

Dr. Hazem Anatomy lec

- What is the most common spinal cord syndrome?
→ central cord syndrome

- What is the best prognosis of the spinal cord syndrome?
 - Brown sequard syndrome [motor effect, ipsilateral, sensory]

- What is the worst syndrome [motor effect, ipsilateral] → sensory effect [contralateral] → anterior spinal cord syndrome

- causes of Brown sequard syndrome ?
- cut of S.C
 - tumor, disc
 - dural hematoma

- " " anterior cord syndrome ↑
في حالات الـ abdominal aortic aneurysm
gorta clamping لا يعالج
Adams vix (لا يعبر له ischemic) (رح يعالج على)

- any lesion in cerebellum will cause ipsilateral effect
ataxia (مماثل) في الجانبين

- (Vermis) affect or control balance of the trunk while the (hemispheres) affect and control balance of limbs

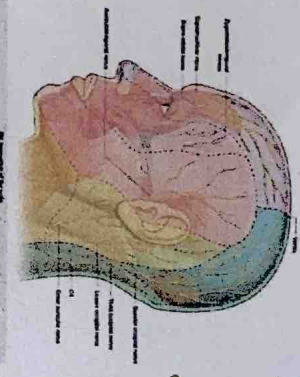
- cerebellum affects the eye movement, speed

→ قد يشارك فيه عضلات معينة ، ال cerebellum مسؤول عن توازن العضلات و يعمل على articulation ، حيث يعمل hypotonic للعضلات لوحها على ال cerebellum كـ lesion.

→ any lesion in cerebellum may cause mutism, also if there
← الشخص يفقد القدرة على الحديث والفهم
is a lesion in vermis (in children) also cause mutism

→ أربع عظمات الكوع والكاحل
ما يسمى «مفصّل»

Dr. Hazem Madi



The meninges are the layers of membranes (meninges) that surround the brain and spinal cord.



Figure 8.1 Major compartments of the head and neck

The two orbits contain the eyes. They are cone-shaped chambers immediately inferior to the anterior aspect of the cranial cavity, and the apex of each cone is directed posteromedially. The walls of the orbits are bone whereas the base of each conical chamber can be opened and closed by the eyelids.

The **nasal cavities** are the upper parts of the respiratory tract and are between the orbits. They have walls, floors, and ceilings, which are predominantly composed of bone and cartilage. The anterior openings to the nasal cavities are **nares** (nostrils), and the posterior openings are **choanae** (posterior nasal apertures).

Description: The scalp refers to the layers of skin and subcutaneous tissue that cover the bones of cranial vault.

Anteriorly: superciliary arches of the Frontal Bone

Posteriorly: external occipital protuberance and superior nuchal lines of occipital bone.

Laterally: inferiorly to the zygomatic arch.

The scalp is a multilayered structure with layers that can be defined by the word itself:

-
- A diagram of a human head in profile, with a cross-section of the cornea. The cornea is shown as a multi-layered structure. Labels with leader lines point to the following layers from the outside in:
- Skin**: The outermost layer of the cornea.
 - Connective tissue (lamellae)**: The layer immediately beneath the skin.
 - Asymptotic layer**: The layer beneath the connective tissue lamellae.
 - Pericardium**: The layer beneath the asymptotic layer.
 - Loose connective tissue**: The innermost layer of the cornea.

Fig. 5C.ALP.

The first 3 layers are tightly held together, forming a single unit. This unit is sometimes referred to as the scalp proper and is the tissue torn away during serious "scalping" injuries.

بہارِ

- ❖ Skin (1st)
It contains numerous hair follicles and sebaceous glands

☐ **Clinical** - a common site for sebaceous cysts due to the abundance of sebaceous glands. **Which could**

❖ Dense Connective tissue (2nd)

It connects the skin to the epicranial aponeurosis. It is richly vascularised and innervated.

- ❑ **Clinical:** The blood vessels within the lower are highly adherent to the connective tissue. This renders them unable to contract fully if lacerated causing profuse bleeding.
- ❑ **Clinical:** Inflammation due to subcutaneous hemorrhage causes much pain & swelling due to the inflammatory response.
- ❑ **Clinical:** Its rich blood supply ensures the vitality of scalp. Thus when a large area of scalp (previously frozen) is removed & stitched it will heal readily.

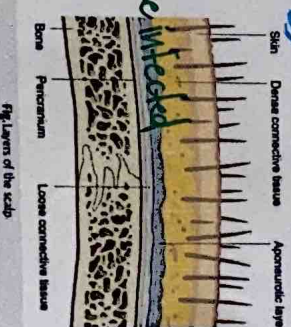


Fig. 1. Layers of the scalp

هو نظام الجرح طلق بغيره، بالتالي فما
أصبح خروج الجرح طلقاً من الجرح طلقاً
بغيره، الجرح طلقاً

Layers of the Scalp: 3rd

❖ Aponeurotic layer (3rd)

The deepest layer of the first 3 layers is the aponeurotic layer. Firmly attached to the skin by the **dense connective tissue** of the 2nd layer, this layer consists of the frontalis muscle connected to the occipitalis muscle via an aponeurosis known as the galea aponeurotica. The galea continues into the temples, investing the auricular muscles, and terminates by attaching to the mastoid processes and the zygomatic arch.

➤ For facial expression

Actions of the Occipitofrontalis muscles: The occipitofrontalis muscles move the scalp, wrinkle the forehead, and raise the eyebrows.

Immervation of the Occipitofrontalis muscles:

- Frontal belly- by temporal branches of CN VII
- Posterior belly- by posterior auricular branch

❑ **Clinical:** If this aponeurosis is incised in the coronal plane the frontalis and occipitalis muscles contract in opposite directions and may result in a large gaping wound.

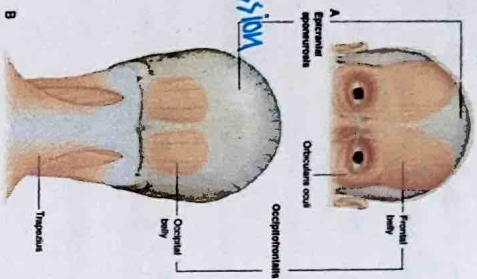


Fig. Occipitofrontalis muscle. A. Frontal belly, B. Occipital belly

هذا الطبقة هي طبقة رابطة بين عضلات ال occipitalis وال frontalis وال aponeurotic layer. هذه العضلة هي قدام و الخلف ال occipitalis dense connection (aponeurosis) لعضلات frontalis. اجتذبة بقوة بهذا طبقة لتنتقل الحركة الى ال occipitalis و هذا يعني ان بعض هذه الطبقة ملاحظة ال occipitalis تنظم هذا و هذا طبقة رابطة بين ال occipitalis و ال frontalis

Scalp: Vasculature

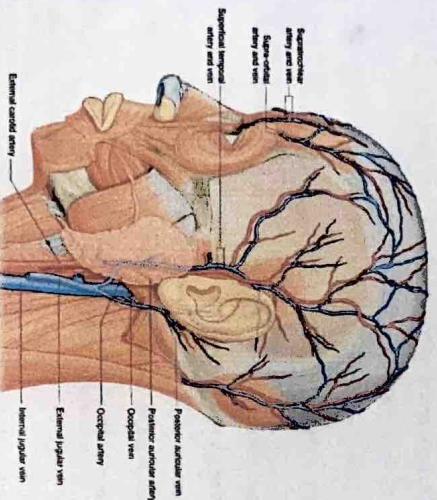


Fig. Vasculature of the scalp

Layers of the Scalp: 4th & 5th

❖ Loose connective tissue (4th)

A layer of loose connective tissue separates the aponeurotic layer from the pericranium and facilitates movement of the scalp proper over the calvaria. This layer contains emissary veins.

❑ Clinical: DANGER LAYER

In scalp injuries, this is the layer in which separation occurs.

