NOSE & OLFACTORY NERVE

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Objective

At the end of the lecture, the students should be able to:

- Describe the structures forming the walls of the nasal cavity.
- List the main structures draining into the lateral wall of the nasal cavity.
- Differentiate between the respiratory and olfactory regions of the nasal cavity.
- List the main sensory and blood supply of the nose.
- Describe the olfactory pathway.

NASAL CAVITY

◆ Extends from nostrils (anterior) to the conchae (posterior)

Divided by the nasal septum into right and left halves, each half has

Floor

Formed by the hard palate:

Palatine process of maxilla (anteriorly)

Horizontal plate of palatine bone (posteriorly)

Roof

Formed by:

* Body of sphenoid, posteriorly

Cribriform plate of ethmoid

in the middle

Frontal, and nasal bones, Anteriorly

Medial wall (nasal septum)

Formed by:

1) Vomer

2) Vertical plate of ethmoid

3) Septal cartilage

Lateral wall

Formed by:

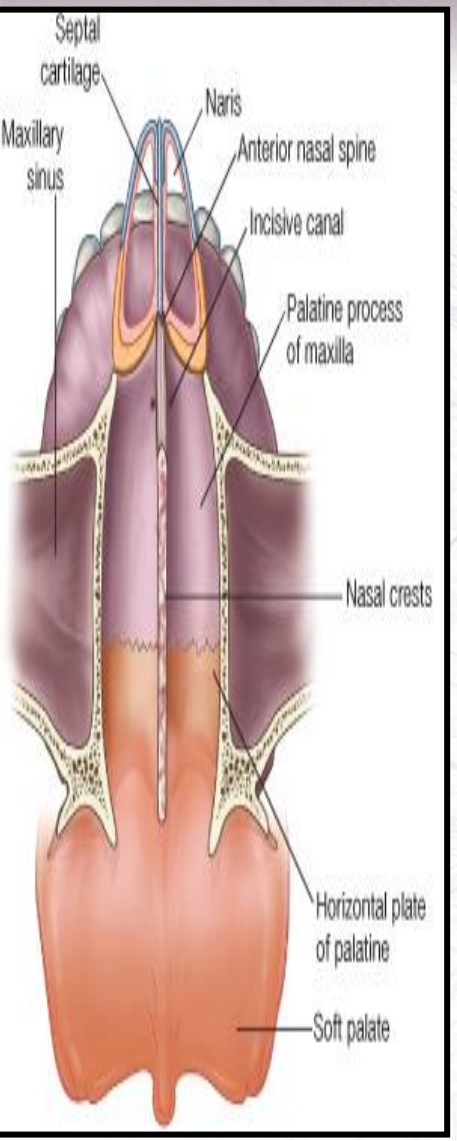
1) Superior, middle and inferior conchae

2) Superior, middle and inferior meatus

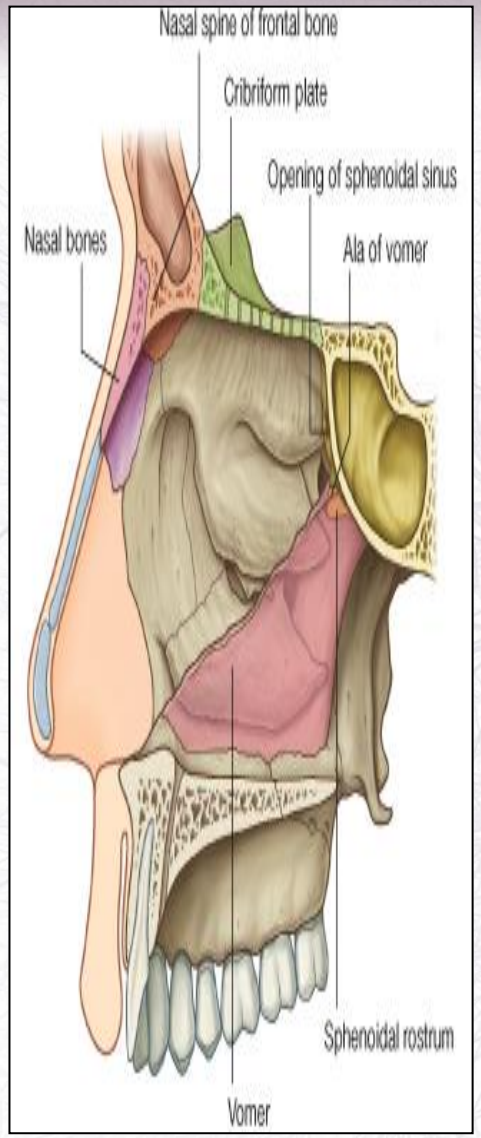
3) Sphenoethmoidal recess

(space (fossa) above superior conchae)

