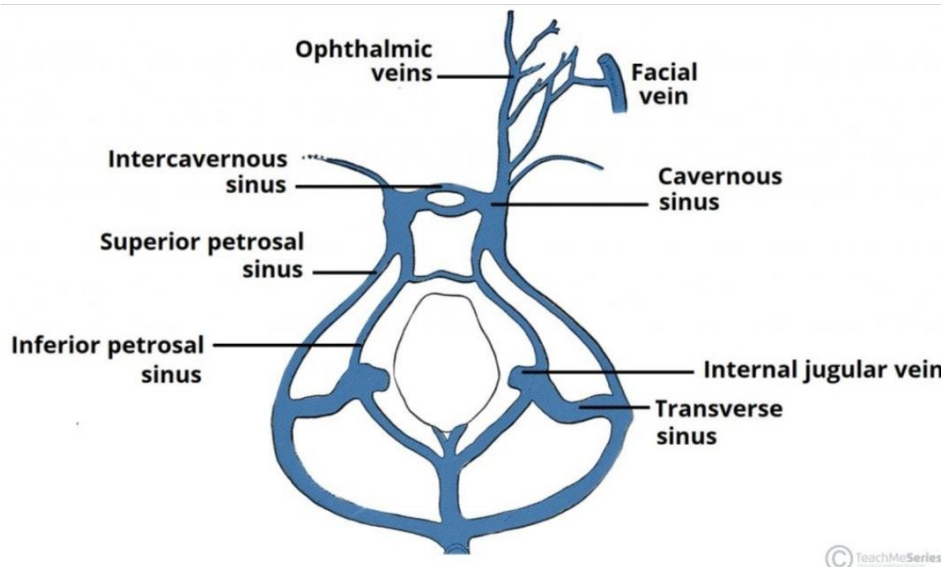


QUESTION 1: Write an essay on the cavernous sinus

ANSWER

The cavernous sinus is a paired dural venous sinus located within the cranial cavity specifically the middle cranial fossa. It is divided by septa into small 'caves' – from which it gets its name.

The cavernous sinus is one of the dural venous sinuses of the head. It is a network of veins that sit in a cavity, approximately 1 x 2 cm in size in an adult. The carotid siphon of the internal carotid artery, and cranial nerves III, IV, V (branches V1 and V2) and VI all pass through this blood filled space.



Related structures

Superiorly: optic tract, optic chiasma, internal carotid artery.

Inferiorly: Foramen lacerum and the junction of the body and greater wing of sphenoid bone.

Medially: Hypophysis cerebri or (pituitary gland) and sphenoidal air sinus.

Laterally: temporal lobe with uncus.

Anteriorly: superior orbital fissure and the apex of the orbit.

Posteriorly: apex of petrous temporal bone.

The cavernous sinus receives blood from

1. Superior and inferior ophthalmic veins
2. Cerebral veins
3. Emissary veins

Blood leaves the sinus via superior and inferior petrosal sinuses as well as via the emissary veins through the foramina of the skull (mostly through foramen ovale). There are also connections with the pterygoid plexus of veins via inferior ophthalmic vein, deep facial vein and emissary veins.

Apart from the blood which passes through a venous sinus, several anatomical structures, including some cranial nerves and their branches, also pass through the sinus

Structures within the outer (lateral) wall of the compartment from superior to inferior:

1. Oculomotor Nerve CNIII
2. Trochlear nerve CNIV
3. Ophthalmic and maxillary branches of the trigeminal nerve CNV1 and CNV2

Structures passing through the midline (medial) wall:

1. Abducent nerve CNVI
2. Internal carotid artery accompanied by the Internal carotid plexus

These nerves, with the exception of CN V2, pass through the cavernous sinus to enter the orbital apex through the superior orbital fissure. The maxillary nerve, division V2 of the trigeminal nerve travels through the lower portion of the sinus and exits via the foramen rotundum. The maxillary branch passes external to, but immediately adjacent to, the lateral wall of the sinus).

The optic nerve lies just above and outside the cavernous sinus, superior and lateral to the pituitary gland on each side, and enters the orbital apex via the optic canal.

FUNCTION

Venous drainage

As a venous sinus, the cavernous sinus receives blood from the superior and inferior ophthalmic veins and from superficial cortical veins, and is connected to the basilar plexus of veins posteriorly. The cavernous sinus drains by two larger channels, the superior and inferior petrosal sinuses, ultimately into the internal jugular vein via the sigmoid sinus, also draining with emissary vein to pterygoid plexus.

CLINICAL ANATOMY

1. It is the only anatomic location in the body in which an artery travels completely through a venous structure. If the internal carotid artery ruptures within the cavernous sinus, an arteriovenous fistula is created (more specifically, a carotid-cavernous fistula). Lesions affecting the cavernous sinus may affect isolated nerves or all the nerves traversing through it.

2. The pituitary gland lies between the two paired cavernous sinuses. An abnormally growing pituitary adenoma, sitting on the bony sella turcica, will expand in the direction of least resistance and eventually compress the cavernous sinus. Cavernous sinus syndrome may result from mass effect of these tumors and cause ophthalmoplegia (from compression of the oculomotor nerve, trochlear nerve, and abducens nerve), ophthalmic sensory loss (from compression of the ophthalmic nerve), and maxillary sensory loss (from compression of the

maxillary nerve). A complete lesion of the cavernous sinus disrupts CN III, IV, and VI, causing total ophthalmoplegia, usually accompanied by a fixed, dilated pupil. Involvement of CN V (V1 and variable involvement of V2) causes sensory loss in these divisions of the trigeminal nerve. Horner's syndrome can also occur due to involvement of the carotid ocular sympathetics, but may be difficult to appreciate in the setting of a complete third nerve injury.