Injection can easily spread in this layer. The emissary veins are a conduit through which injections can enter the cranial cavity because they have no valves.

Blunt trauma can result in hemorrhage in this layer. The blood can spread forward into the face because occipitofrontalis muscle has no bony attachment anteriorly, resulting in "black eyes".

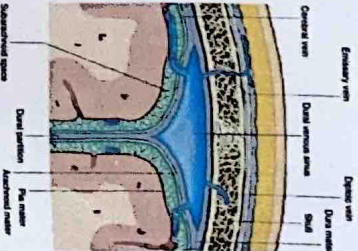
❑ Clinical: "Caput succedaneum"

refers to swelling, or edema, of an infant's scalp that appears as a lump or bump on their head shortly after delivery. This condition is harmless and is due to pressure put on the infant's head during delivery.

❖ Pericranium (5th)

is the periosteum over the external surface of the skull, knits into the sutures.

هذا الطبقة هي طبقة رابطة بين ال occipitalis و ال frontalis و ال aponeurotic layer. هذه الطبقة هي طبقة رابطة بين ال occipitalis و ال frontalis و ال aponeurotic layer. هذه الطبقة هي طبقة رابطة بين ال occipitalis و ال frontalis و ال aponeurotic layer. هذه الطبقة هي طبقة رابطة بين ال occipitalis و ال frontalis و ال aponeurotic layer.



Scalp Vasculature: Arterial Supply

- 1) Branches from the internal carotid artery
- 2) supply the anterior part of scalp
- 1) Supratrochlear arteries
- 2) supra-orbital arteries

supply the anterior and superior aspects of the scalp. They branch from the ophthalmic artery while it is in the orbit, continue through the orbit, and exit onto the forehead in association.

Branches from the external carotid artery

- 3 branches of the external carotid artery supply the largest part of the scalp
- 1) Posterior auricular artery - supply an area of the scalp posterior to the ear.
- 2) Occipital artery - supply a large part of the posterior aspect of the scalp.
- 3) Superficial temporal artery - supplies almost the entire lateral aspect of the scalp.

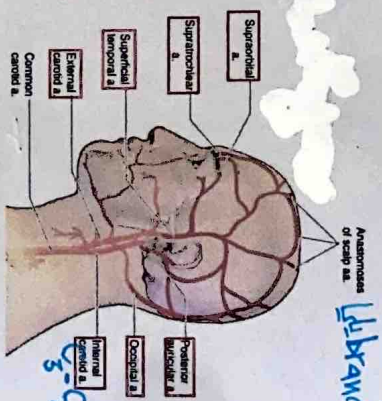


Fig. Arterial supply of the scalp

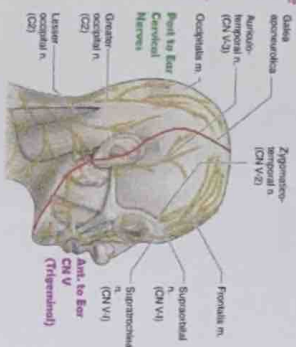
هذا الطبقة هي طبقة رابطة بين ال occipitalis و ال frontalis و ال aponeurotic layer. هذه الطبقة هي طبقة رابطة بين ال occipitalis و ال frontalis و ال aponeurotic layer. هذه الطبقة هي طبقة رابطة بين ال occipitalis و ال frontalis و ال aponeurotic layer. هذه الطبقة هي طبقة رابطة بين ال occipitalis و ال frontalis و ال aponeurotic layer.

سلايد 6:

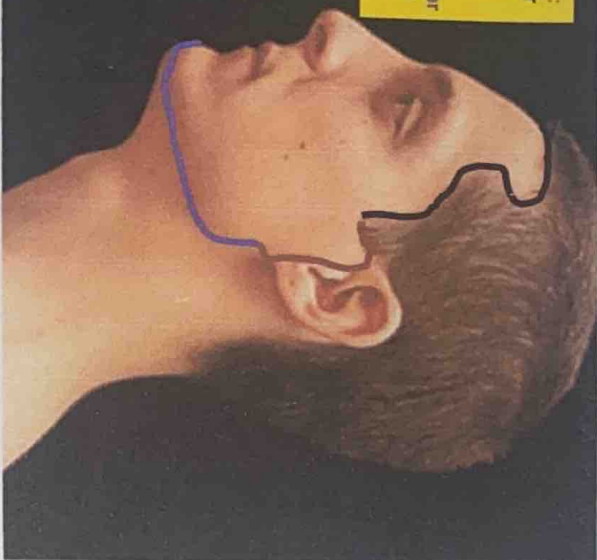
حالة الدخول معروضا إنه غالباً الخطأ، إنه أكثر من جرسه، إلى
الخطأ، ترفاً محو إلى ١٢ مل، هذا يمكن يحدث في shock من دماغه.
نعم يمكن يحدث في hypovolemic حالة في الدخول، فإنه
نسبة التريخا الأكثرية كبيرة نسبة لدره الصغرى القليل

Scalp: Innervation

- **Trigeminal Nerve** - supplies anterior to the ears and the vertex
 - **Supratrochlear nerve** - branch of the ophthalmic nerve [CN V1], which supplies the anteromedial forehead.
 - **Supraorbital nerve** - branch of the ophthalmic nerve [CN V1], which supplies a large portion of the scalp between the anterolateral forehead and the vertex.
 - **Zygomaticotemporal nerve** - branch of the mandibular nerve [CN V3], this supplies the temple.
 - **Auriculotemporal nerve** - branch of the mandibular nerve [CN V3] which supplies skin anterosuperior to the auricle.
- **Cervical Nerves** - supplies posterior to the ears and the vertex
 - **Lesser occipital nerve** - derived from the anterior ramus (division) of C2 and supplies the skin posterior to the ear
 - **Greater occipital nerve** - derived from the posterior ramus (division) of C2 and supplies the skin of the occipital region.
 - **Great auricular nerve** - derived from the anterior rami of C2 and C3 and supplies the skin posterior to the ear and over the angle of the mandible.
 - **3rd occipital nerve** - derived from the posterior ramus of C3 and supplies the skin of the inferior occipital region.



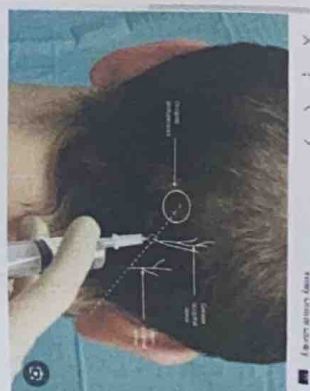
Face boundaries:
Hair line superior
Auricles, lateral
Mandibular border
and chin, inferior



Awake craniotomy scalp block

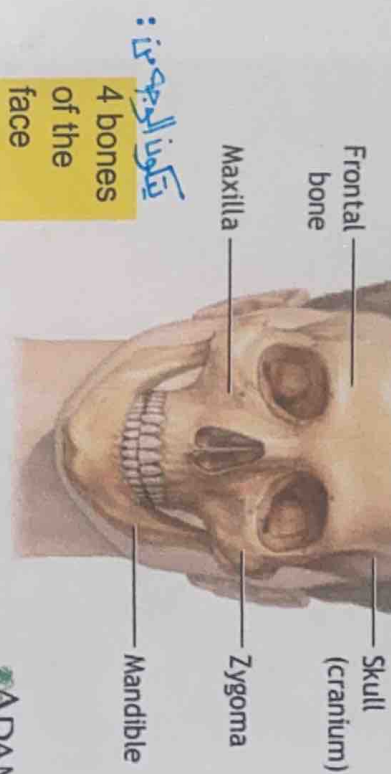


related to occipital N occipital neuralgia [Inquad]



