CRANIAL CAVITY-II

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Lesson Plan

- Intracranial dural venous sinuses:
  - Introduction
  - Classification

- Cavernous Sinus:
  - Location
  - Extent
  - Relations
  - Structures within the lateral wall of sinus
  - Structures passing through the sinus
  - Tributaries
  - Communications
  - Applied aspects
INTRACRANIAL DURAL VENOUS SINUSES
Introduction

- Intracranial venous sinuses are the venous channels present in the cranial dura.

Formation-

- These are formed in **two ways:**
  - By separation of two layers of dura.
  - By reduplication of meningeal layer.
Introduction contd...

- All the venous sinuses, except the Inferior Sagittal and Straight sinuses, lie between the meningeal and endosteal layers of dura mater.

- These venous sinuses are lined by endothelium and this endothelium is continuous with the endothelium of intracranial veins.
These venous sinuses drain blood from:

- Brain.
- Skull bones.

The blood from these sinuses drained into Internal Jugular Veins.
• These venous sinuses are **devoid of valves** in their lumen.

• Most of the dural venous sinuses communicate with the extracranial veins through **emissary veins**.

• These emissary veins are also **valveless** and maintain the equilibrium of venous pressure within and outside the skull.

• These venous sinuses receive **venous blood and cerebrospinal fluid**.
Classification

- Paired (7).
- Unpaired (7).

**Paired Dural Venous Sinuses**

1. Cavernous
2. Superior petrosal
3. Inferior petrosal
4. Transverse
5. Sigmoid
6. Sphenoparietal
7. Petrosquamous
Classification contd...

**Unpaired Dural Venous Sinuses—**

1. Superior Sagittal
2. Inferior Sagittal
3. Straight
4. Occipital
5. Anterior Intercavernous
6. Posterior Intercavernous
7. Basilar Venous Plexus
Cavernous Sinus

- The interior of this sinus is divided into a number of small spaces (caverns) by trabeculae, hence the name cavernous sinus.

Location -
- In the middle cranial fossa, alongside the body of sphenoid bone.

- It has:
  - Floor
  - Medial wall
  - Roof
  - Lateral wall
Cavernous Sinus contd...

- **Its Floor** is formed by endosteal layer.

- **Medial wall, Roof and Lateral wall** are formed by meningeal layer.
Cavernous Sinus contd...

**Extent**

**Anteriorly**-
- Up to medial end of superior orbital fissure.

**Posteriorly**-
- Up to apex of petrous part of temporal bone.
Cavernous Sinus contd...

Relations-

Superior-
- Optic chiasma.
- Optic tract.
- Internal carotid artery.
- Anterior perforated substance.
The dura and sinuses are intact on the left side. On the right, the dura has been removed revealing the trigeminal ganglion.

The yellow line crossing over the hypophyseal fossa indicates the plane of section of the image above. It shows the cavernous sinus and its contents.
Relations of Cavernous Sinus contd...

**Inferior**-

- Foramen lacerum.
- Junction of body and greater wing of sphenoid.
Relations of Cavernous Sinus contd...

Medial-

- Pituitary gland (hypophysis cerebri).
- Sphenoid air sinus.
Relations of Cavernous Sinus contd...

Lateral-

- Uncus of temporal lobe of cerebral hemisphere.

- Cavum trigeminale (Meckel’s Cave) containing trigeminal ganglion.
Relations of Cavernous Sinus contd...

Anterior-
- Superior Orbital Fissure.
- Apex of orbit.

Posterior-
- Crus cerebri of midbrain.
- Apex of petrous part of temporal bone.
Structures present in lateral wall of Cavernous Sinus

- From above downwards:
  - Oculomotor nerve.
  - Trochlear nerve.
  - Ophthalmic nerve.
  - Maxillary nerve.
Structures passing through the Cavernous Sinus

- Internal Carotid Artery.
- Abducent Nerve.
Tributaries of Cavernous Sinus

- Cavernous sinus receives blood from:
  - Orbit.
  - Meninges.
  - Brain.

Tributaries from Orbit:

- Superior Ophthalmic Vein.
- Inferior Ophthalmic Vein.
- Central Vein of Retina (sometimes)
Tributaries of Cavernous Sinus contd...

**Tributaries from Meninges**-

- Sphenoparietal Sinus.
- Middle Meningeal Vein [anterior (frontal) trunk].

**Tributaries from Brain**-

- Superficial Middle Cerebral Vein.
- Inferior Cerebral Veins.
Communications of Cavernous Sinus

- **Transverse Sinus** (via superior petrosal sinus).
- **Internal Jugular Vein** (via inferior petrosal sinus).
- **Ptérygoïd Venous Plexus** (via emissary veins which pass through foramen ovale, foramen lacerum and emissary sphenoidal foramen).
- **Facial Vein**
- **Opposite Cavernous Sinus** (via anterior and posterior intercavernous sinuses).
- **Superior Sagittal Sinus** (via Superficial Middle Cerebral Vein and Superior anastomotic vein).
- **Internal Vertebral Venous Plexus** (via Basilar Venous Plexus).
Applied Aspects

Cavernous Sinus Thrombosis [CST]-

• It may be caused by passage of septic emboli via its communicating channels.

• Most common cause is passage of septic emboli from face.

Routes for reaching the septic emboli from face to cavernous sinus-

• 2 routes:

  • Facial Vein → Angular Vein → Superior Ophthalmic Vein → Cavernous Sinus
  
  • Facial Vein → Deep Facial Vein → Pterygoid Venous Plexus → Emissary veins → Cavernous Sinus.
Cavernous Sinus Thrombosis [CST] contd...

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<tr>
<th>Signs &amp; Symptoms</th>
<th>Anatomical Correlation</th>
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<tr>
<td>Severe pain in the eye and forehead</td>
<td>Involvement of Ophthalmic nerve</td>
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<tr>
<td>Ophthalmoplegia (Paralysis of ocular muscles)</td>
<td>Involvement of 3\textsuperscript{rd}, 4\textsuperscript{th} &amp; 6\textsuperscript{th} cranial nerves</td>
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<tr>
<td>Edema of eyelids with Exophthalmos</td>
<td>Congestion of orbital veins</td>
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Caroticocavernous Fistula-
- It is an arteriovenous communication between Internal Carotid Artery (ICA) & Cavernous Sinus.
- This communication is established if ICA is ruptured in fracture base of the skull.
- Arterial blood rushes into the cavernous sinus and its communicating channels.

Signs & Symptoms-

- **Pulsating Exophthalmos** - Eyeball protrudes and pulsates with each heart beat.
- A loud systolic murmur over the eye.
- Ophthalmplegia.
- Marked orbital and conjunctival edema.