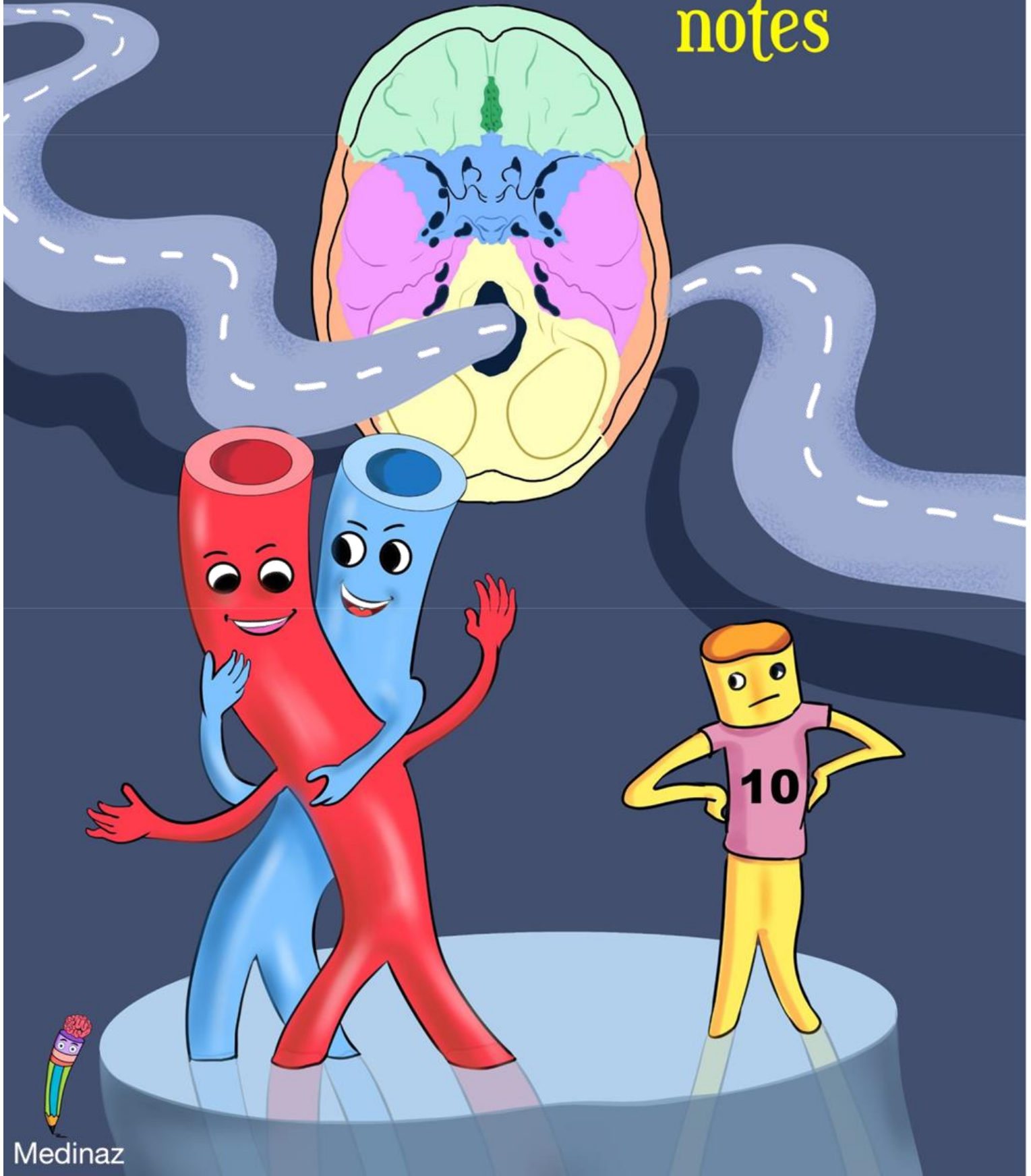


FORAMINA & CANALS

High-yield
notes



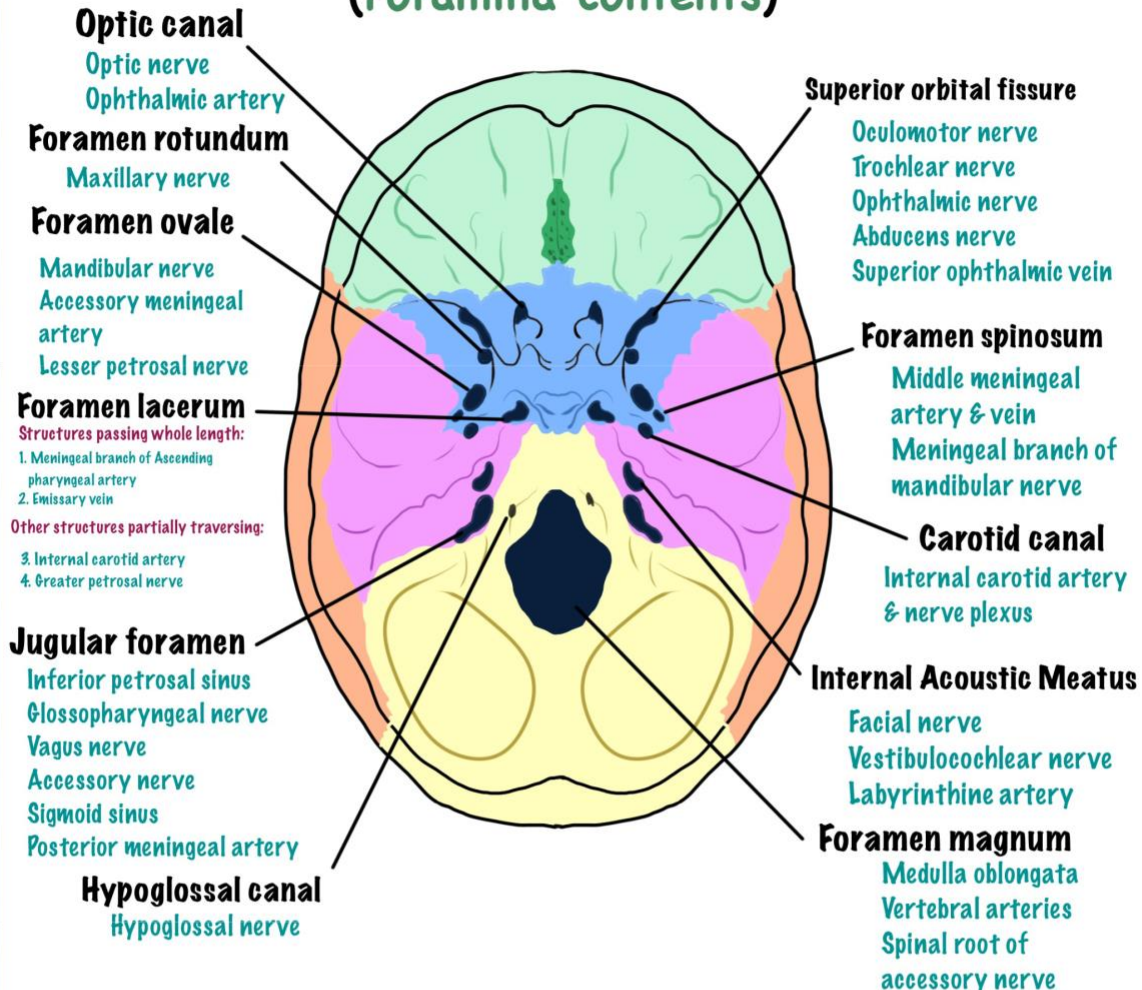
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Base of the Skull