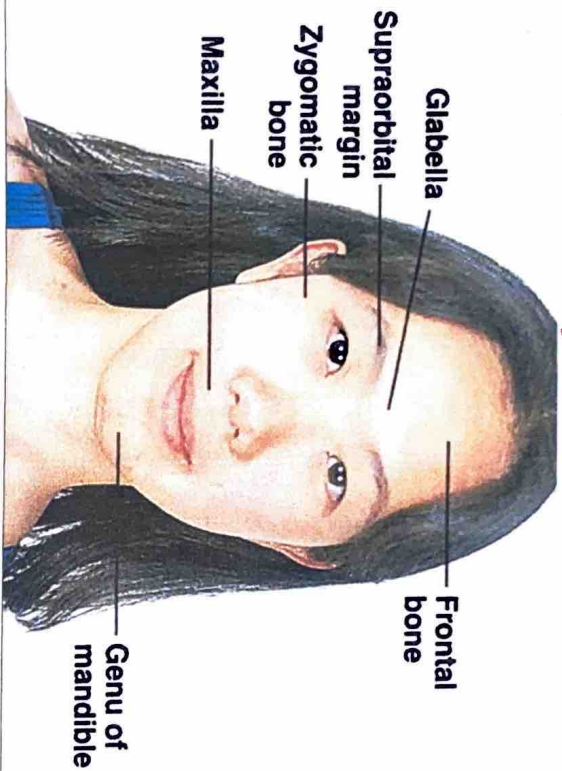
ليش نعرفه اننا inner part نيج ال scalp كخبر من حالات الدوخة فحسب نجي تحت التشنج البطني [Awake craniotomy] والمريض حاسس رايها عشتا يظن تحت المراقبة

Skeleton of face

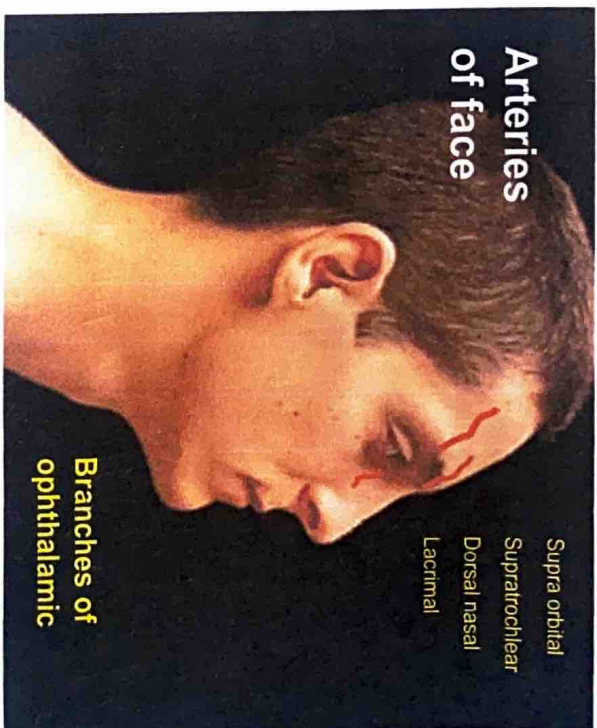


ADAM1

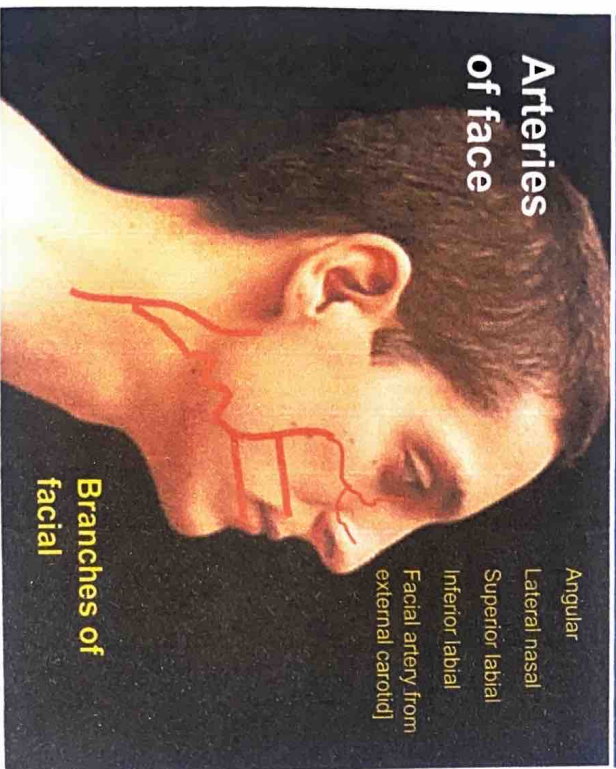
Anterior View of Bony Landmarks on the Face



