

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

GROSS FEATURES OF PONS

BY

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LEARNING OBJECTIVES

- By the end of this lecture students would be able to,
- Identify location and position of pons in brain stem
- Describe its composition and surfaces
- Identify position of related cranial nerves

Anatomical position/SIZE

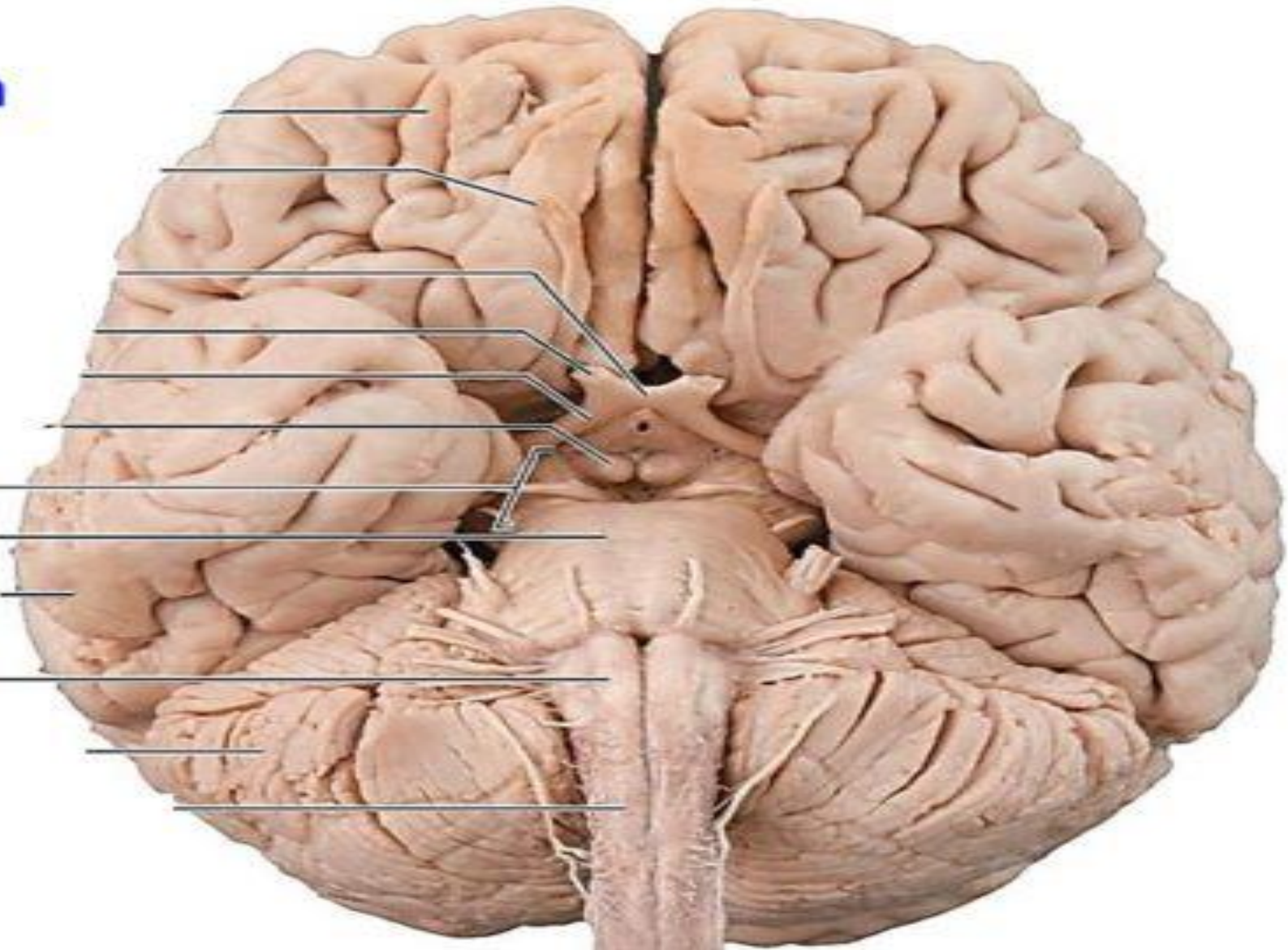
- Pons are anterior to cerebellum and connect medulla to mid brain
- Posterior cranial fossa on clivus
- PONS MEANS BRIDGE.....between rt and Lt cerebellar hemispheres
- **SIZE:**
- 2.5cm

Brainstem

Midbrain

Pons

Medulla
Oblongata



ANATOMICAL POSITION

- The pons is a horseshoe-shaped collection of nerve fibres located in the anterior part of the posterior cranial fossa.
- Its anatomical relations are as follows:
- **Posteriorly** – the cerebellum, separated by the fourth ventricle.
- **Inferiorly** – the medulla oblongata.
- **Superiorly** – the midbrain lies immediately above the pons.

