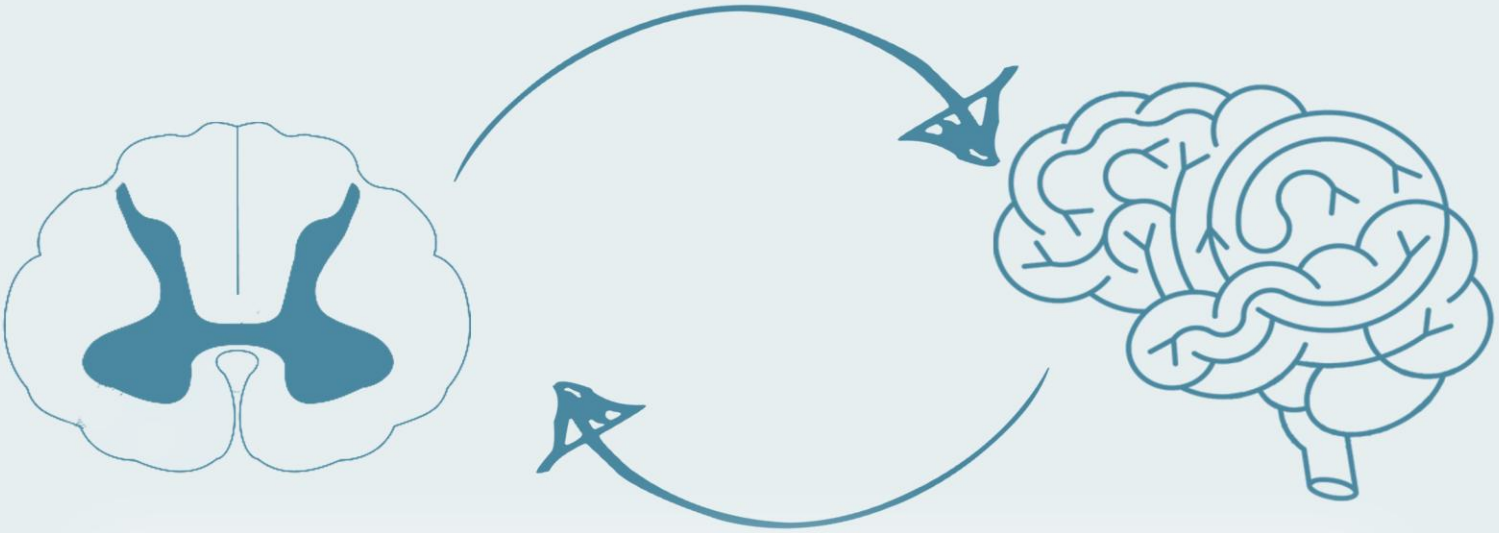


CNS

Anatomy Lab

slides sheets

number	3
Done by	Farah Mohammad
Correction	Ahmad Al-Tarefe
Doctor	Mohammad Al salem

تذكر أنَّ : أولئك الذين بداخلهم شيء يفوق كل الظروف ، هم فقط من استطاعوا أنّ يحققوا انجازاً رائعاً .... كن ذا همة

Recommendation: Study this sheet after you finish the whole anatomy material . Dr.Alsalem started talking about the blood supply for brain and spinal cord which are mentioned in sheet#5 so that we didn't write them .

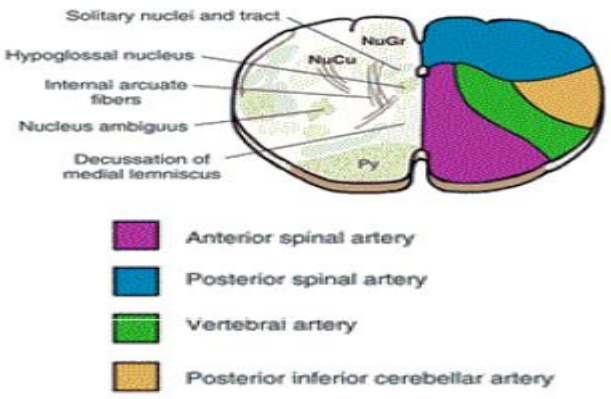
26:00-56:27/ Rec.Lab#3

Let start :

- **Medulla oblengata** : we will study the blood supply in two levels .

