, lat. wall – caput nuclei caudati

Pars centralis: upper wall - corpus callosum, caud. wall – corpus ncl. caudati, lamina affixa thalami, tela chorioidea ventriculi lateralis, fornix

Cornu inferius: upper wall – corpus callosum (tapetum), cauda ncl. caudati, stria terminalis, caudal wall – hippocampus with pes hippocampi, fimbria hippocampi (a part of crus fornicis), alveus hippocampi, eminentia collateralis, glomus choroideum

Cornu posterius: upper wall: corpus callosum (tapetum), caudally trigonum collaterale,

medially – calcar avis

Ventricles are filled by CSF.

Dura mater encephali

Inner and external layer (periosteum) fuse together, no cavitas epiduralis!, sinuses

Inner layer forms:

Falx cerebri: to the fissura longitudinalis cerebri (sinus sagittalis sup. and inf., attached to crista galli, crista frontalis, sulcu sinus sagittalis superior, protuberantia occipitalis interna)

Falx cerebelli: in between hemisphers of cerebellum (attached to crista occipitalis interna)

Tentorium cerebelli: separates occipital lobi from cerebellum (attached to processus clinoides os sphenoidalis, crista superior pyramidis, sulci transversi, protuberantia occipitalis interna)

Diaphragma sellae: closes fossa hypophysialis

Cavum trigeminale

Vagina nervi optici (fuses with sclera)

Vessels of dura mater encephali

Aa. meningeae

A. meningea anterior (from a. ethmoidalis anterior through lamina cribrosa ossis ethmoidalis)

A. meningea media (from a. maxillaris through foramen spinosum)

A. meningea posterior (from a. pharyngea ascendens through foramen jugulare)

R. meningeus (from a. carotis int.)

Veins: to the sinus durae matris

Nerves: rr. meningei from V. and X. cranial nerve

Dura mater spinalis

Endorhachis – external layer of dura mater spinalis

Saccus durae matris – S2-3, filum durae matris spinalis

Cavitas epiduralis (between endorhachis and internal layer of dura mater spinalis with plexus venosi vertebrales interni)

Vessels :

rr. meningei (rr. spinales of spinal arteries)

veins to plexus venosus vertebrales interni

nerves – rr. meningei of spinal nerves

Arachnoidea

is without vessels and nerves!

cavum subdurale, cavitas subarachnoidealis (with liquor cerebrospinalis)

Arachnoidea encephali – on the surface of gyri, granulationes arachnoideales – processes of arachnoidea to sinus durae matris

(foveolae granulares – impressiones in bones)

Arachnoidea spinalis – till S2 with broad subarachnoidal space

Pia mater encephali

with vessels, but no sensory innervation, covers gyri and runs into fissures between gyri, in ventricles forms a part of tela choroidea

Cisternae subarachnoideales:

Cerebellomedullaris – by apertura mediana and laterales flows liquor to subarachnoideal space

Cisterna interpeduncularis

Cisterna chiasmatis

Cisterna fossae lateralis cerebri

Pia mater spinalis no sensory innervation

20-25 ligg. denticulata – as suspensory apparatus

Cisterna lumbalis (L2-S2) (with cauda equina and filum terminale)

Lumbar punctum – L4-5

Suboccipital punctum (in children)

Pneumoencephalography (by lumbar punctum), **ventriculography** (by trephination directly), **lumbar anesthesia** (to subarachnoideal space)

Liquor cerebrospinalis – from blood plasma in plexus choroideus

About 150 cm³ (in ventricles 35 cm³, rest in subarachnoideal space)

– created in plexus choroideus of ventricles:

From **lateral ventricles** runs on the **III. ventricle** (through interventricular foramen), through **aquaeductus mesencephali** to **IV. ventricle**, through **apertura mediana and laterales** (in velum medullare inferius) to the **subarachnoideal space** – **granulationes arachnoideales** to **sinus durae matris**.

Vessels of the CNS

Spinal cord

Arteries

rr. spinales - from: a. cervicalis ascendens, a. vertebralis, a. cervicalis profunda
aa. intercostales, aa. lumbales, a. iliolumbalis, a. sacralis lateralis and mediana)

Form: **rr. radicales anteriores** – form **a. spinalis anterior**

rr. radicales posteriores – form **aa. spinales posteriores**

(aa. periphericae and rr. meningei for dura and pia mater – from all arteries)

Veins

vv. spinales (in epidural space), **vv. basivertebrales** (from vertebral bodies) – to **plexus venosus vertebrales interni** – via **vv. intervertebrales** to **plexus venosus vertebrales externi** – to **vv. lumbales** and **vv. intercostales posteriores**