ANTERIOR SURFACE(VENTRAL)

- CONVEX
- Transversely striated
- Middle cerebellar peduncle
- Basilar groove
- Cerebral peduncles
- Ponto medullary junction
- 5 cranial nerve
- 6, 7, 8 cranial nerves(medial to lateral)

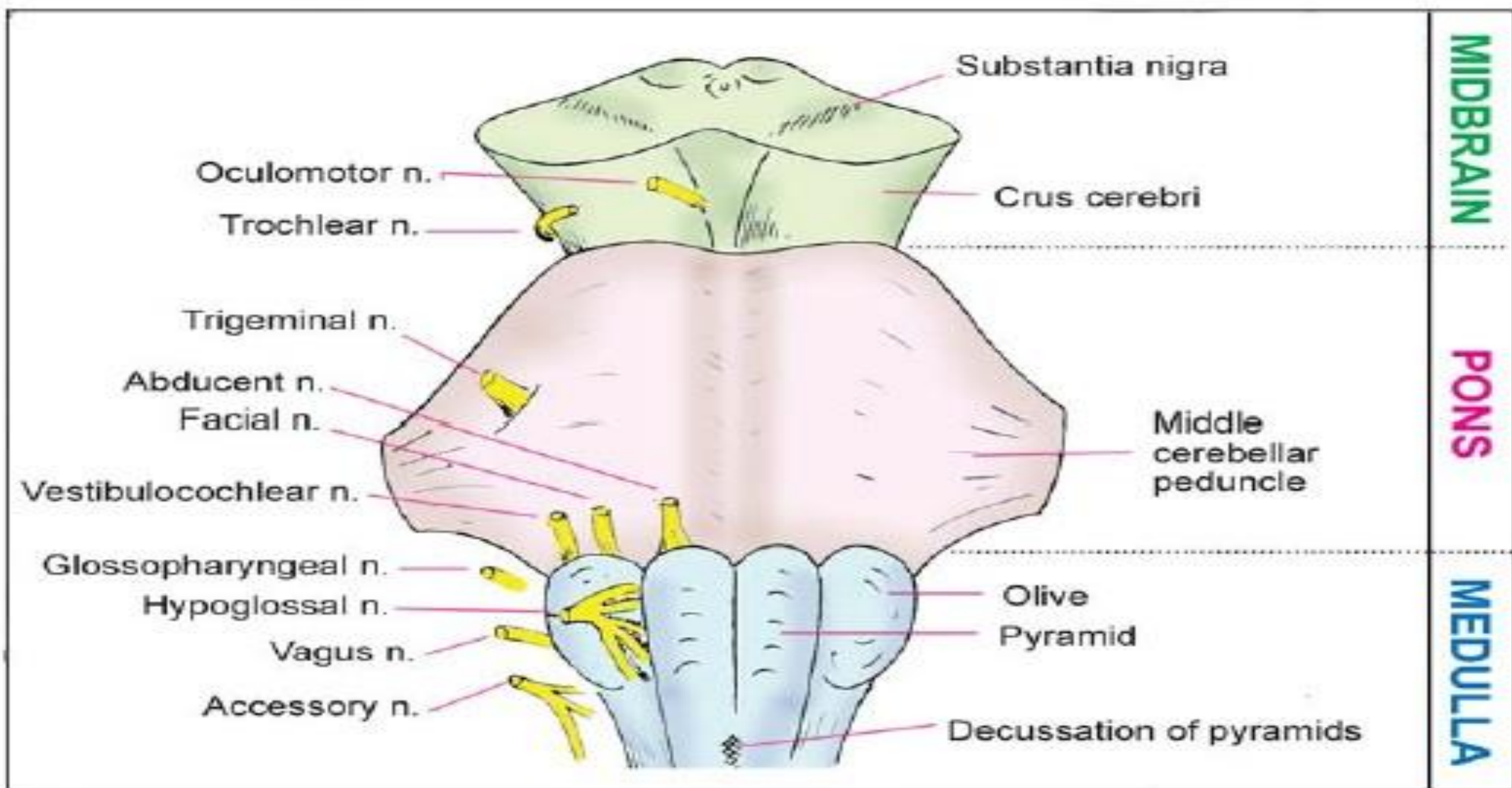
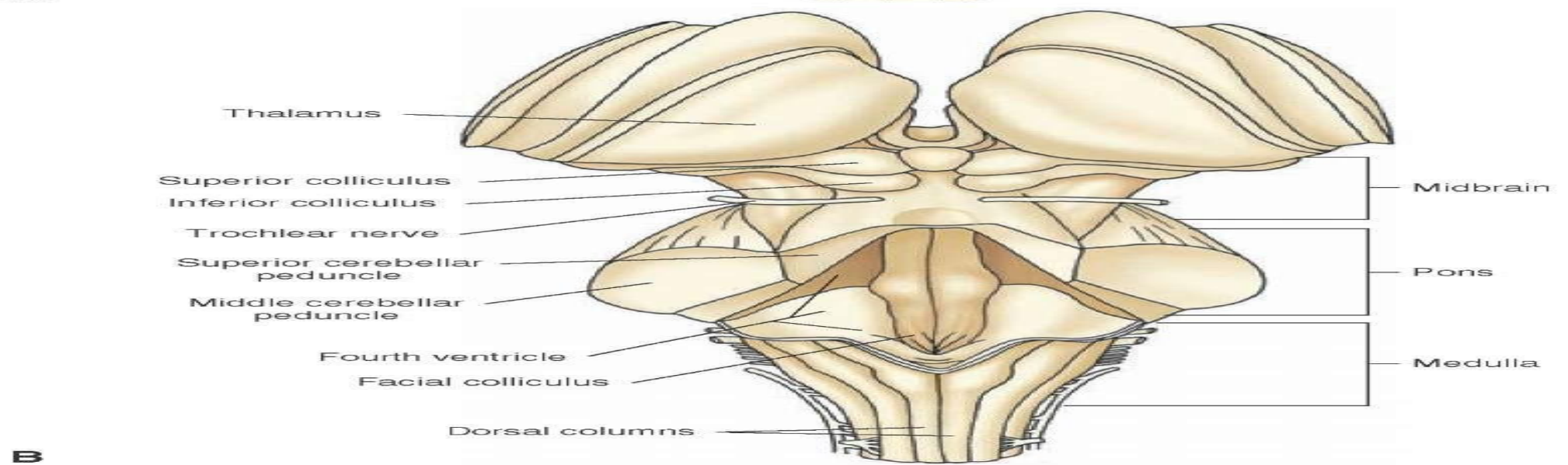
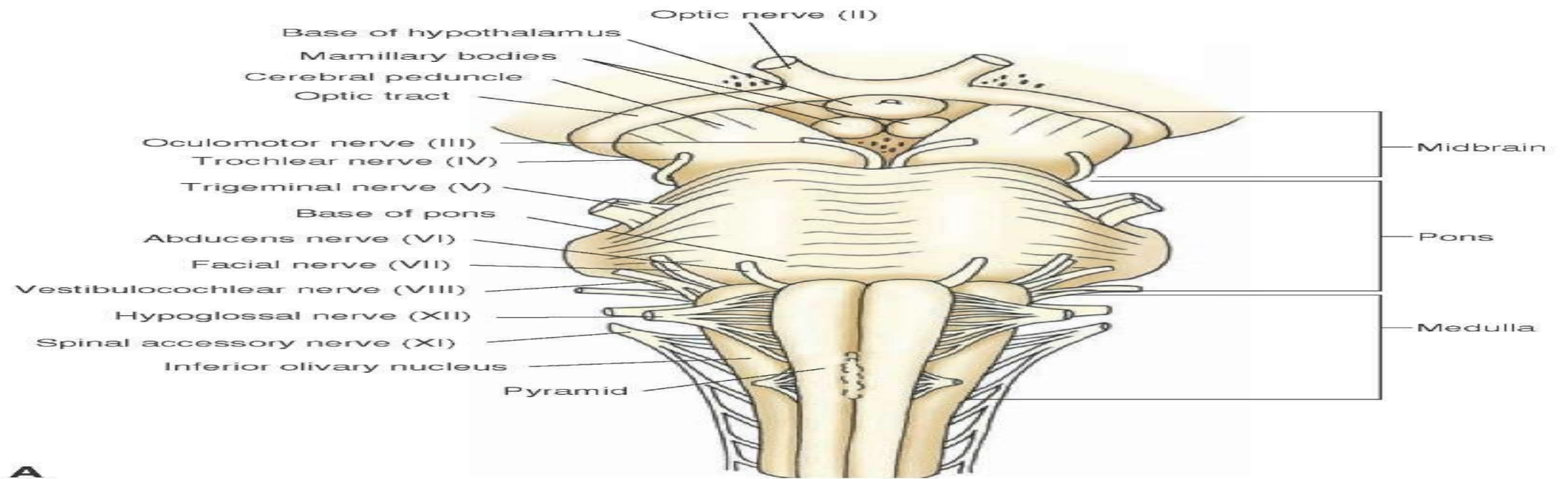


Fig. 6.1. Ventral aspect of the brainstem.