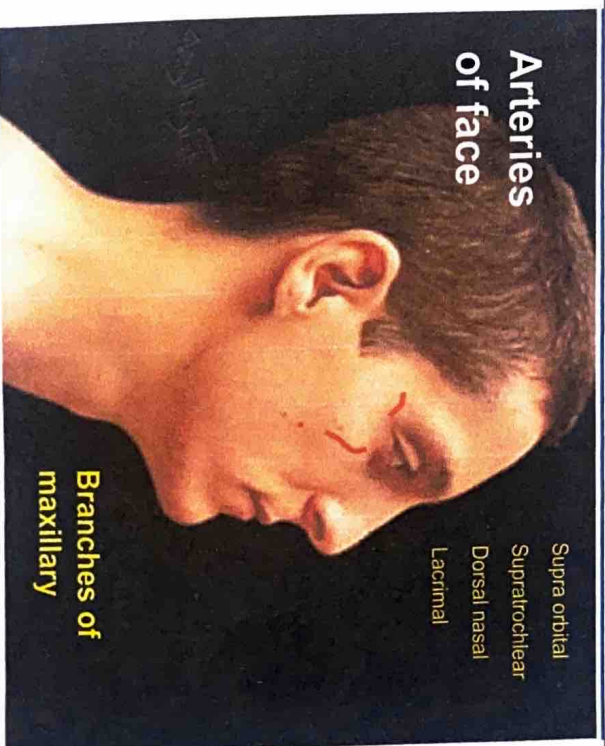
Arteries of face

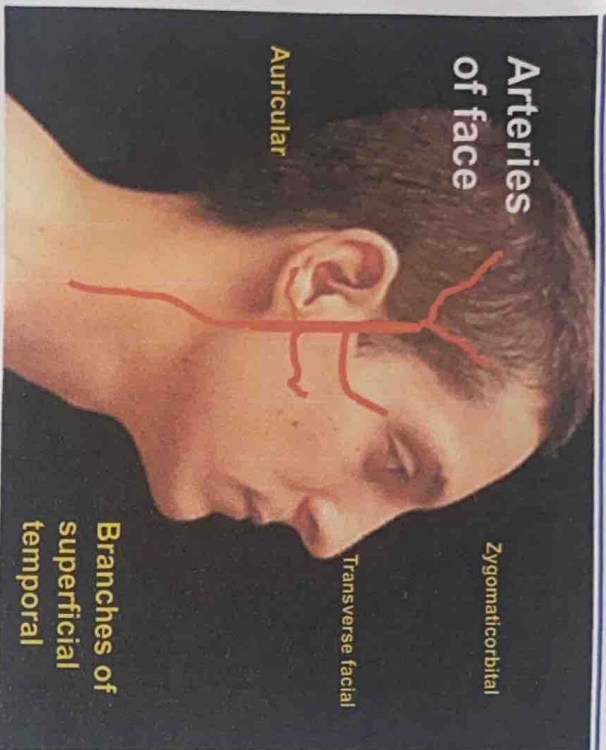


Arteries of face



Arteries of face





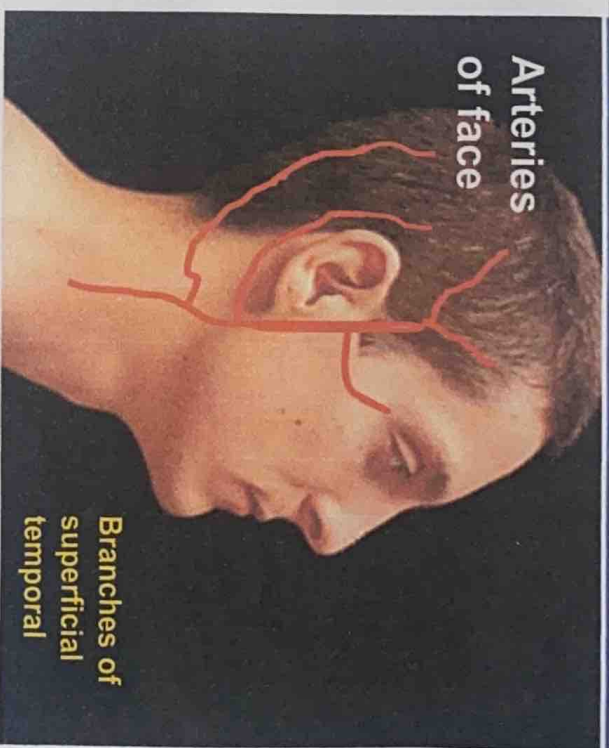
Arteries of face

Zygomaticofacial

Transverse facial

Auricular

Branches of superficial temporal

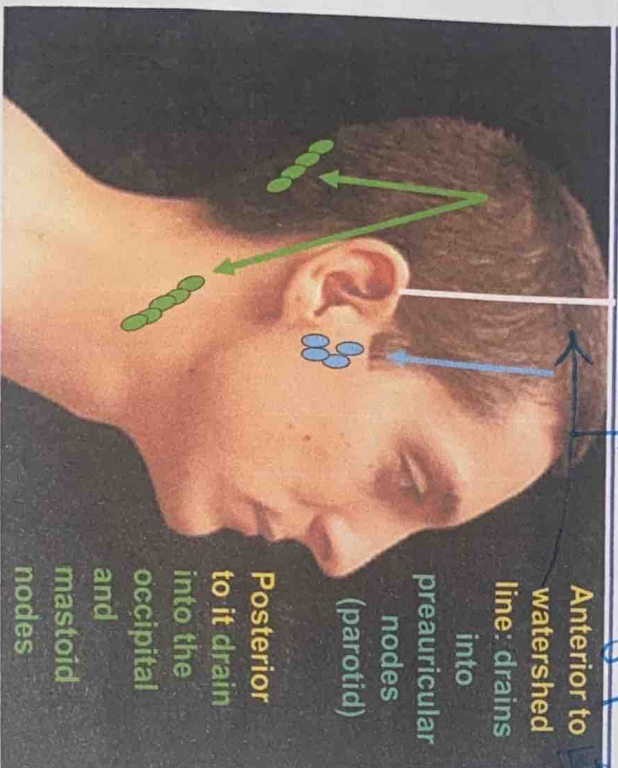


Arteries of face

Branches of superficial temporal

ear to the side of the face

lymph nodes:

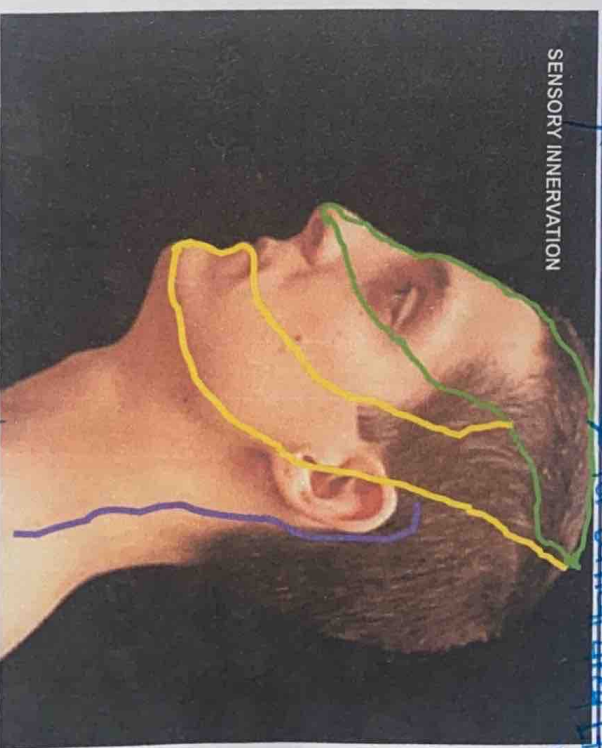


Anterior to watershed line: drains into preauricular nodes (parotid)

Posterior to it drain into the occipital and mastoid nodes

lateral canyons to angle of mouth. From V_1, V_2, V_3 [branches of trigeminal nerve] for cervical area to angle of mandible

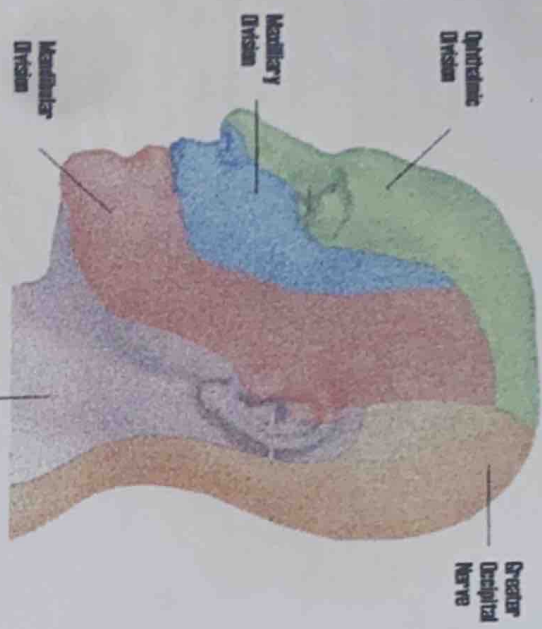
SENSORY INNERVATION



angle of mandible

facial nerve to the side of the face

facial nerve to the side of the face



MUSCLES OF THE FACE

- Sphincters
- Dilators
- Expressors

MUSCLES OF THE FACE

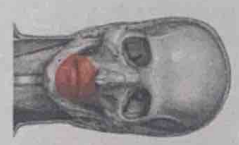
Sphincters

ORBICULARIS ORIS

Encircling the mouth, it inserts into muscle and skin around the mouth. This muscle closes the mouth and purses the lips - the "kissing muscle".

ORBICULARIS OCULI

Muscles encircling the orbit of the eye. They close the eyes, produce blinking, squinting and draw the eyebrows downward.

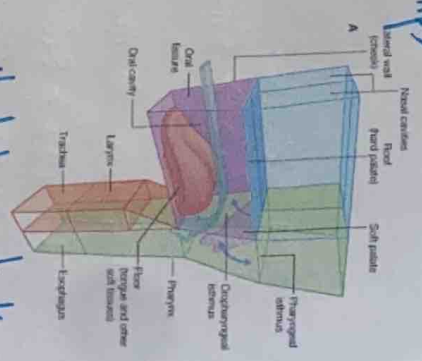


For mouth

ORAL CAVITY

The oral cavity is inferior to the nasal cavities. It has a roof and floor, and lateral walls, opens onto the face through the oral fissure, and is continuous with the cavity of the pharynx at the oropharyngeal isthmus.

The roof of the oral cavity consists of the hard and soft palates. The floor is formed mainly of soft tissues, which include a muscular diaphragm and the tongue. The lateral walls (cheeks) are muscular and merge anteriorly with the lips surrounding the oral fissure (the anterior opening of the oral cavity).