(Foramina contents)



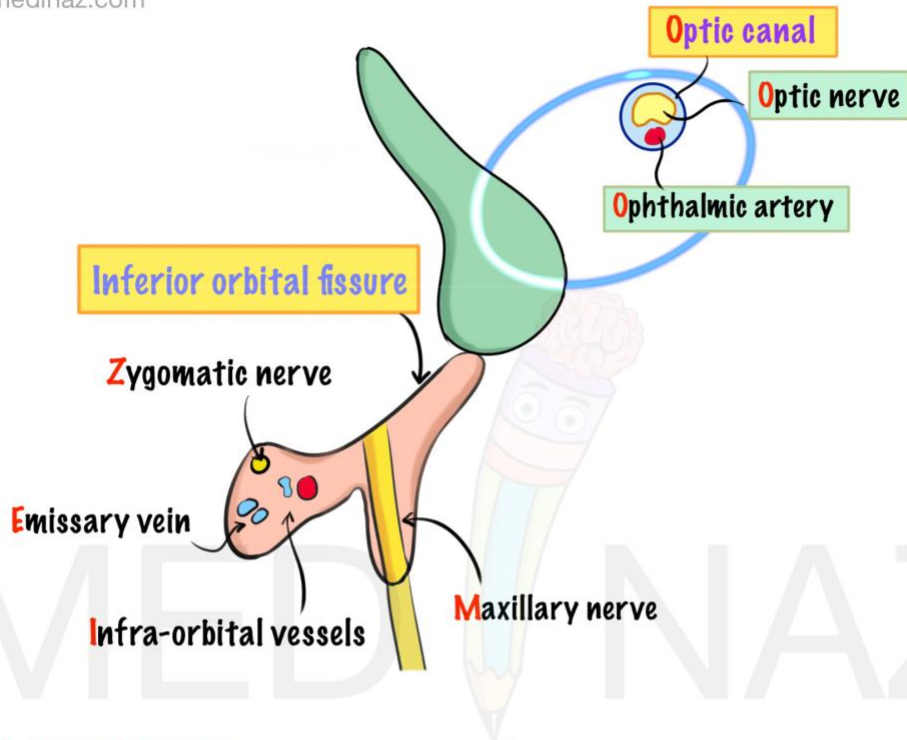
Clinical Correlates

Jugular foramen syndrome: may be caused by a tumor pressing on CN IX, X, and XI. Patients present with hoarseness, dysphagia (CN IX and X), loss of sensation over the oropharynx and posterior third of the tongue (CN IX), and trapezius and sternocleidomastoid weakness (CN XI). The nearby CN XII may be involved, producing tongue deviation to the lesioned side.

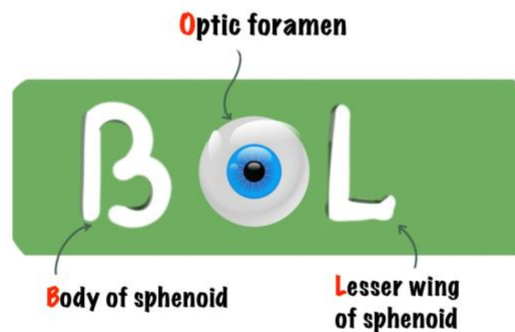
Optic canal contents

- Optic nerve, sympathetic nerves
- Ophthalmic artery

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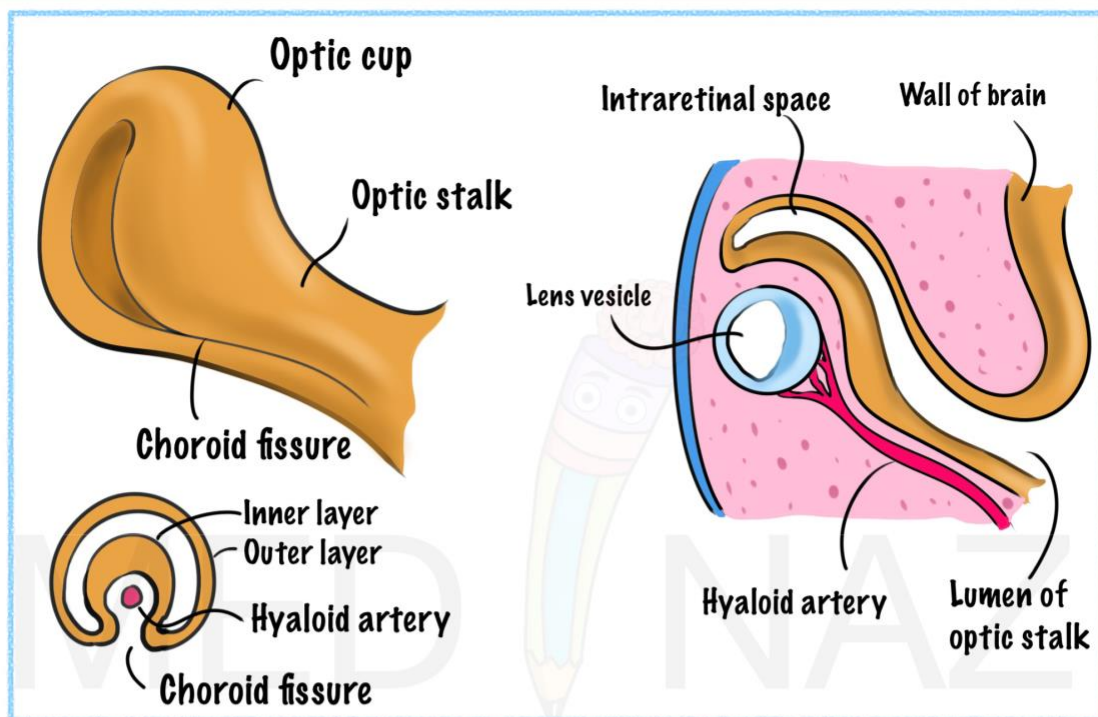