EXTERNAL ANATOMY

ANTERIOR SURFACE

The anterior or ventral surface of the pons is marked by a bulging formed by the **transverse pontocerebellar fibres**. These fibres wrap around the otherwise vertically oriented brainstem. It measures around 2.5 cm in adults.

The basilar groove demarcates the midline of the ventral surface and is where the basilar artery is located.

The **pontomedullary** junction is an important anatomical landmark defined by the angle between the lower border of the pons and the superior border of the medulla.

Several cranial nerves originate from the ventral surface of the pons:

- **Cranial nerve V:** [trigeminal](#) – originates from the lateral aspect of mid pons
- **Cranial nerve VI:** [abducens](#) – originates from the pontomedullary junction, close to the midline
- **Cranial nerve VII:** [facial](#) – originates from the cerebellopontine angle, the more lateral aspect of the pontomedullary junction.
- **Cranial nerve VIII:** [vestibulocochlear](#) – originates laterally to the facial nerve.

POSTERIOR SURFACE(DORSAL)

- Cerebellum
- When we remove cerebellum we have cavity of 4 ventricle
- Median sulcus
- Sulcus limitans
- Vestibular area
- Medial eminence
- Fascial colliculus
- Substantia ferruginea

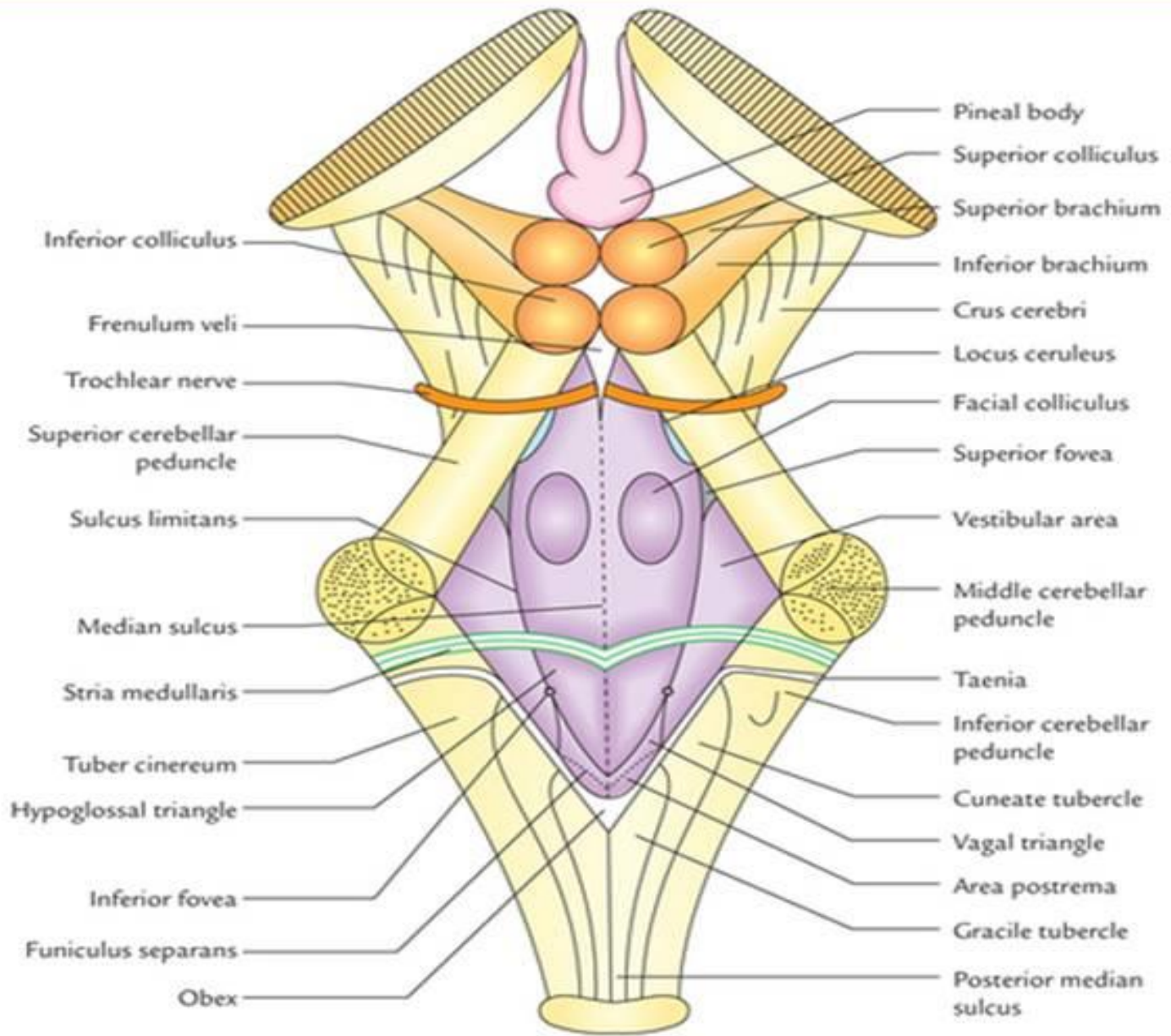
POSTERIOR SURFACE

The pons is intimately related to the cerebellum and is connected to it by the middle cerebellar peduncles. Removal of the cerebellum will reveal the underlying **fourth ventricle**.