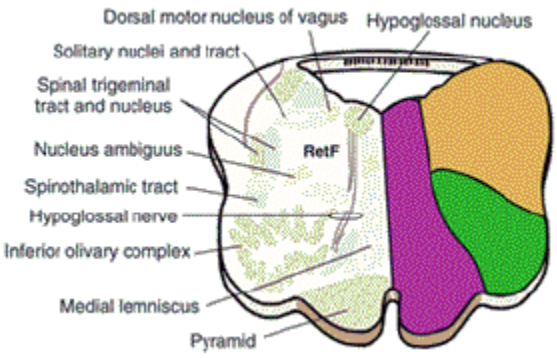
A- Close medulla (central canal) :

It is divided into four regions ; medial , anteromedial , posteriolateral and posterior region.



- **Medially** : anterior spinal artery.
- **Anteromedial**: vertebral artery
- **posterolateral** : posterior inferior cerebellar artery (PICA).
- **Posterior :** posterior spinal artery which is a branch from PICA.

B-Open medulla (4th ventricle) : It is divided into four regions ; medial , anteromedial , posteriolateral region.



- **Medially** : anterior spinal artery.
- **Anteromedial**: vertebral artery
- **posterolateral** : posterior inferior cerebellar artery (PICA).

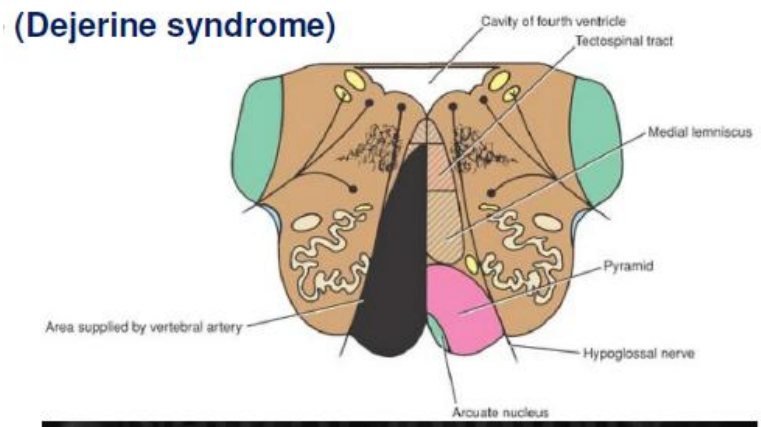
Lesions:

1- **Medial medullary syndrome (Dejerine syndrome):** It is caused by a lesion in anterior spinal artery which supplies the area close to the mid line.

Symptoms: (keep your eyes on right pic).

- **Contralateral** hemiparesis= weakness: the pyramid will be affected .
- **Contralateral** loss of proprioception , fine touch and vibration (medial lemniscus).
- Deviation of the tongue to the **ipsilateral** side when it is protruded (hypoglossal root or nucleus injury).

This syndrome is characterized by Alternating hemiplegia



MRI from Open Medulla (notice the 4th ventricle)

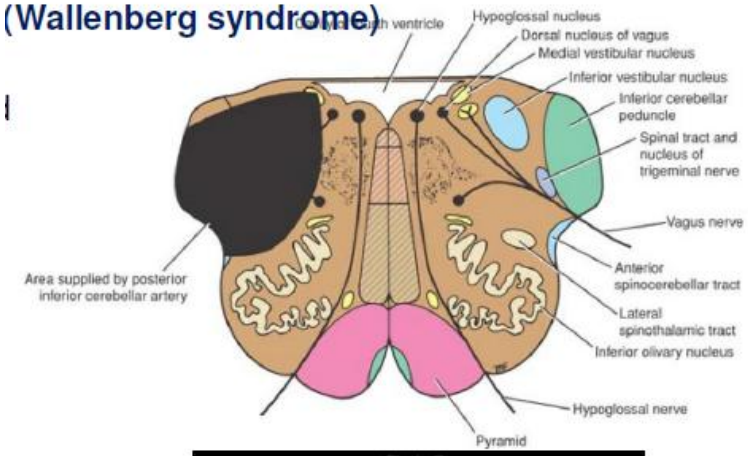
Note :The Alternating hemiplegia means ;

1- The upper and lower limbs are paralyzed in the contralateral side of lesion = upper motor neuron lesion .