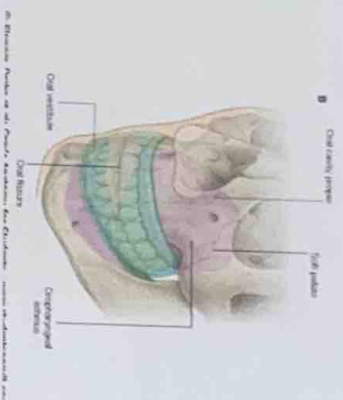
laterally → cheeks
anteriorly → teeth and lips

Floor and roof → arches

cavity between cheeks and teeth
is → oral vestibule

cavity between sup and inf
arches is cavity proper

the outer **oral vestibule**, which is horseshoe shaped, is between the dental arches and the deep surfaces of the cheeks and lips-the oral fissure opens into it and can be opened and closed by muscles of facial expression, and by movements of the lower jaw; the inner **oral cavity proper**, which is enclosed by the dental arches



Cranial Nerves

- I Olfactory
- II Optic
- III Oculomotor
- IV Trochlear
- V Trigeminal
- VI Abducens
- VII Facial
- VIII Vestibulocochlear
- IX Glossopharyngeal
- X Vagus
- XI Accessory
- XII Hypoglossal



Multiple nerves innervate the oral cavity

General sensory innervation is carried predominantly by branches of the trigeminal nerve [V]:

the upper parts of the cavity, including the palate and the upper teeth, are innervated by branches of the **maxillary nerve [V2]**; the lower parts, including the teeth and oral part of the tongue, are innervated by branches of the **mandibular nerve [V3]**

taste (special afferent-SA) from the oral part or **anterior two-thirds of the tongue** is carried by branches of the **facial nerve [VII]**, which join and are distributed with branches of the trigeminal nerve [V];

All muscles of the tongue are innervated by the **hypoglossal nerve [XII]**, except the palatoglossus, which is innervated by the vagus nerve [X].

I. Olfactory Nerve

- ❖ Component: Sensory
 - ❖ Function: Smell
 - ❖ Origin: Olfactory receptor nerve cells
 - ❖ Opening to the Skull: Openings in cribriform plate of ethmoid
- 
- An anatomical illustration of the olfactory bulb and its associated structures. The olfactory bulb is shown as a reddish, textured mass. Above it, the olfactory nerve is depicted as a bundle of fibers. The illustration is set against a light blue background with a faint grid pattern.



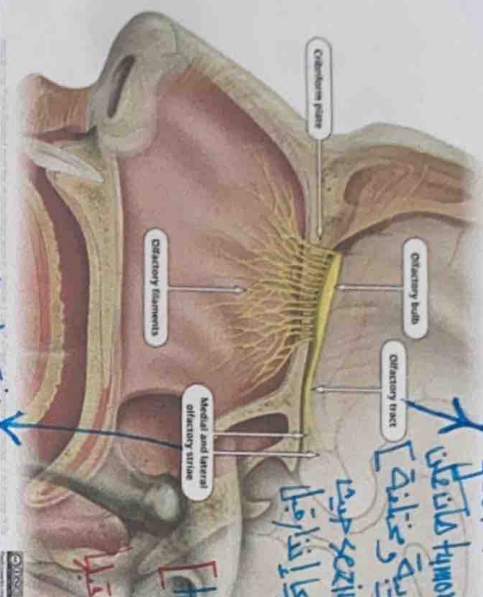
حبيب ال CSF على ارتفاع
 سطح خداع في بعض
 الحالات مثل meningitis و tumor
 هذا الاختبار مهم في CSF
 حيث على بعض المرضى CSF | pakage
 (Kraninoreg)

وهذا على العرب ليتبع
الملك [روانكس] كدونه
الجمعة على المرافقة حارة

→ Fall
in front of nose

nerve endings

Olfactory nerve



goes to temporal lobe
يعني لو راح عنده tumor فانه يمشي
يشم الرائحة كبرية وكثيره وعنده
ويعطاه حيلة ان يعرف حيث
الرائحة طاريا يكون زحاما فانه يمشي
منه الطبع
[temporal] seizures
عندنا فيم انا نسمع كلام
اشياء غريبة

منسحقا طين حلو
anterior perforator
substance

II. Optic Nerve

العين البصري

- Component: Sensory
- Function: Vision
- Origin: Back of the eyeball
- Opening to the Skull: Optic Canal



this nerve → arise from retina

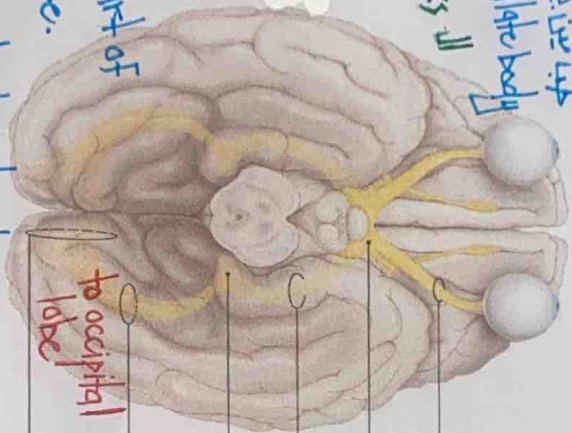
III. Oculomotor Nerve

- Component: Motor
- Function:
 - Raises upper eyelid
 - Turns eyeball upward, downward and medially
 - Constricts pupil
 - Accommodates the eye
- Origin: Anterior surface of the midbrain
- Opening to the Skull: Superior orbital fissure



• nerve 6 → supply the lateral rectus M
• nerve 4 → supply the superior oblique M
• كل ال nerves يتطلع من قدام
• عدا ال trochlear يتطلع من
• كذا ويليها

• medial geniculate body
• auditory filaments



• around the cerebral peduncle
there is the cistern (CSF)
cranial nerves لا يمرت من

• if affected by any
lesion → Bitemporal
Hemianopia
• focally with
Pituitary adenoma
• cranial pharynx
• through the medial
cavity and spheno-
sinus, we can reach
the pituitary gland
• optic tract
• optic chiasma
• Lateral geniculate body
• Optic radiation
• to occipital
lobe
• Visual cortex

vision latero orbit atavismal zavtan slithuna

lateralis au to carterand vd vlnemoband bnties si nobsterni vlogas lerned

[VI] avian

are ptear requu artt bna areled and gndubou vline artt to zraq requu artt

[VII] avian vlnemoband artt to zndand vd nobsterni

vd nobsterni are ptear artt to zndand bna dteat artt gndubou areq requu artt

[VIII] avian nobsterni artt to zndand

si augnot artt to zndand vd nobsterni to nqa lino artt mot (A2 merville lino) areq

areq nobsterni are ptear artt to zndand bna dteat artt gndubou areq requu artt

[IX] avian nobsterni artt to zndand

[X] avian nobsterni artt to zndand

areq nobsterni artt to zndand bna dteat artt gndubou areq requu artt

[XI] avian nobsterni artt to zndand

[XII] avian nobsterni artt to zndand

سلايد (٧) :
Brodmann classification of Brain areas

Brodmann classification of Brain areas

area 17, 18, 19 → occipital lobe

area 1, 2, 3 → sensory

area 4, 6 → motor

area 44, 45 → Broca's area

area 21, 22 → Wernicke's area

فوق الـ lateral geniculate nucleus على midbrain

optic nerve من الـ Edinger Westphal nucleus على midbrain

من الـ Edinger Westphal nucleus على midbrain

Myelars lob → related to vision

abducent palsy
smelling of optic nerve

شوكا شوكا

منطقة الـ CP التي تحتفظ على الـ Myelars lob

منطقة الـ CP التي تحتفظ على الـ Myelars lob

abducent palsy

smelling of optic nerve

Myelars lob → related to vision

Myelars lob → related to vision

Myelars lob → related to vision

Myelars lob → related to vision

Myelars lob → related to vision

Myelars lob → related to vision

Myelars lob → related to vision

Myelars lob → related to vision

Myelars lob → related to vision

Myelars lob → related to vision

Myelars lob → related to vision

Myelars lob → related to vision

Myelars lob → related to vision

Myelars lob → related to vision

Myelars lob → related to vision

→ around the cilia tertia there is the cavernous sinus which contain the (ICA + Nerve 6) and on its wall there is Nerve 3, 4, V₁