The floor of the fourth ventricle is composed of the dorsal surface of the pons and the medulla. There are some important anatomical landmarks here:

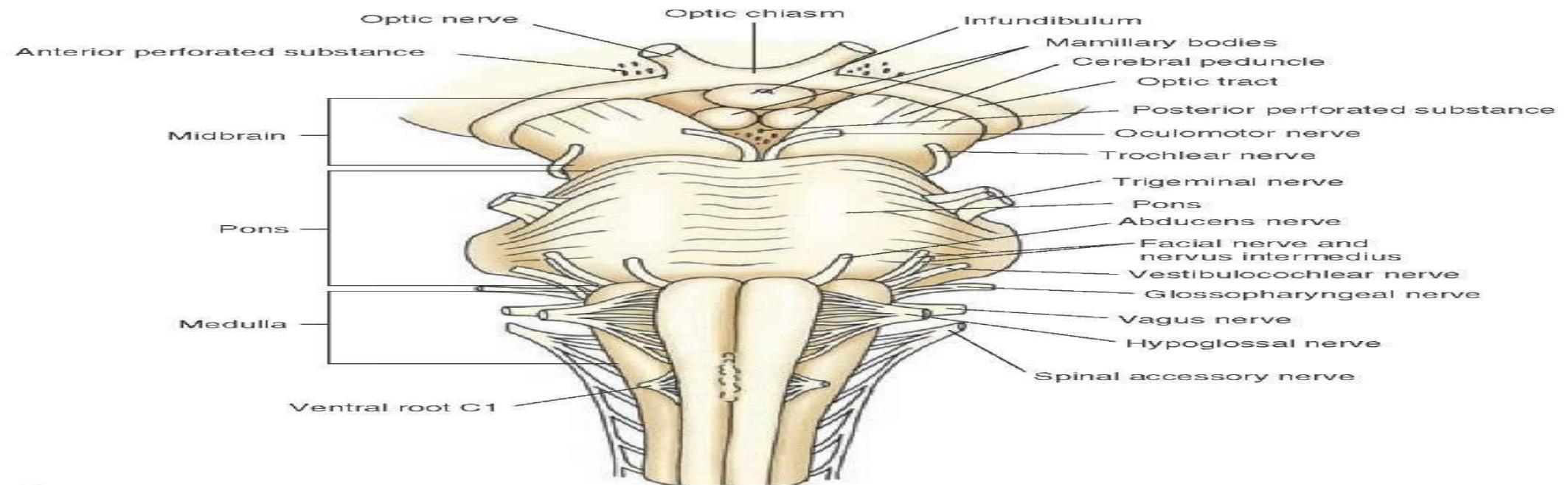
- The **medial eminence** marks the midline of the floor.
- The **facial colliculus** is a bulging formed by the fibres of the facial nerve looping around the abducens nucleus.
- The **stria medullaris** of the fourth ventricle is a bundle of nerve fibres crossing transversely from the lateral aspect into the midline. They mark the posterior border between the pons and the medulla.

The angle formed at the junction of the pons, medulla, and cerebellum is another anatomical landmark and is named **cerebellopontine angle**. Here, the cerebellar **flocculus**, the ventricular **choroid plexus** and the emerging CNs VII and VIII surround the lateral apertures of the fourth ventricle (the foramen of Luschka).