➔ **Optic foramen:** is situated between lesser wing and body of sphenoid



Choroid fissure of eye

The developing optic vesicle and stalk have a groove on their inferior surfaces called the optic or choroidal fissure, through which blood vessels gain access to the **optic cup** as well as the **lens vesicle**. The blood vessels are the **hyaloid artery**, a branch of the ophthalmic artery, and its accompanying vein



Superior Orbital Fissure

Upper part:

- Superior ophthalmic vein
- Recurrent meningeal branch of ophthalmic artery.
- Trochlear nerve, Lacrimal and frontal branch of 5th CN
- Lower border provides attachment to common tendinous ring of Zinn.

Middle part:

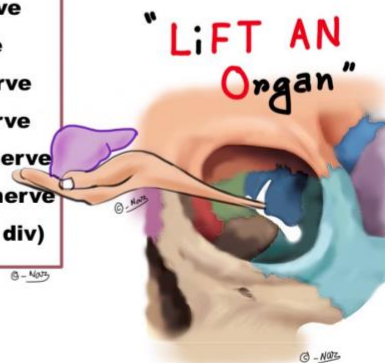
- Oculomotor nerve (3)
- Nasociliary nerve (V1)
- Abducent nerve

Lower part:

- Inferior ophthalmic vein
- Sympathetic plexus

Nerves Passing Through Superior Orbital Fissure

- Lacrimal nerve
- Frontal nerve
- Trochlear nerve
- Abducent nerve
- Nasociliary nerve
- Oculomotor nerve (sup. and inf. div)

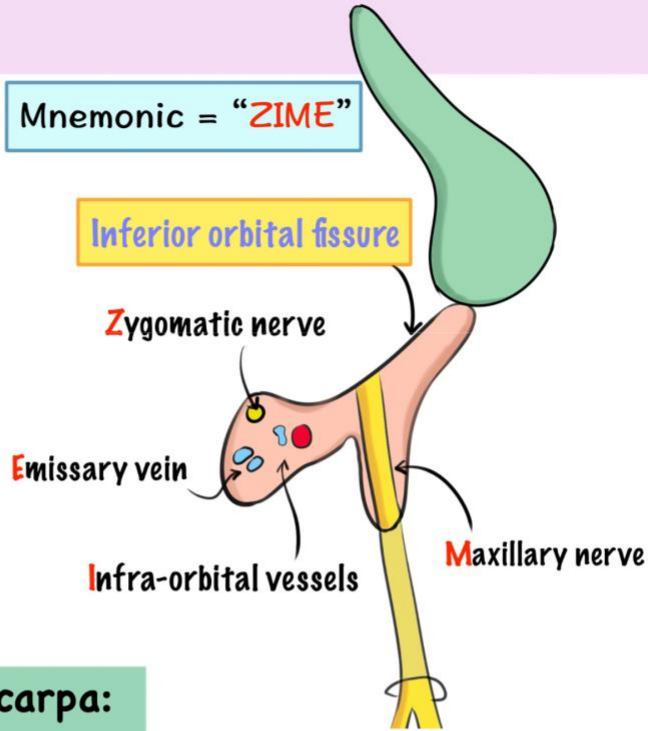


Inferior orbital fissure (IOF) contents

- Zygomatic nerve
- Infra-orbital vessels
- Maxillary nerve
- Emissary vein

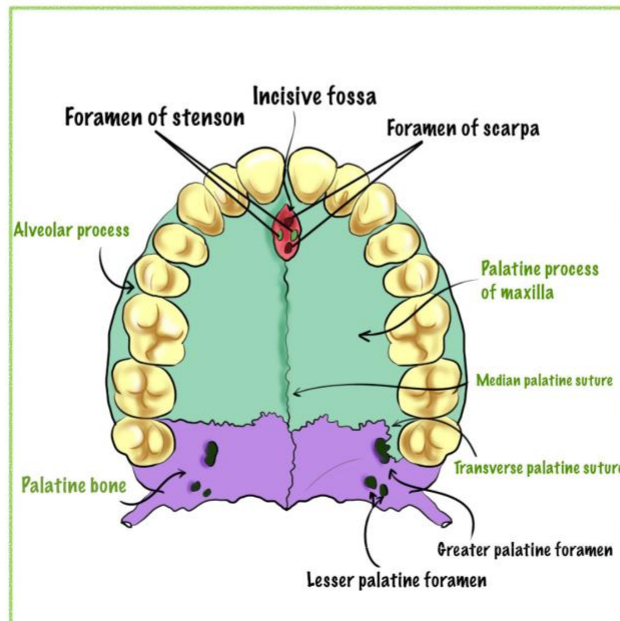
Mnemonic = "ZIME"