Vessels of the brain

1) Aa. vertebrales

2) Aa. carotis internae

A. vertebralis – branch of a. subclavia, foramen magnum, clivus – right and left join into **a. basilaris**

a) **a. spinalis anterior and posterior** – joins with arteries of spinal cord

b) **a. cerebelli inferior posterior** – r. choroideus ventriculi IV., rr. medullares and rr. ad medullam oblongatam

A. basilaris – **a. cerebelli inferior anterior**

a. labyrinthini - via porus acusticus internus

aa. pontis

a. cerebelli superior

aa. cerebri posteriores – **aa. communicans posteriores**, aa. centrales posteriores, rr. choroidei, rr. corticales, r. calcarinus

A. carotis interna

through canalis caroticus and sinus cavernosus

(aa. hypophysiales, r. meningeus)

Aa. caroticotympanicae in canalis caroticus to tympanic cavity

A. ophtalmica (division of branches - see eye)

A. cerebri anterior (into fissura longitudinalis cerebri)

aa. centrales anteriores, a. communicans anterior, a. pericallosa, rr. corticales, rr. orbitales et frontales, rr. parietales

A. choroidea anterior

A. cerebri media (into fossa cerebri lateralis)

aa. centrales anteriores, aa. thalamostriatae, a. haemorrhagica cerebri – often bleeding; rr. corticales, rr. insulares, rr. frontales, rr. parietales, rr. temporales

Circulus arteriosus cerebri (Willisi) - variable

Circle of arteries around chiasma opticum, lamina terminalis, infundibulum and hypophysis and substantia perforata posterior

aa. cerebri posteriores – **aa. communicantes posteriores** – **aa. cerebri mediae**
– **aa. cerebri anteriores** – **a. communicans anterior**

Veins – vv. cerebri – to sinus durae matris

Sinus durae matris – blood to the **vena jugularis interna**

Located in between periosteal and internal layer of dura mater and in its folds,
no valves, no muscle layer – it is not possible regulation of blood drainage

Sinus sagittalis superior (into upper part of falx cerebri)

Sinus sagittalis inferior (into caudal part of falx cerebri)

Sinus rectus (junction of v. cerebri magna and sinus sagittalis inferior)

Sinus occipitalis (from foramen magnum and plexus basilaris to confluens sinuum)

Sinus transversus (from confluens sinuum continues to sinus sigmoideus)

Sinus sigmoideus (continuation of sinus transversus – its continuation is v. jugularis interna)

Sinus petrosus superior (in the attachment of tentorium cerebelli, joins with sinus cavernosus and sinus sigmoideus)

Sinus petrosus inferior (joins to vena jugularis interna in foramen jugulare)

Sinus cavernosus (joined by sinus intercavernosus anterior and posterior, joins with v. ophtalmica superior, course of n.III., n. IV., n. ophtalmicus, n. VI., a. carotis interna)

Sinus sphenoparietalis (along to lesser wing of sphenoid bone to sinus cavernosus)

Plexus basilaris - around foramen magnum (to sinus occipitalis, sinus cavernosus, sinus petrosus inferior, through foramen magnum to plexus venosi vertebrales interni)

Tributaries to sinus durae matris

- 1) **vv. meningeae** (to sinus durae matris except for the biggest – v. meningeae media – to plexus pterygoideus)
- 2) **vv. diploicae** (to sinus durae matris or to superficial veins)
- 3) **vv. emissariae** (between sinus durae matris and superficial veins – v. emissaria mastoidea, condylaris, parietalis)
- 4) **vv. labyrinthi** (from inner ear to sinus petrosus inferior)
- 5) **v. ophthalmica superior** (to sinus cavernosus)

Vv. cerebri – no valves, variable, superficial and deep

Superficial veins of the brain

- vv. cerebri superiores** (to sinus sagittalis superior)
- v. cerebri media superficialis** (from fossa cerebri lateralis to the sinus cavernosus)
- vv. cerebri inferiores** (blood from base of frontal, parietal and temporal lobe to the sinus cavernosus, sinus petrosus superior and transversus)

Deep veins of the brain

- v. basalis** (from genu corporis callosi to v. cerebri magna)
- v. cerebri media profunda** (from fossa cerebri lateralis to v. basalis)
- vv. cerebri internae** (on the ceiling of III. ventricle, originate from: **v. septi pellucidi**, **v. choroidea superior** and **v. thalamostriata**; below splenium corporis callosi both venae join into **v. cerebri magna (Galenii)**. Together with vv. basalis and sinus sagittalis inferior is tributary to sinus rectus.

Veins of cerebellum

- vv. cerebelli superiores and inferiores** (to sinus transversus and sigmoideus)

Veins of brain stem

- vv. mesencephalicae, vv. pontis, vv. medullae oblongatae** (to veins of cerebellum and veins of spinal cord)