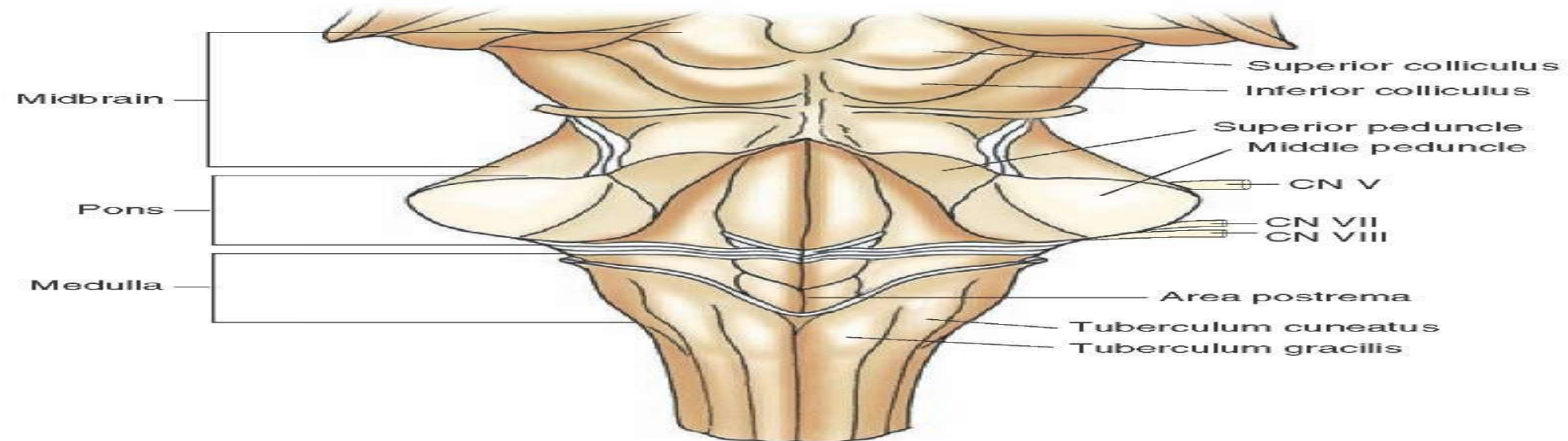


Inferior colliculus
 Frenulum veli
 Trochlear nerve
 Superior cerebellar peduncle
 Sulcus limitans
 Median sulcus
 Stria medullaris
 Tuber cinereum
 Hypoglossal triangle
 Inferior fovea
 Funiculus separans
 Obex

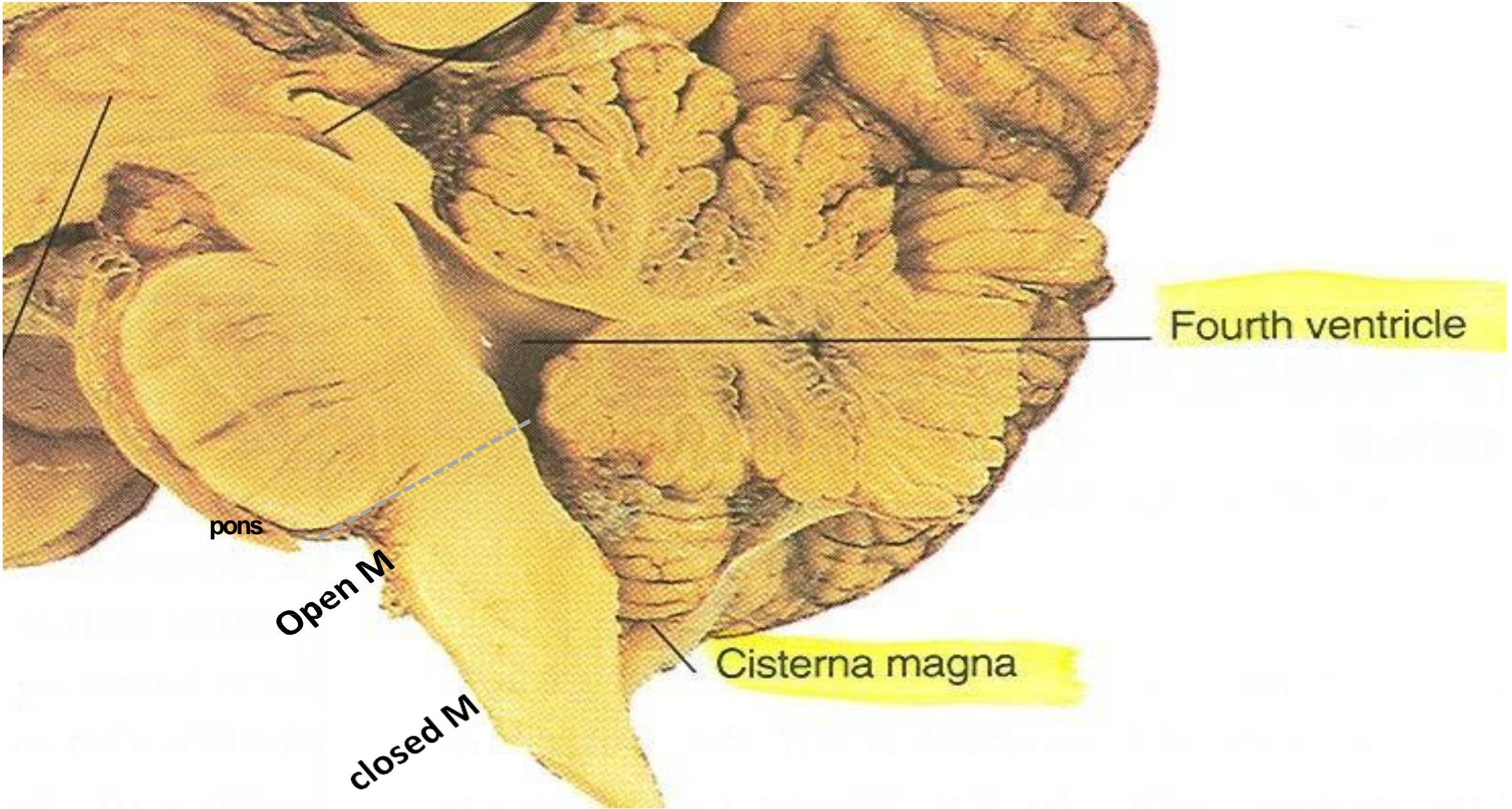
Pineal body
 Superior colliculus
 Superior brachium
 Inferior brachium
 Crus cerebri
 Locus ceruleus
 Facial colliculus
 Superior fovea
 Vestibular area
 Middle cerebellar peduncle
 Taenia
 Inferior cerebellar peduncle
 Cuneate tubercle
 Vagal triangle
 Area postrema
 Gracile tubercle
 Posterior median sulcus