Inferior orbital fissure



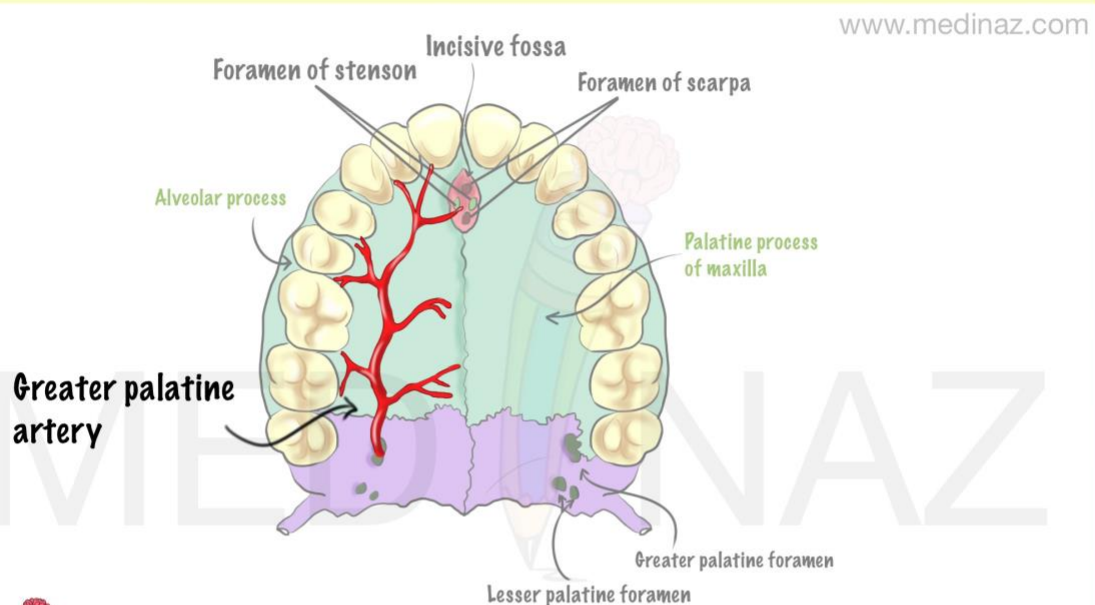
Foramen of scarpa:

In the maxilla, occasionally two additional canals are present in the middle line of the palatine process; they are termed the **foramina of Scarpa**, and when present transmit the **nasopalatine nerves**, the left passing through the anterior, and the right through the posterior canal



Nasopalatine foramen:

- ➔ Also known as - nasopalatine foramen / anterior palatine foramen
- ➔ It is the oral opening of the **nasopalatine canal**.
- ➔ It is located in the maxilla in the incisive fossa, midline in the palate posterior to the central incisors, at the junction of the medial palatine and incisive sutures.
- ➔ It can be **single** or **multiple**.
- ➔ It transmits the **greater palatine artery** and **vein** from the **oral to the nasal** cavity and the **nasopalatine nerve** in the opposite direction.



High yield points

- ➔ Emissary sphenoidal foramen is aka- **foramen of Vesalius**.
- ➔ Foramen of **Luschka** and **Magendie** are foramen of drainage of **CSF**.
- ➔ Forament of Magendie is **median aperture** in ventricular system and links the 4th ventricle and the cisterna magna.
- ➔ Foramen of Luschka are 2 lateral apertures in 4th ventricle.
- ➔ Space between uncinete process and bulla ethmoidalis in known as **hiatus semilunaris**

Foramen spinosum

Foramen spinosum contents

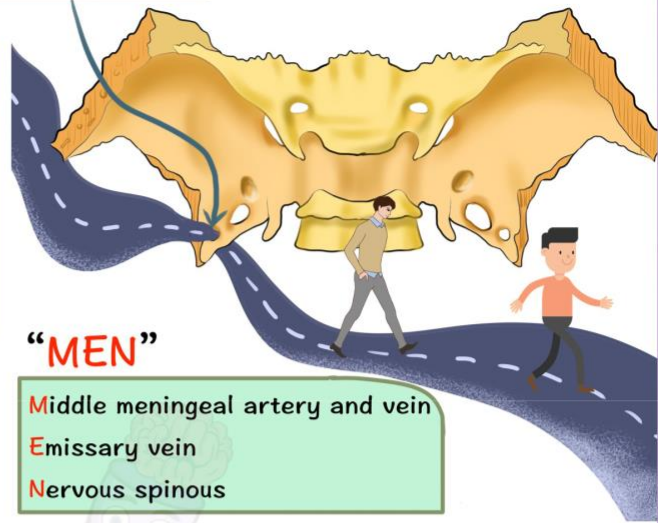
- ➔ Middle meningeal artery and vein
- ➔ Emissary vein
- ➔ Nervous spinous (meningeal branch of mandibular nerve)

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“MEN”

- Middle meningeal artery and vein
- Emissary vein
- Nervous spinous



Foramen lacerum

- ➔ B/w petrous and sphenoid
- ➔ Lower part - filled with cartilage
- ➔ Upper part - transmits ICA

Hypoglossal canal contents

- ➔ Hypoglossal nerve and its meningeal branch
- ➔ Meningeal branch of ascending pharyngeal artery.
- ➔ Emissary vein

Jugular foramen contents

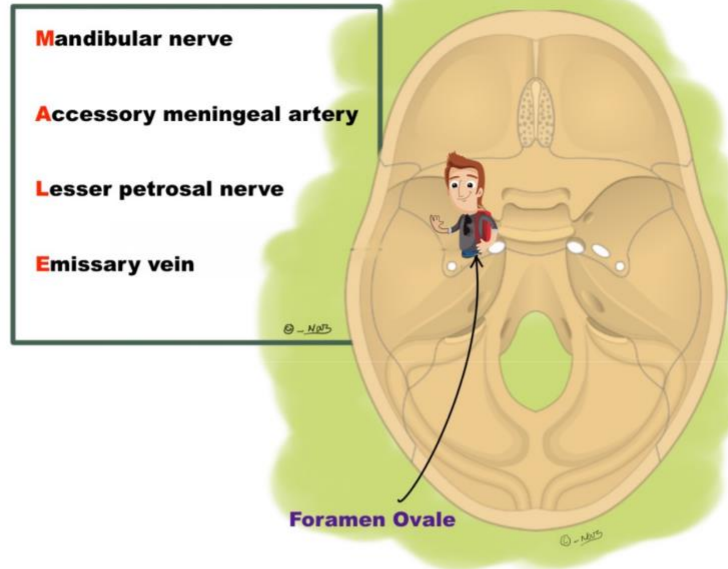
- ➔ Anterior part: Inferior petrosal sinus
- ➔ Middle part: CN 9, 10, 11 + Meningeal branch of ascending pharyngeal artery.
- ➔ Posterior part: Occipital artery + IJV, emissary vein



Points to remember:

- ➔ CN 12 passes through hypoglossal canal

Foramen Ovale contents

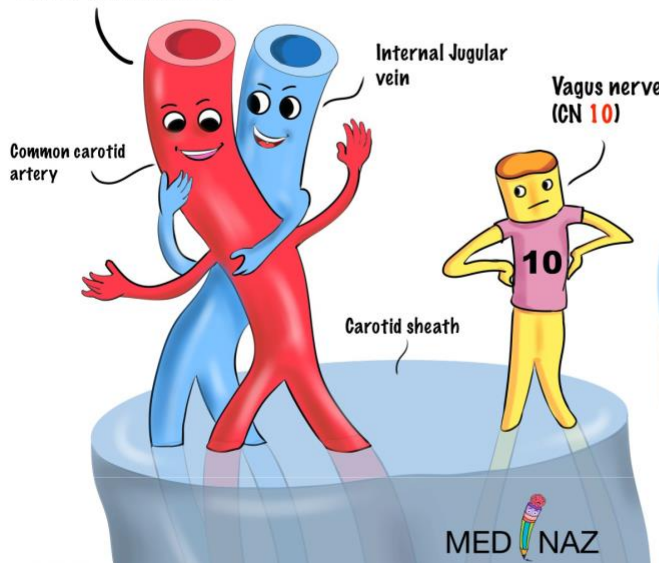


Carotid Sheath contents

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- ➔ Internal jugular vein
- ➔ Common carotid artery (ICA in upper part)
- ➔ Vagus n. [Note: Sympathetic trunk is outside]

Hey Buddy !!
Come, join with us..



Mnemonic:

I See 10 CC's in the IV

I See (I.C.) = Internal Carotid artery

10 = CN 10 (Vagus nerve)

CC = Common Carotid artery

IV = Internal Jugular Vein

Greater Palatine Foramen:**Mnemonic:****GAP (Greater and Anterior Palatine Vessels)**

1. Greater Palatine vessels
2. Anterior Palatine vessels

**Lesser Palatine Foramen:**MED  NAZ

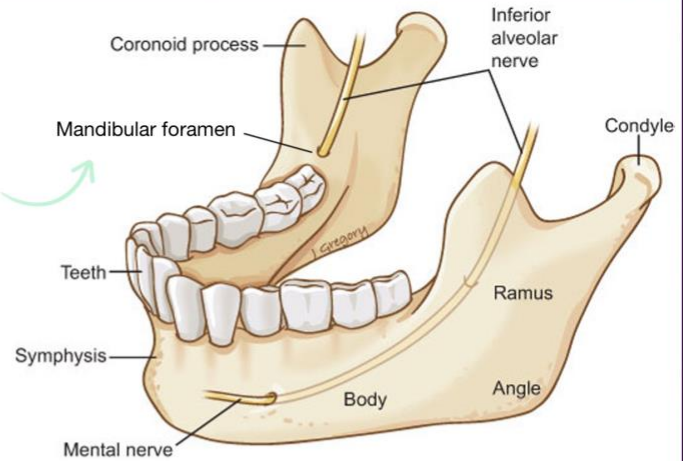
➔ Lesser palatine nerve and vessels

**High yield points**

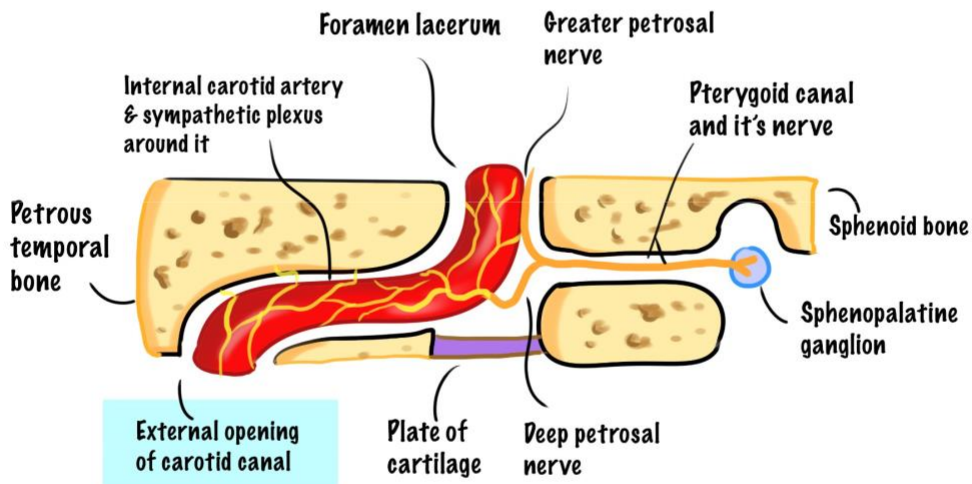
- ➔ **Sinus of Morgagni**- lies in between base of skull and superior constrictor
- ➔ **Foramen of Morgagni**- lies in between xiphoid process and 7th costal cartilage which contains superior epigastric vessels.
- ➔ **Anal column of Morgagni** situated at junction of upper mucous part of anal canal and squamous part of anal canal
- ➔ Space between uncinat process and bulla ethmoidalis is known as **hiatus semilunaris**

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Mandibular canal/foramen:
Inf. Alveolar nerve/vessels