2- while the face is paralyzed in the ipsilateral side of lesion = lower motor neuron lesion.

2- Lateral medullary syndrome (Wallenberg syndrome) or PICA syndrome: It is caused by a lesion in PICA which supplies the area close to lateral areas .

Symptoms :



1- Contralateral loss of pain and temperature sensation from the body (anterolateral system).

2-Ipsilateral loss of pain and temperature sensation from the face (spinal trigeminal tract and nucleus). **Rem**: the crossing occurs above this level.

3-Vertigo and Nystagmus : because the vestibular nuclei is the most lateral structure beneath 4th ventricle.

4-loss of taste from the **ipsilateral** half of the tongue (solitary tract and nucleus).

5-Hoarseness and dysphagia : due to **nucleus ambiguus** or roots of cranial nerves IX , Xand cranial part of XI).

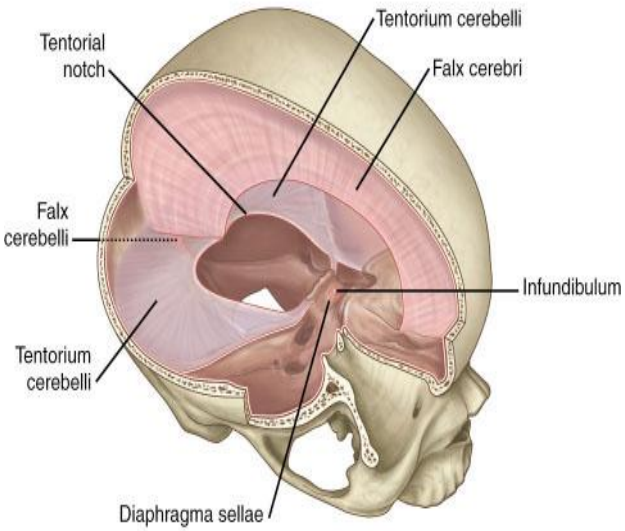
Remember : the vagus nerve supply the muscles of pharynx , larynx and palate except stylopharyngeus= CN.IX and tensor palatine = CN.V.

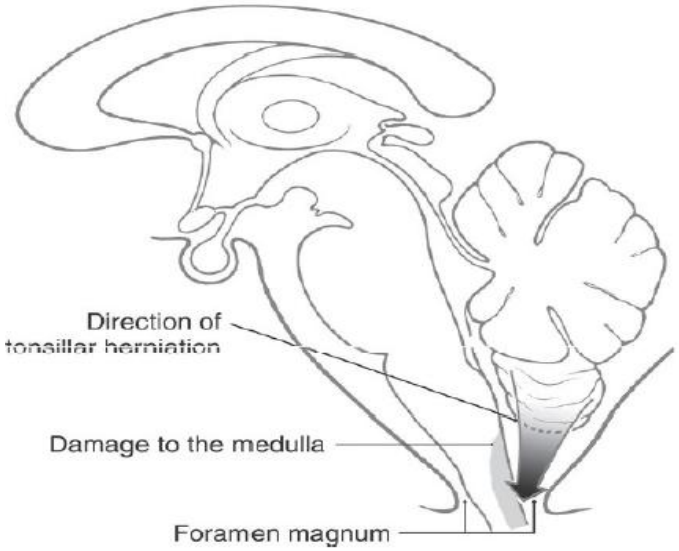
6- Ipsilateral Horner syndrome:

Rem : lateral reticulospinal tract has descending autonomic regulating fibers provide a pathway by which the hypothalamus can control the sympathetic and sacral parasympathetic outflow.

Symptoms : ptosis , miosis= constriction of pupil and anhidrosis (sympathetic injury !!)

3- TONSILLAR HERNIATION: this herniation occurs in posterior cranial fossa precisely in infratentorial compartment where the hindbrain and the tonsil of cerebellum are present.