A



B



Fourth ventricle

pons

Open M

closed M

Cisterna magna

BORDERS

- *Superior Border...*

Cerebral peduncle, 3rd Nerve, Superior Cerebellar peduncle

- *Inferior Border ...*

AICA, Medulla

Structures underneath the floor of fourth ventricle

Part of the floor	Structures
Beneath the superior half of the floor	<ul style="list-style-type: none">• Abducent nucleus surrounded by internal genu of facial nerve• Vestibular nuclei
Beneath the inferior half of the floor	<ul style="list-style-type: none">• Vestibular nuclei• Dorsal nucleus of vagus• Nucleus intercalatus• True vomiting centre• Vital centres

Structural components and functions of the pons

Components	Functions
Grey matter	
• Pontine nuclei	Relay stations of corticopontine fibres and give origin to the pontocerebellar fibres
• Nuclei of V, VI, VII and VIII cranial nerves	Give or receive nerve fibres of these cranial nerves
• Pontine respiratory centre	Modifies the output of the respiratory centres in the medulla
White matter	
• Ascending and descending tracts	Subserves the motor and sensory functions
• Transverse pontocerebellar fibres	Form the distal segment of the recently evolved 'cortico-ponto-cerebellar pathway'

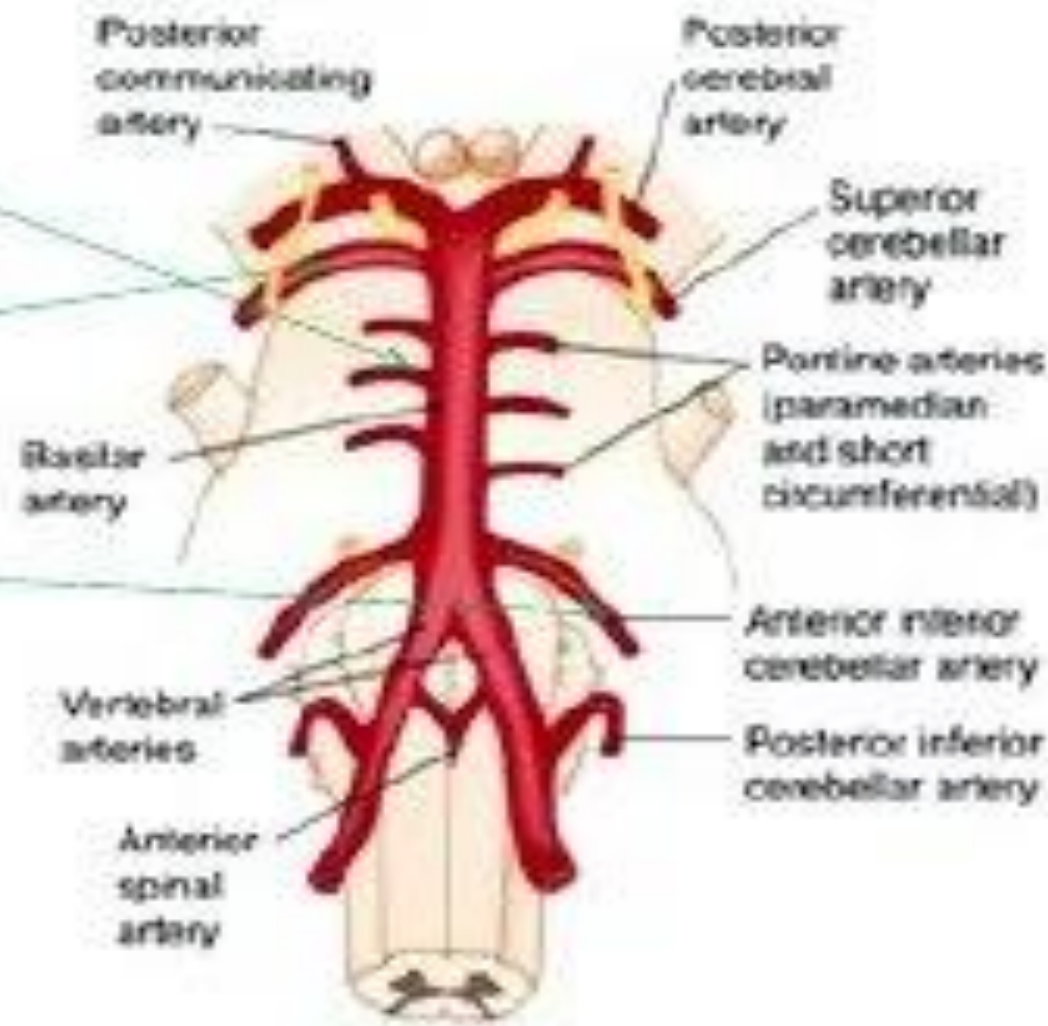


Vascular supply to the Pons

- The Pons is supplied by the;
- *Basilar artery*, contributions of this main artery can be further subdivided;
 - *Paramedian branches*, to medial pontine region
 - *Short circumferential branches*, supply anterolateral pons
 - *Long circumferential branches*, run laterally over the anterior surface of the Pons to anastomose with branches of the *anterior inferior cerebellar artery (AICA)*.
- Some reinforcing contributions by the *anterior inferior cerebellar* and *superior cerebellar arteries*

BLOOD SUPPLY OF PONS

- ARTERIAL SUPPLY:
- Pontine branches of basilar artery.
- Superior cerebellar artery.
- Anterior inferior cerebellar artery.
- VENOUS SUPPLY:
- Basilar venous plexus.
- Inferior petrosal sinuses.





Medial Pontine Syndrome/ Middle Alternating Hemiplegia

Paramedian branches of basilar artery occlusion

Clinical picture

- contralateral hemiplegia of arm & leg
- contralateral loss/decrease of proprioception, vibration, discriminative touch