3. Because of its connections with the facial vein via the superior ophthalmic vein, it is possible to get infections in the cavernous sinus from an external facial injury within the danger area of the face. In patients with thrombophlebitis of the facial vein, pieces of the clot may break off and enter the cavernous sinus, forming a cavernous sinus thrombosis. From there the infection may spread to the dural venous sinuses. Infections may also be introduced by facial lacerations and by bursting pimples in the areas drained by the facial vein.

QUESTION 2: Discuss the walls of the nose

The nasal cavity

The nasal cavity has a:

- floor
- roof
- lateral wall
- Medial or septal wall.

The **floor** of the nasal cavity is formed by the hard palate which consists of

- Palatine process of the maxilla
- Horizontal plate of the palatine bone

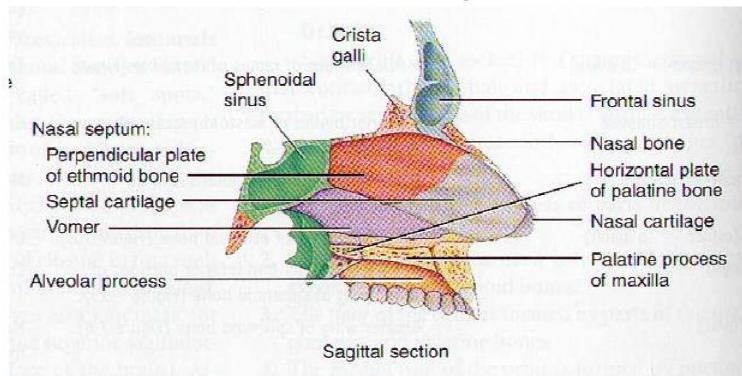
The **roof** of the nasal cavity is narrow and is formed

- Anteriorly beneath the bridge of the nose by the nasal and frontal bones,
- In the middle by the cribriform plate of the ethmoid,
- located beneath the anterior cranial fossa
- Posteriorly by the downward sloping body of the sphenoid.

The **medial wall** is the Nasal Septum, it divides the nasal cavity into right and left halves. It has osseous and cartilaginous parts

Nasal septum consists of the perpendicular plate of the ethmoid bone (superior), the vomer (inferior) and septal cartilage (anterior).

The Nasal Septum

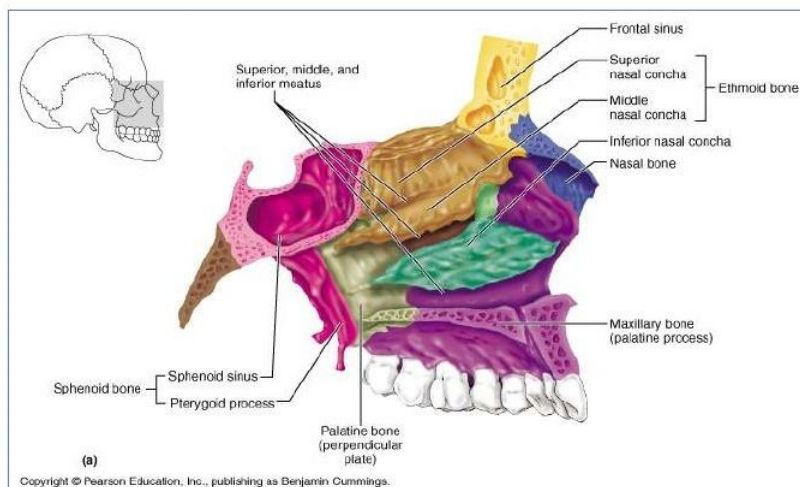


The **lateral wall** of the nasal cavity is a region of the nasopharynx essential for humidifying and filtering the air we breathe in nasally. Marked by 3 bony projections:

- Superior concha
- Middle concha
- Inferior concha (houses the specialised olfactory epithelium for olfaction)

The space below each concha is called a meatus.

The Lateral Walls of Nasal Cavity



Inferior meatus: The Nasolacrimal duct drains into the inferior meatus.

Middle meatus: The Maxillary sinus, Frontal sinus and anterior ethmoid sinuses open into the middle meatus.

Superior meatus: posterior ethmoid sinuses open into the superior meatus.

Sphenoethmoidal recess: sphenoid sinus open into this recess.

Blood Supply to the Nasal Cavity

From branches of the maxillary artery, one of the terminal branches of the external carotid artery. The most important branch is the sphenopalatine artery. The sphenopalatine artery anastomoses with the septal branch of the superior labial branch of the facial artery in the

region of the vestibule. The submucous venous plexus is drained by veins that accompany the arteries.

Nerve Supply of the Nasal Cavity

The olfactory nerves from the olfactory mucous membrane ascend through the cribriform plate of the ethmoid bone to the olfactory bulbs .

The nerves of ordinary sensation are branches of the ophthalmic division (V1) and the maxillary division (V2) of the trigeminal nerve.

Lymph Drainage of the Nasal Cavity

The lymph vessels draining the vestibule end in the submandibular nodes.

The remainder of the nasal cavity is drained by vessels that pass to the upper deep cervical nodes.

Clinical Anatomy

The nasal cavity is easily prone to complications such as:

Trauma to the Nose

Infection of the Nasal Cavity

Foreign Bodies in the Nose

Nose Bleeding (Epistaxis)