The tonsil herniates due to many reasons and this will pressurize on hindbrain, **Causes** :

- Mass in the posterior cranial fossa (tumor, hemorrhage).

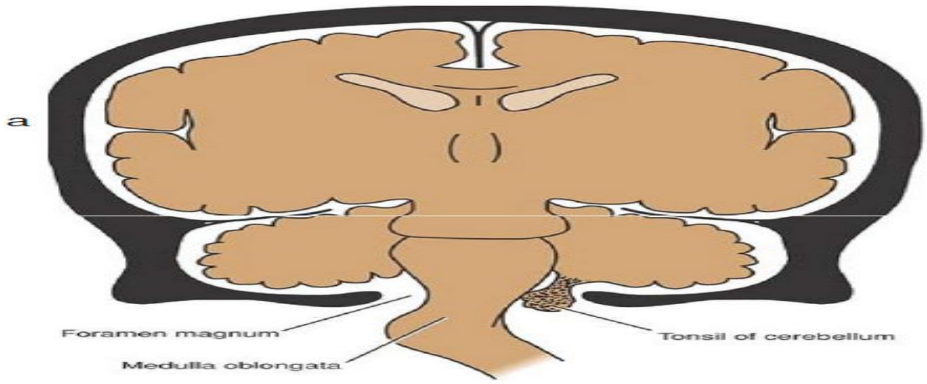
- **Increaseing in intracranial pressure**:
  This will lead the Soft tissue in the tonsil to be pushed in weak areas like the foramen magnum , the real problem is when this tissue compresses the medulla oblongata.

- **The major concern in acute herniation is damage to the ventrolateral reticular area of reticular formation which contains the respiratory center and cardiac center.** The symptoms are variable and depend on degree of injury :

1. Sudden change in heart rate .
2. Hypertension.
3. Hyperventilation.
4. Rapidly decreasing level of consciousness because the reticular formation is responsible for conscious mind .
5. Death if it severe .

4-Arnold-Chiari Phenomenon:

It is caused by a Congenital anomaly in the tonsil of the cerebellum and the medulla oblongata that herniate through the foramen magnum into the vertebral canal and maybe asymptomatic in some people . The symptoms are similar to **TONSILLAR HERNIATION** .



5-Central herniation :

It is caused by a lesion occupying space in the supratentorial compartment . Here the pressure will be from up to down and this will cause the diencephalon to move downward through the tentorial notch and into the brainstem.

Symptoms: change **in respiration**. As the damage progresses downward into the brainstem , this will lead to:

1. Significant change in respiration either **Tachypnea or apnea.**
2. Profound loss of motor and sensory functions.
3. probable loss of consciousness , if it progressed **.**
4. Eye movements are irregular . Rem: CN.III and CN.IV in Midbrain.

6-Upward Cerebellar Herniation:

It is caused by a mass in the posterior cranial fossa , this will force portions of the cerebellum upward through the tentorial **notch from down to up** (upward cerebellar herniation) .

It often compresses on the posterior aspect of midbrain(tectum) and causes obstruction of the cerebral aqueduct which leads to hydrocephalus . Also , it may occlude the branches of the superior cerebellar artery with resultant infarction of cerebellar structures .

The hydrocephalus increases the intracranial pressure which leads to :

1. vomiting.
2. headache
3. lethargy.
4. decreased levels of consciousness.

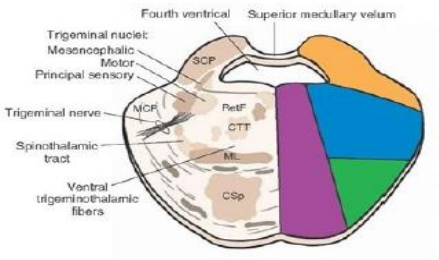
Pons: It is supplied by **basilar artery** and its branches called pontine arteries :

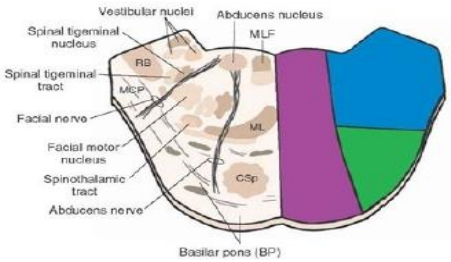
1-Medially: paramedian branches of basilar artery

2-**Laterally** : short and long circumferential , superior cerebellar artery in upper part of pons and some part of anterior inferior cerebellar artery (AICA) .