- ipsilateral lateral rectus muscle paralysis
- paralysis of conjugate gaze toward side of lesion

Where's the lesion ?

- (corticospinal fibers in basilar pons)
- (medial lemniscus)
- (abducens nerve fibers or nucleus)
- (paramedian pontine reticular formation/pontine gaze center)nucleus—CN 6)

CLINICAL CORRELATES

PONTOCEREBELLAR ANGLE SYNDROME

- The anatomical structures located in the pontocerebellar angle include VIIth and VIIIth
- cranial nerves, flocculus of cerebellum and choroid plexus of fourth ventricle.
- The pontocerebellar angle syndrome occurs due to pressure exerted on the lateral region of the caudal part of the pons by **acoustic neuroma**, a tumor which develops,
- from the Schwann cells surrounding the cochlear nerve near its attachment to the brainstem.

CLINICAL CORRELATES

- The characteristic signs and symptoms are as follows :
 - – *Tinnitus, progressive deafness, and vertigo* due to damage of VIIIth cranial nerve.
 - – *Ipsilateral ataxia* and *staggering gait* due to compression of cerebellar peduncle.
 - – *Ipsilateral lower motor neuron type of facial palsy*, due to involvement of facial nerve.
 - – *Ipsilateral loss of pain and temperature sensation and loss of corneal reflex* due to
- involvement of spinal tract and nucleus of trigeminal nerve.

CLINICAL CORRELATES

- **Pontine haemorrhage**
- The pontine haemorrhage may occur due to involvement of branches of basilar and anterior inferior cerebellar arteries. If the pontine haemorrhage is extensive and bilateral,
- the patient presents following clinical picture:
 - – **Pin-point pupil**, due to involvement of ocular sympathetic fibres.
 - – **Hyperpyrexia**, due to severe damage to pons, the body is cut off from heat regulating centres in the hypothalamus.
 - – **Deep coma**, due to involvement of reticular formation.
 - – **Bilateral paralysis of face and limbs**, due to involvement of facial nerve nuclei and corticospinal fibres.

CLINICAL CORRELATES

- **Tumours of the pons**

- *The **astrocytoma** of the pons is the most common tumour of the brainstem. It usually*
- occurs in childhood. The signs and symptoms depend on the area affected.



"That's all Folks!"™