Carotid canal: ICA, venous and sympathetic plexus

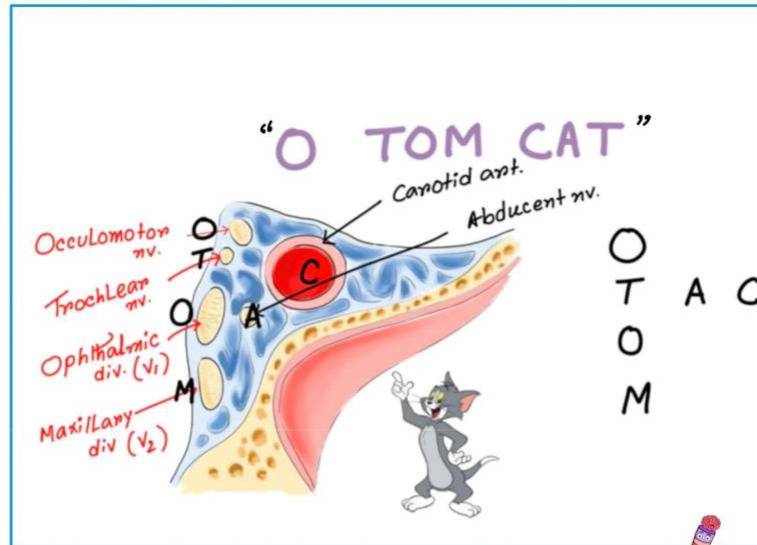


Foramen rotundum: Maxillary nerve



Cavernous Sinus Contents

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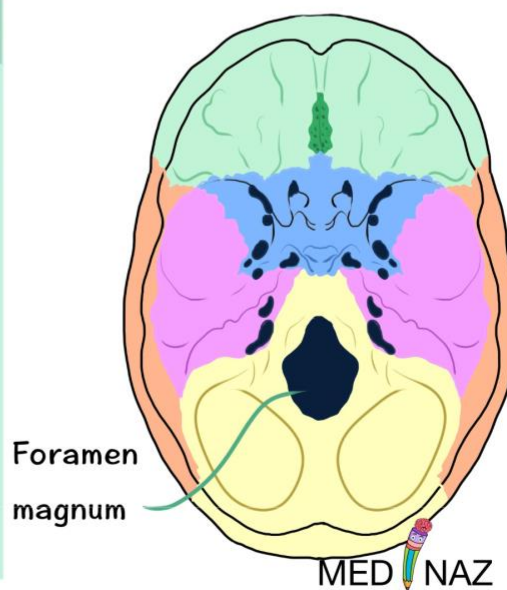


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- ➔ Structures passing through the CS (Direct contents of CS) - CN 6, ICA, Symp plexus
- ➔ Structures transversing lateral wall of CS (Above downwards) - CN 3,4, V1, V2 and Trigeminal ganglion
- ➔ Structures piercing roof of CS - CN 3,4, ICA

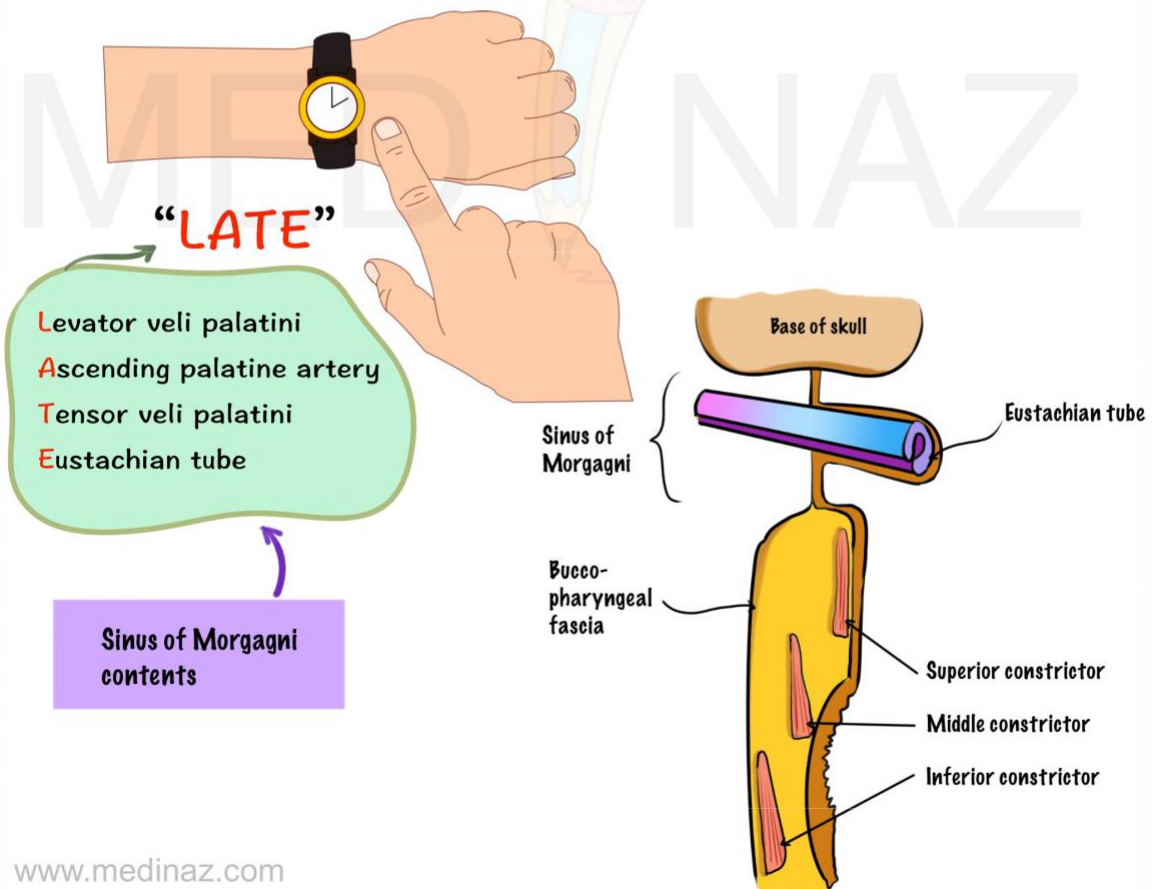
Foramen magnum transmits:

- ➔ Narrow ant part:
 - Apical ligament of dens
 - vertical band of cruciate ligament
 - membrana tectoria
- ➔ Wider post part:
 - 4th part of vertebral artery
 - spinal accessory nerve
 - symp plexus
 - spinal vessels
- ➔ Sub arachnoid space:
 - lowest part of medulla oblongata
 - 3 meninges



Sinus of Morgagni (Ventricle of larynx)