Note: nerves of cavernous sinus arise from sup orbital fissure

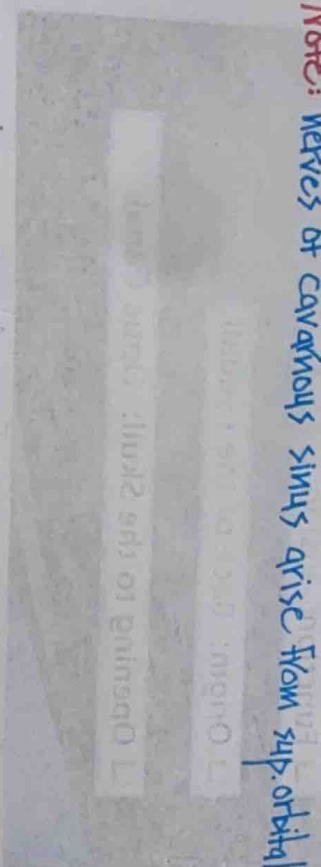


Figure 1: Cavernous sinus system

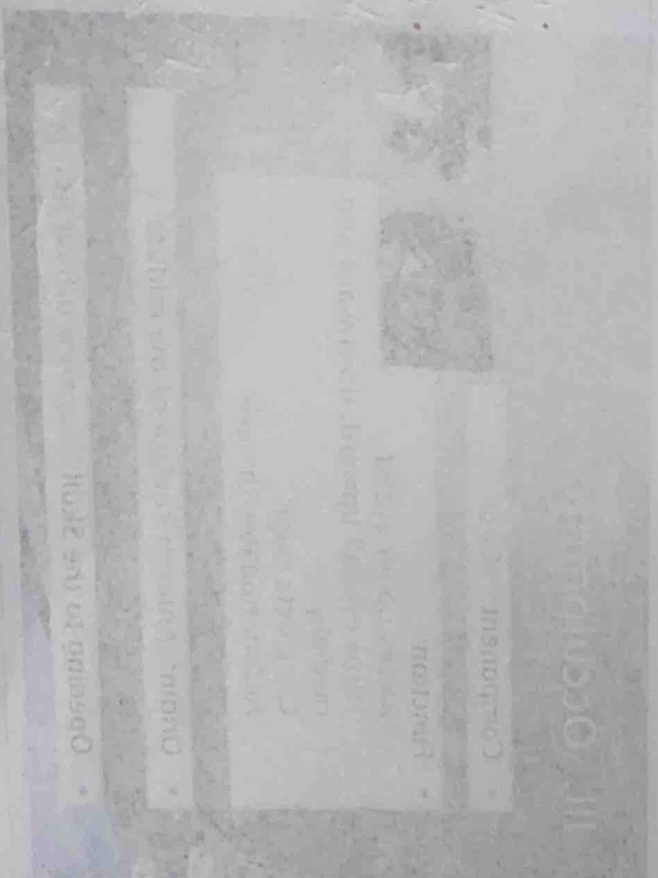
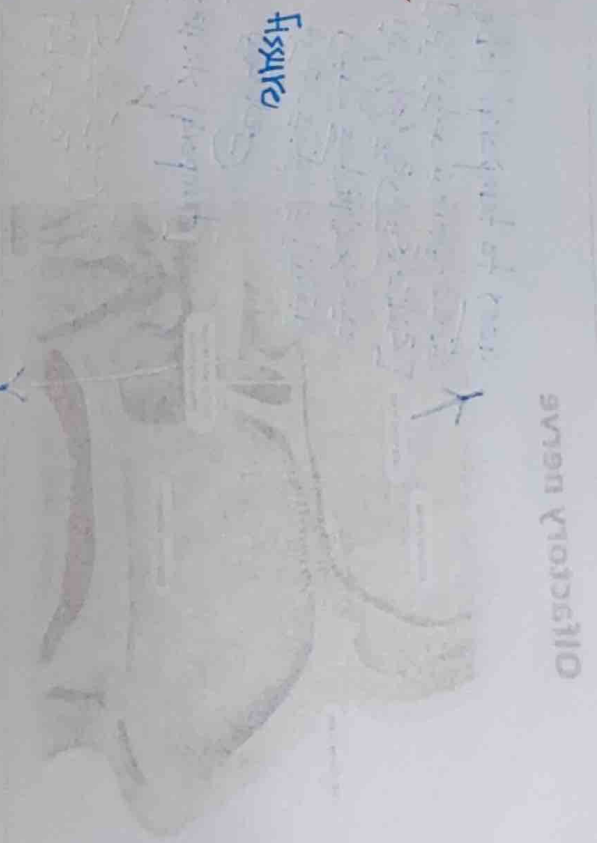


Figure 2: Cavernous sinus system

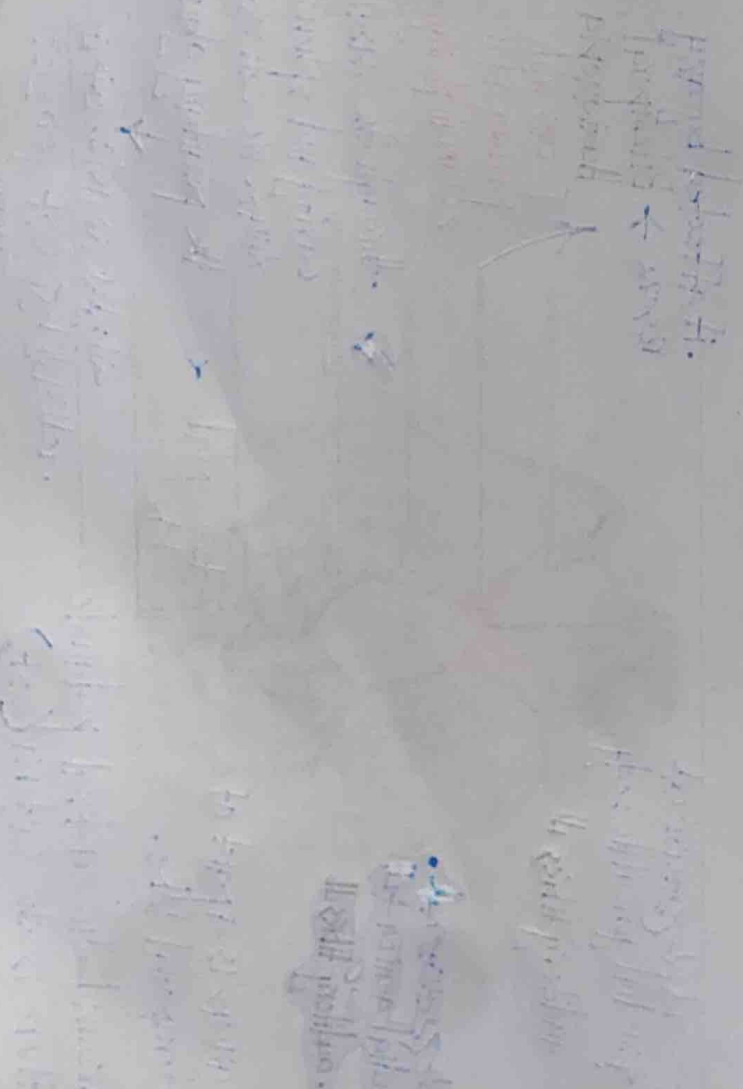
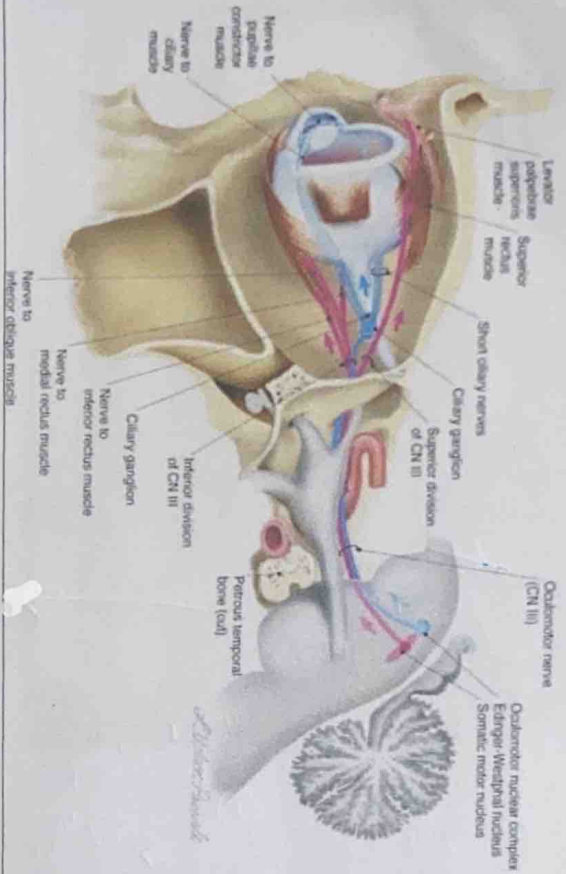