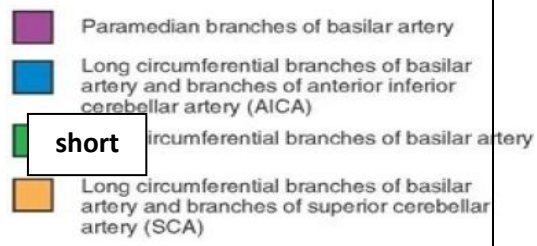
See Right picture :

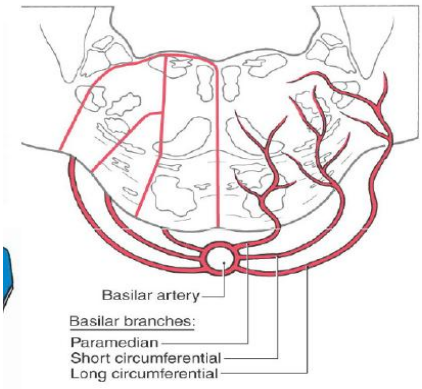
Level through cranial part





Level through caudal part





Lesions:

1- Foville syndrome:

It is caused by an occlusion of the paramedian artery in the caudal part which contains CN.VI and CN.VII .

Symptoms:

A- Ipsilateral abducent nerve palsy .

B-Contralateral hemiparesis : corticospinal tract passes in basilar part .

C- Variable contralateral sensory loss reflecting various degrees of damage to the medial lemniscus.

If the lesion extended laterally , it will include the root of the facial nerve and the result will be an **ipsilateral** paralysis of the upper and lower facial muscles . This lesion is called **Millard-Gubler syndrome** and the patient has alternating hemiplegia .

2- The midpontine base syndrome:

It is caused by an Occlusion of the paramedial branches and short circumferential branch.

Symptoms :

1. Corticospinal fibers (**contralateral** hemiparesis)
2. Main sensory and motor trigeminal roots **(ipsilateral** loss of pain and thermal sense and paralysis of the masticatory muscles) "عملية المضغ تتأثر" .
3. fibers of **the middle cerebellar peduncle** (ataxia).

Midbrain : **:** It is supplied by **basilar artery** and its branches .

Note: There is no much difference in blood supply between superior and inferior colliculus levels **except** at superior colliculus there is branch called thalamogeniculate artery from Posterior cerebral artery .

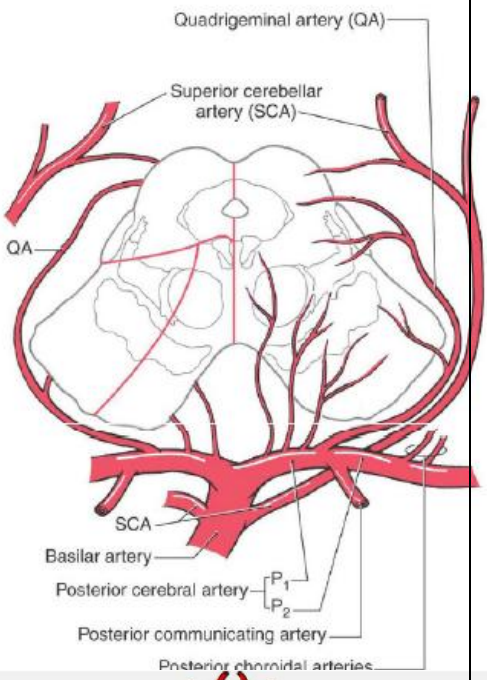
1-Ventrolateral regions :

1- Quadrigeminal branch from Posterior cerebral artery mainly and sometime from basilar artery.

2-Anterior choroidal artery from internal carotid

3- Posterior medial choroidal artery from posterior cerebral artery.