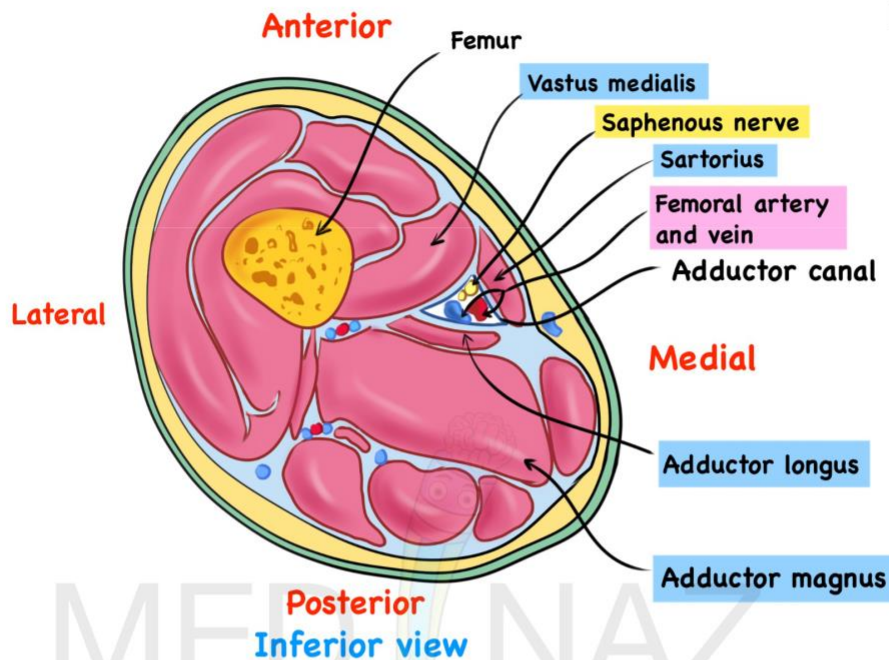
- ➔ (Semilunar space between base of skull and sup. constrictor)
 - Eustachian tube
 - Levator veli palati
 - Tensor veli palati
 - Ascending palatine artery
- ➔ Between superior and middle constrictor:
 - Stylopharyngeus m/s and its nerve (CN9)
- ➔ Between middle and inferior constrictor:
 - Internal laryngeal nerve and sup. Laryngeal vessels
- ➔ Between inferior constrictor and esophagus:
 - Recurrent laryngeal nerve and inf. Laryngeal vessels



Adductor canal:

- ➔ Also called:
 - Hunter's canal
 - subsartorial canal
- ➔ It is a narrow conical tunnel located in the thigh
- ➔ It is approximately 15 cm long

MED NAZ 



Borders

- Anteromedial:** Sartorius
- Lateral:** Vastus medialis
- Posterior:** Adductor longus and adductor magnus.

Contents

- The adductor canal serves as a passageway for structures moving between the anterior thigh and posterior leg.
- It transmits the **femoral artery**, **femoral vein** (posterior to the artery), nerve to the **vastus medialis** and the saphenous nerve – the **largest cutaneous branch** of the femoral nerve.
- As the femoral artery and vein exit the canal, they are called the **popliteal artery** and **vein** respectively

Adductor Canal Block

In the adductor canal block, local anaesthetic is administered in the adductor canal to block the **saphenous nerve** in isolation, or together with the nerve to the vastus medialis.

The block can be used to provide sensory anaesthesia for procedures involving the distal thigh and femur, knee and lower leg on the medial side. The sartorius and **femoral artery** are used as anatomical landmarks to locate the saphenous nerve.

Adductor Canal Compression Syndrome

Adductor canal compression syndrome describes entrapment of the neurovascular bundle within the adductor canal. A rare condition, it is usually caused by hypertrophy of adjacent muscles such as **vastus medialis**.

It is most common in young males, who may present with **claudication** symptoms due to femoral artery occlusion (more common) or neurological symptoms due to entrapment of the saphenous nerve

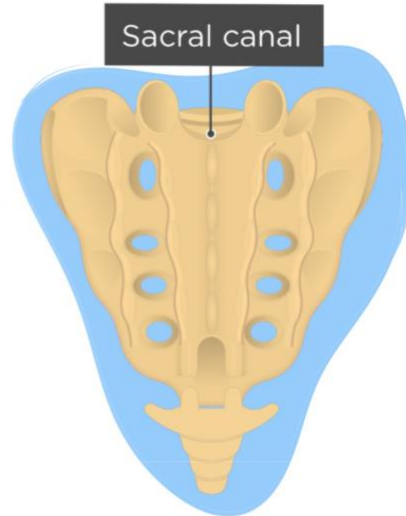
Sacral canal:

- Cauda equina (nerve fibres)
- Filum terminale (end of spinal cord)
- Spinal meninges (dura, arachnoid)

So lower sacral nerve pierce the dura and arachnoid at S2 level

Structures emerging at sacral hiatus:

- Sacral nerve S5
- A pair of coccygeal nerve,
- Filum terminale



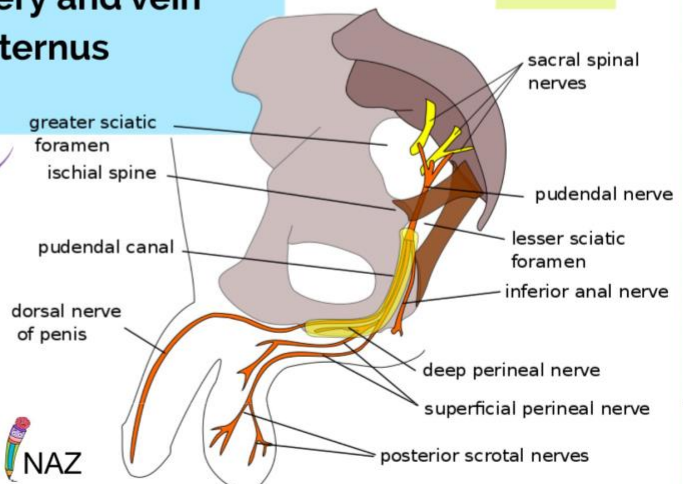
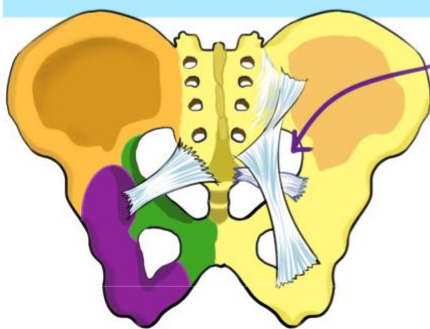
Greater sciatic foramen:

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Structures passing above piriformis:
Superior gluteal nerve and vessels

Structures passing below piriformis:
P: posterior cutaneous nerve of thigh
I: inferior gluteal artery, vein and nerve
N: nerve to quadratus femoris
P: pudendal nerve
I: internal pudendal artery and vein
N: nerve to obturator internus
S: sciatic nerve

