17/MHS01/101

THE CAVERNOUS SINUS

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

Each cavernous sinus has a close anatomical relationship with several key structures in the head, and is arguably the most clinically important venous sinus.

The dural venous sinuses are channels between the two layers of dura mater which are responsible

for the venous drainage of the brain, skull, orbit , internal ear.

ANATOMICAL LOCATION AND BORDERS

The cavernous sinuses are located within the middle cranial fossa, on either side of the sella turcica of the sphenoid bone (which contains the pituitary gland). They are enclosed by the endosteal and meningeal layers of the dura mater.

The borders of the cavernous sinus are as follows:

Anterior – superior orbital fissure.

Posterior – petrous part of the temporal bone.

Medial – body of the sphenoid bone.

Lateral – meningeal layer of the dura mater running from the roof to the floor of the middle cranial fossa.

Roof – meningeal layer of the dura mater that attaches to the anterior and middle clinoid processes of the sphenoid bone.

Floor – endosteal layer of dura mater that overlies the base of the greater wing of the sphenoid bone.

CONTENTS

Several important structures pass through the cavernous sinus to enter the orbit. The can be sub-classified by whether they travel through the sinus itself, or through its lateral wall:

Travels through cavernous sinus: Travels through lateral wall of cavernous sinus:

Abducens nerve (CN VI)

Carotid plexus (post-ganglionic sympathetic nerve fibres)

Internal carotid artery (cavernous portion)

Oculomotor nerve (CN III)

Trochlear nerve (CN IV)

Ophthalmic (V1) and maxillary (V2) branches of the trigeminal nerve

The cavernous sinus is the only site in the body where an artery (internal carotid) passes completely through a venous structure. This is thought to allow for heat exchange between the warm arterial blood and cooler venous circulation.

DURAL VENOUS SINUS SYSTEM

Each cavernous sinus receives venous drainage from:

Ophthalmic veins (superior and inferior) – these enter the cavernous sinus via the superior orbital fissure.

Central vein of the retina – drains into the superior ophthalmic vein, or directly into the cavernous sinus.

Sphenoparietal sinus – empties into the anterior aspect of the cavernous sinus.

Superficial middle cerebral vein – contributes to the venous drainage of the cerebrum

Pterygoid plexus – located within the infratemporal fossa.

It is important to note that the superior ophthalmic vein forms an anastomosis with the facial vein. Therefore, the ophthalmic veins represent a potential route by which infection can spread from an extracranial to an intracranial site.

The cavernous sinuses empty into the superior and inferior petrosal sinuses, and ultimately, into the internal jugular vein. The left and right cavernous sinuses are connected in the midline by the anterior and posterior intercavernous sinuses. They travel through the sella turcica of the sphenoid bone.

WALLS OF THE NOSE

The nose is the most prominent part of the the human face. The external nose also functions to protect the inner nose and allows the entry of air. The internal part of the nose is termed the nasal cavity. It is involved in respiration, olfaction, speech and taste.

The external nasal anatomy is a pyramidal structure, with its root located superiorly and apex sitting inferiorly. The root is continuous with the anterior surface of the head and the part between the root and the apex is called the dorsum of the nose. Inferior to the apex are the two nares (nostrils), which are the openings to the nasal cavity. The nares are separated by the nasal septum and are laterally bounded by the ala nasi (wings of the nostrils) which are the lateral processes of the septum.

The external nose is comprised of both bony and cartilaginous components. The bony part shapes the nose root, formed by the nasal, maxillae and frontal bones. The cartilaginous part is located inferiorly and is comprised of several alar, two lateral, and one septal cartilage:

Alar cartilages; major alar cartilage forms the apex of the nose, minor alar cartilages support the ala nasi.

Lateral processes of the alar cartilage; form the dorsum of the nose

Septal cartilage; bounds the nares medially

The septal cartilage is attached to both the bony nasal septum (which is actually the perpendicular plate of the ethmoid bone) and the vomer bone. Both nasal septum and vomer are bony parts of the internal nose.

The internal part of the nose is the nasal cavity. The two nasal cavities sit within the external nose and the adjacent skull. The cavities open anteriorly to the face through the two nares. Posteriorly the cavities communicate with the nasopharynx by two apertures called choanae.

Besides the anterior and posterior apertures, each nasal cavity has a roof, floor, and lateral and medial walls. There are 12 cranial bones in total that contribute to the nasal cavity structure, which include the paired nasal, maxilla, palatine and lacrimal bones, as well as the unpaired ethmoid, sphenoid, frontal and vomer bones.Among all of them, the ethmoid bone is the most important element, because, it makes the greatest portion of the nasal skeletal framework by forming the roof and walls of the nasal cavities; and, it contains ethmoidal cells which, as a group, are one of the four paranasal sinuses.