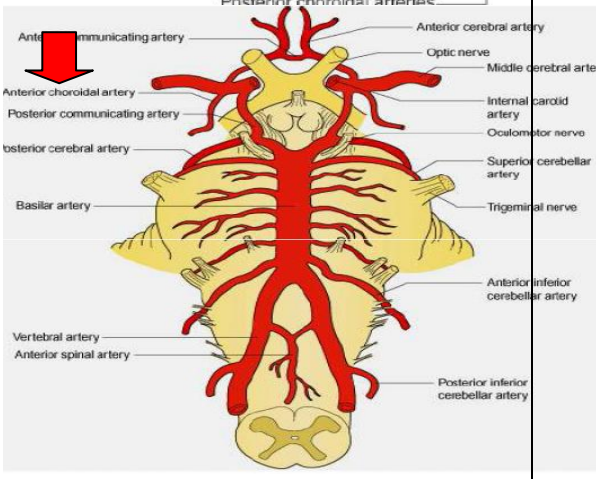
They supply **lateral** aspects of the substantia nigra and crus cerebri.



2-Medial region :

Paramedian branches from Posterior cerebral artery and basilar artery .

It supplies are the oculomotor, trochlear, Edinger-Westphal nuclei , the exiting oculomotor fibers, the red nucleus , and **medial** aspects of the substantia nigra and crus cerebri .

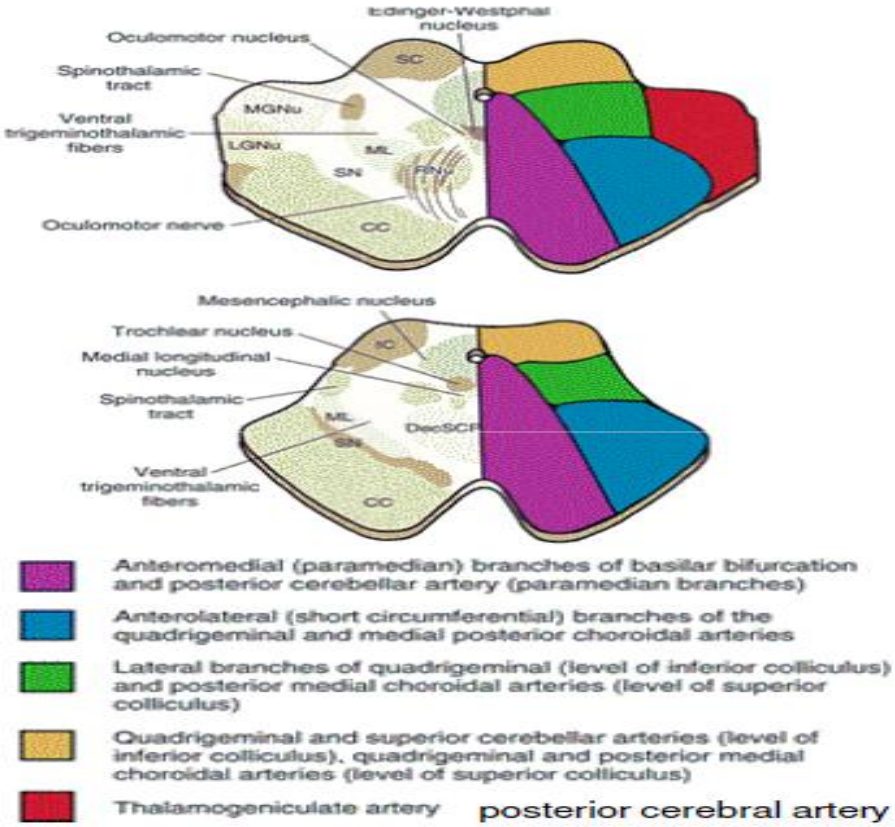


Note : Medial regions of the midbrain receive numerous small branches from posterior cerebral artery and from the posterior communicating artery (mentioned in the slide).

3-Posterior region :

The posterior midbrain is served primarily by the quadrigeminal artery which typically arises from posterior cerebral artery and medial branches of the superior cerebellar artery . They supply **the nuclei of the superior and inferior colliculi and pretectum nucleus.**

In addition , Much of the periaqueductal gray , the anterolateral system and the brachium of the inferior colliculus are supplied by quadrigeminal branches and superior cerebellar artery . (mentioned in the slide)



THE END