**P
I
N
P
I
N
S**



MED NAZ

Structures passing through lesser sciatic foramen:

PINTO

Pudendal
nerve

Nerve and **T**endon of
Obturator internus

Int. Pudendal
vessels

Femoral Triangle

N: femoral **N**erve

A: femoral **A**rtery

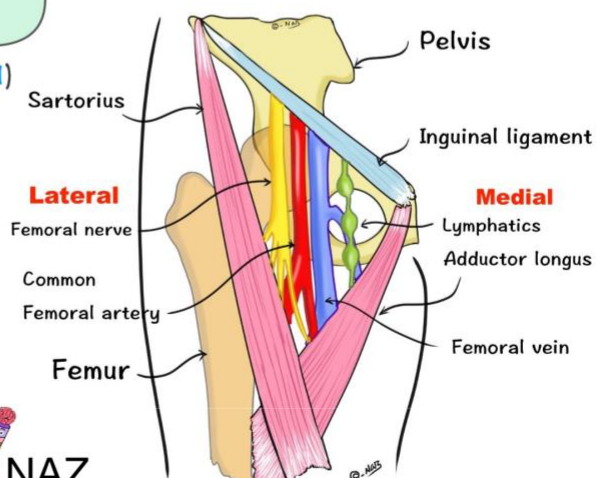
V: femoral **V**ein

E: **E**mpy space (Femoral canal)

L: **L**ymphatics

(From lateral to medial)

“**NAVEL**”



Internal Auditory Canal anatomy

BB: Bill's bar

FC: Falciform crest

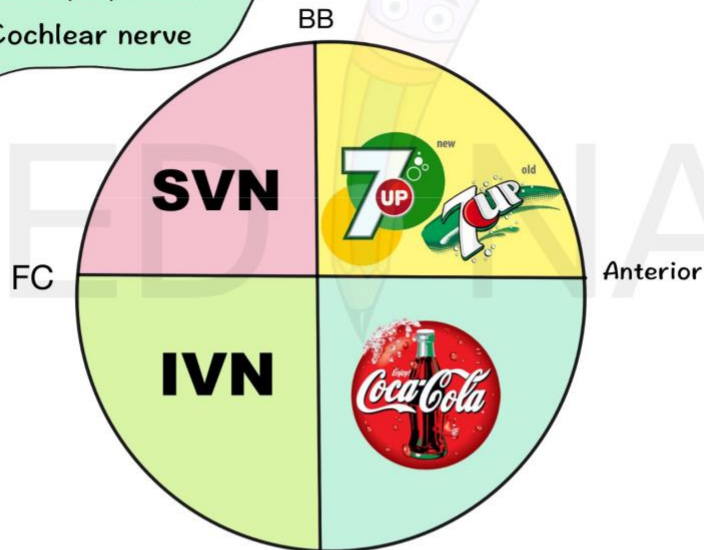
SVN: Superior vestibular nerve

INV: Inferior vestibular nerve

7up: Facial (VII) nerve

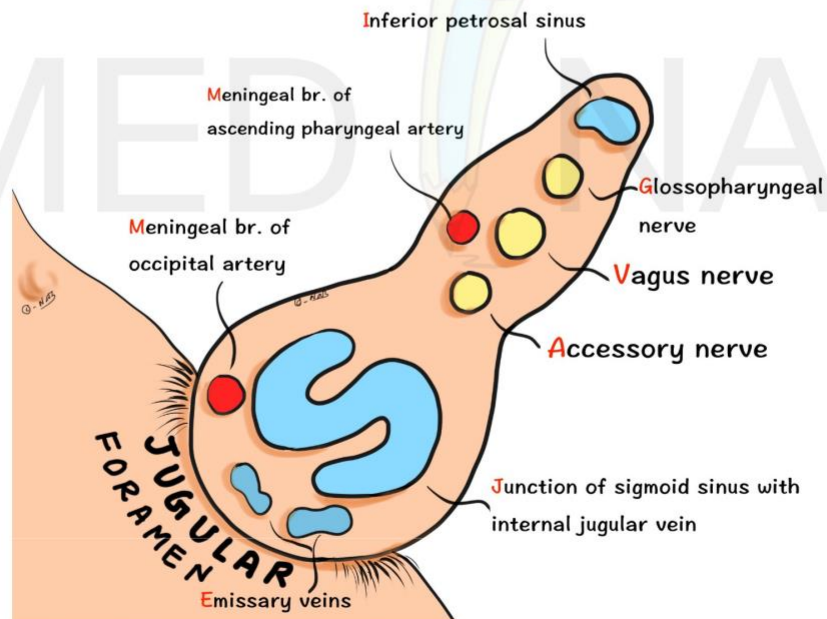
Coke: Cochlear nerve

“7up, Coke down”



Jugular foramen contents

“Married Man Is Going Vagus to Access Eternal Joy”



- ➔ **Hypoglossal canal** (anterior condylar canal): transmits hypoglossal nerve.
- ➔ **Tympanomastoid fissure**: transmits Arnold's nerve (auricular branch of vagus nerve).
- ➔ **Pterygoid canal**: transmits Vidian nerve.
- ➔ **Petrotympenic fissure**: transmits chorda tympani branch of facial nerve.
- ➔ **Dorello's canal**: Found between petrous apex and clivus and below Gruber's ligament (petrosphenoidal ligament).
It transmits:
 - 6th CN
 - Inferior petrosal sinus.
- ➔ **Internal acoustic meatus**: transmits 7th, 8th nerve, nervus intermedius of Wrisberg and labyrinthine vessels.



High yield points

- ➔ **Foramen transversarium** is present in the transverse process of cervical vertebrae. It transmits vertebral vessels and sympathetic plexus (C1-C6)
- ➔ **Dorello canal** is an opening in cavernus sinus close and transmits abducent nerve.
- ➔ **Sternberg's canal** is located antero-medial to foramen rotundum and is d/to incomplete fusion of greater wing of sphenoid with the pre sphenoid. A/w spontaneous CSF leaks and meningocoele.
- ➔ **The canal of Nuck**, is an abnormal patent pouch of peritoneum extending into the labia majora of female. It is analogous to the processus vaginalis in males.
- ➔ **Foramen of Vesalius** (or emissary sphenoidal foramen) transmits emissary vein.
- ➔ **Wide neural foramina** are seen in- Neurofibromatosis



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