Figure 3: Cavernous sinus system

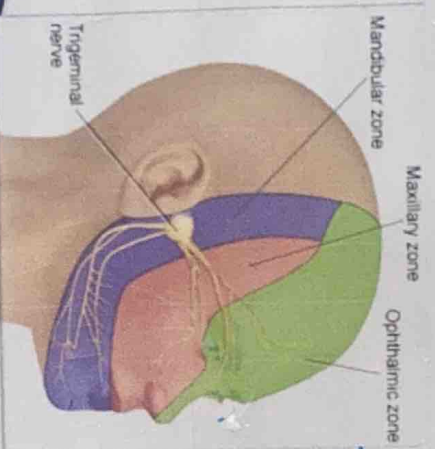


IV. Trochlear Nerve



- ✓ **Component:** Motor
- ✓ **Function:** Assisting in turning eyeball downward and laterally
- ✓ **Origin:** Posterior surface of the midbrain
- ✓ **Opening to the Skull:** Superior orbital fissure

V. Trigeminal Nerve



- mixed nerve [motor + sensory]
- $V_3 \rightarrow V_1 \rightarrow V_2 \rightarrow V_3$
- supplying muscle
- it has 3 nuclei

V1. Ophthalmic Nerve

- ❖ **Component:** Sensory
- ❖ **Function:**
 - ❖ Cornea
 - ❖ Skin of forehead
 - ❖ Scalp
 - ❖ Eyelids and nose
 - ❖ Mucous membranes of paranasal sinuses and nasal cavity
- ❖ **Origin:** Anterior aspect of the pons
- ❖ **Opening to the Skull:** Superior orbital fissure

V2. Maxillary Nerve

- Component: Sensory
- Function:
 - Skin of the face over maxilla
 - Teeth of the upper jaw
 - Mucous membrane of the nose, the maxillary sinus and palate
- Origin: Anterior aspect of the pons
- Opening to the Skull: Foramen ovale

V3. Mandibular Nerve

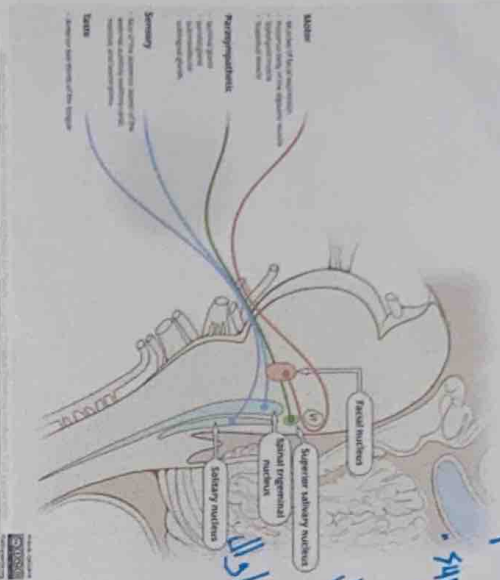
- Component: a. Motor
- Function:
 - Muscles of mastication
 - Mylohyoid
 - Anterior belly of digastric
 - Tensor veli palatine
 - Tensor tympani
- Origin: Anterior aspect of the pons
- Opening to the Skull: Foramen Rotundum

VI. Abducent Nerve

- ✓ Component: Motor
- ✓ Function: Lateral rectus muscle turns eyeball laterally
- ✓ Origin: Anterior Surface of hindbrain between pons and medulla
- ✓ Opening to the Skull: Superior orbital fissure



Facial nerve

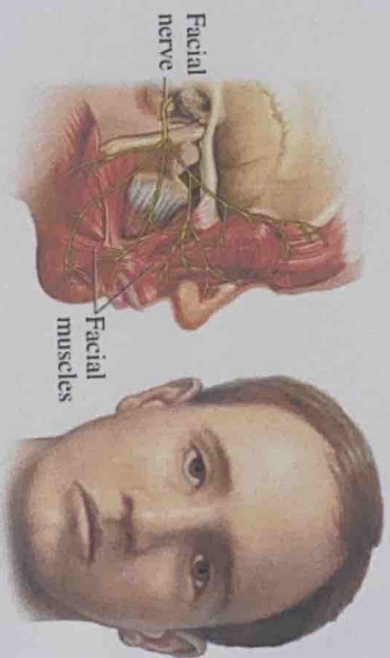


it has many nuclei located in pons and medulla oblongata

superior salivary and solitary nucleus [its nucleus]

مستقر لنا في الحبل (بواسطة لا chorda tympani)

وستكون: جزئيا لا lacrimation ولا facial expression



شرح عن ال LMNL وال LMNL

LMNL → lesion on cerebral cortex before nucleus, or before ANS in spine

لا أقامه frontal بأحد Blood أقامه من الجبهة

يعني: يعني فقرة N facial بأحد B. في

جربتنا! يعني المعنى من الوجة بأحد من جربتنا

والملك كذا

جربتنا! (هذا مخرج من دالة بشكل الوجه)

كثيرا الملهيا

أول الرغبات لا عدها جرحه

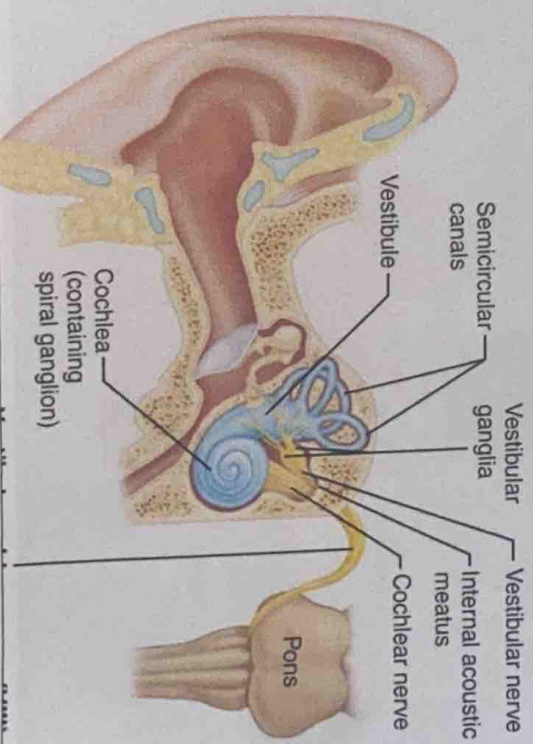
ومشاه قلا: يعني عنده (LMNL) ، لكن

لو قلا/ يعني عنده (LMNL) ونفطة جرحه

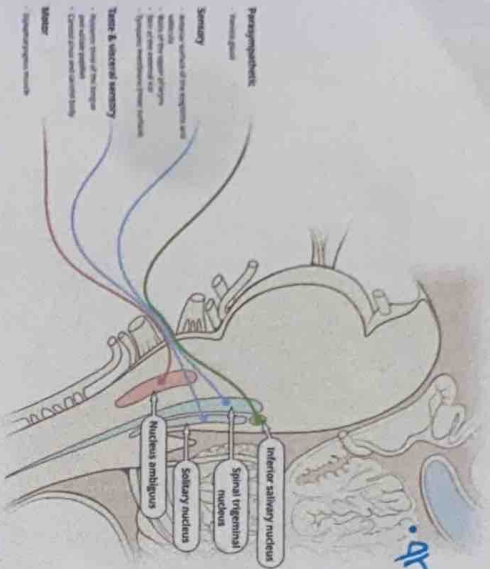
سأ:

هو ال facial بيطلي مع بعضنا من ال roots ويندخلنا في ال internal auditory canal حيث Nerve 8 يخرج على ال vestibulocochlear system على ال stylomastoid foramen

The Vestibulocochlear Nerves - VIII

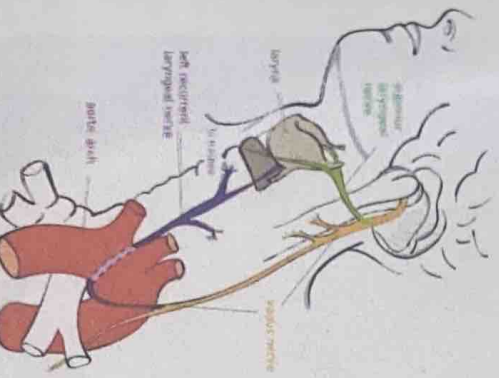
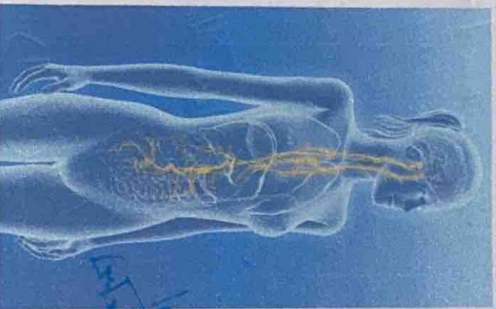


Glossopharyngeal nerve

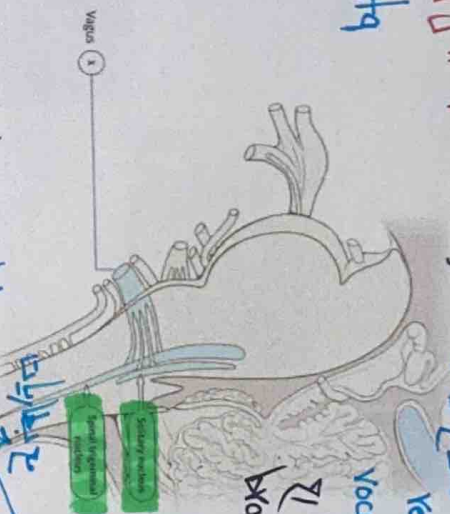


mixed nerve (parasymp + motor for pharyngeal muscle + sensory)

arise from medulla oblongata



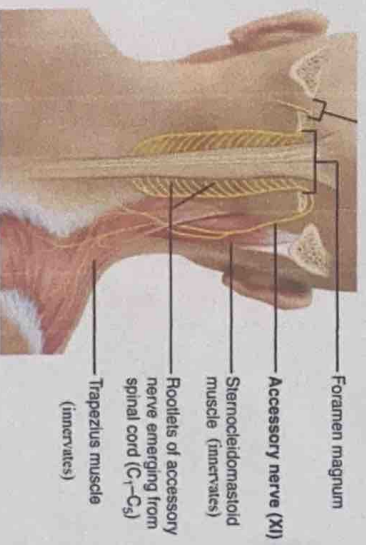
Vagus nerve. it pass through the carotid sheath. it pass through the carotid sheath. it pass through the carotid sheath.



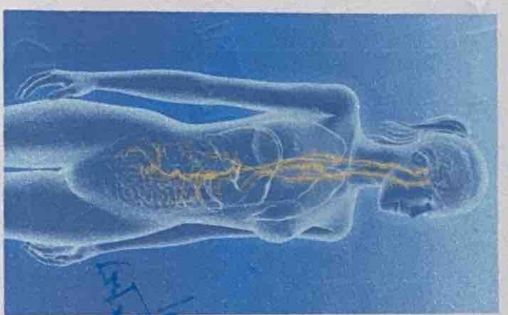
recurrent laryngeal nerve vocal cord. it pass through the carotid sheath. it pass through the carotid sheath. it pass through the carotid sheath.

Vagus N. it pass through the carotid sheath. it pass through the carotid sheath. it pass through the carotid sheath.

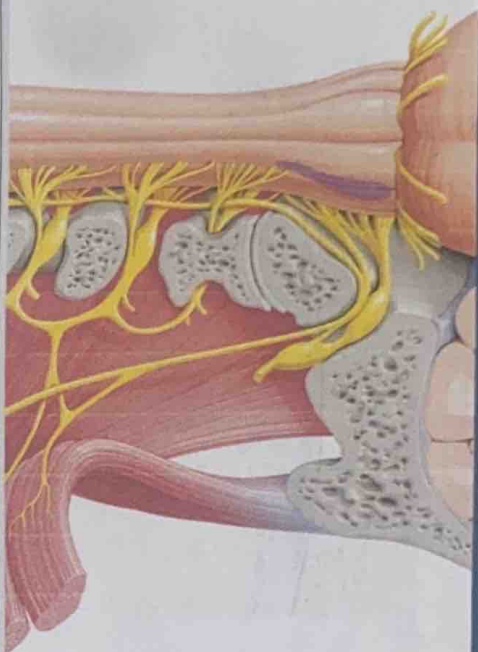
The Accessory Nerves - XI - unique origin from spinal cord



Arise from the spinal cord. it pass through the carotid sheath. it pass through the carotid sheath. it pass through the carotid sheath.

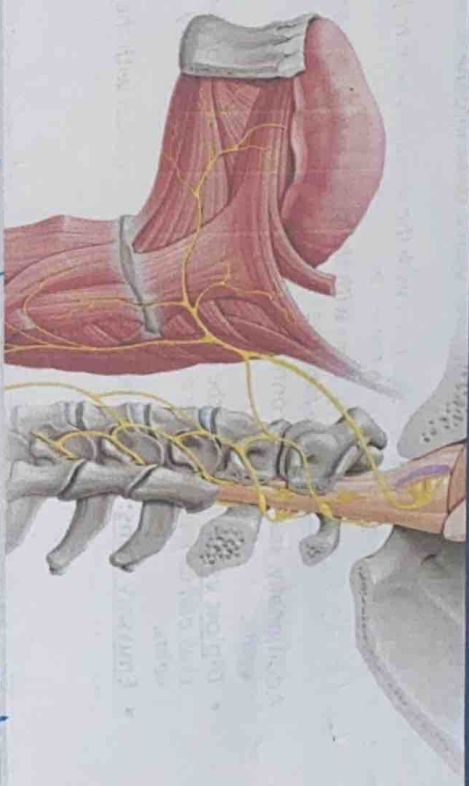


Accessory nerve



K

Hypoglossal nerve



K

طراد ال nerve يغذي عضلات اللسان، لو حار عليه extension يترجح على انفتاح
 الجوة، حيث عضلات اللسان يفتح Protraction [اللسان ينحرف له Protraction]
 ، لو ضغطت العين سنا هينفتح للسؤال و فترجح اللسان

Thanks for your attention

Questions