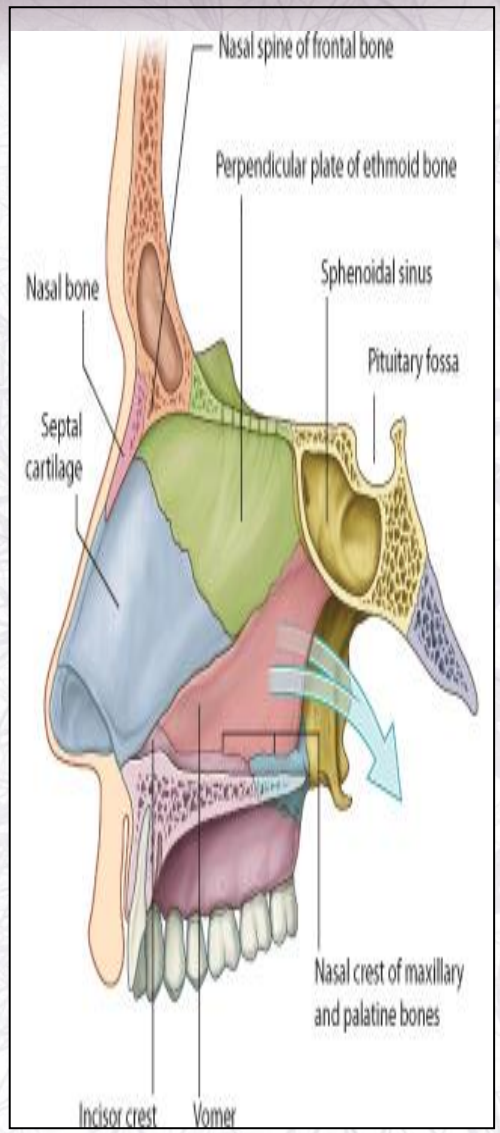
FLOOR



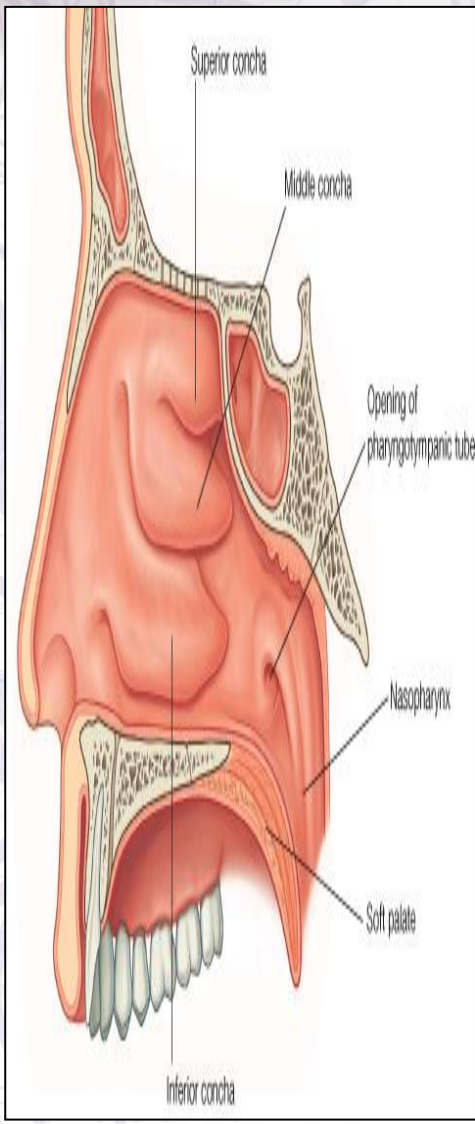
ROOF



MEDIAL WALL



LATERAL WALL



Paranasal (Air) sinuses

- They are air-filled cavities inside:
Maxilla, Sphenoid, Ethmoid and frontal bones.
- Lined with mucoperiosteum
- Communicate with the nasal cavity (open in the lateral wall)
- Their function is to lighten the skull and amplify the sound as we speak.
- Their mucosal lining is continuous with that in the nose and the throat.

So infection in this area tends to migrate into the sinuses causing sinusitis.

Part of the lateral wall of nasal cavity	Receives the opening of:
Sphenoethmoidal recess	Sphenoidal sinus
Superior meatus	Posterior ethmoidal sinus
Middle meatus	Maxillary, frontal, middle and anterior ethmoidal sinuses
Inferior meatus	Nasolacrimal duct

Nasal mucosa

Olfactory mucosa:

It is delicate and contains olfactory nerve cells.

It is present in the roof, lateral wall and upper part of nasal cavity.

On the lateral wall, it lines the upper surface of the superior concha and the sphenoethmoidal recess.

On the medial wall, it lines the superior part of the nasal septum.

Respiratory mucosa:

It is thick, ciliated highly vascular and contains mucous glands & goblet cells.

It lines the **lower part** of the nasal cavity **(from skin of vestibule to the superior concha).**

Functions:

1) Moisten inspired air by the secretion of numerous serous glands

2) Warm inspired air by the submucous venous plexus

3) Clean inspired air by the ciliary action of the ciliated columnar epithelium

Nerve supply:

Nerves of general sensation are derived from **Ophthalmic & Maxillary** divisions of trigeminal nerve.

The anterior part is supplied by: Anterior Ethmoidal nerve.

The posterior part is supplied by branches of the pterygopalatine ganglion:
1-Nasopalatine,
2- Nasal, and
3- Palatine

Arterial supply:

Sphenopalatine artery (maxillary)
Ethmoidal anterior and posterior (ophthalmic)
Superior labial (facial)

Applied anatomy:
Rich arterial anastomosis on anterior & inferior part of nasal septum (Little's area) is the most common site for epistaxis (الرُعاف)

Venous drainage:

Venous plexus in the sub mucosa formed by veins accompanying the arteries

Lymphatic drainage

- **Submandibular** nodes
- **Upper deep cervical** nodes

Olfactory pathway

1st neurone:

Olfactory receptors are specialized, ciliated nerve cells that lie in the olfactory epithelium.

The axons of these bipolar cells form the " true olfactory nerve fibers".

Which passes the skull through the foramina of cribriform plate of ethmoid.

Then, they join the olfactory bulb (which contain interneurons and large mitral cells).

Axons from the mitral cells leave the bulb to form the olfactory tract.

⇒ Each tract divides into 2 roots at the anterior perforated substance:

- ✓ Lateral root
- ✓ Medial root

2nd neuron is formed by the Mitral cells of olfactory bulb.

The lateral root:

Carries olfactory fibers to end in cortex of the **Uncus** & adjacent part of **Hippocampal gyrus (center of smell)**

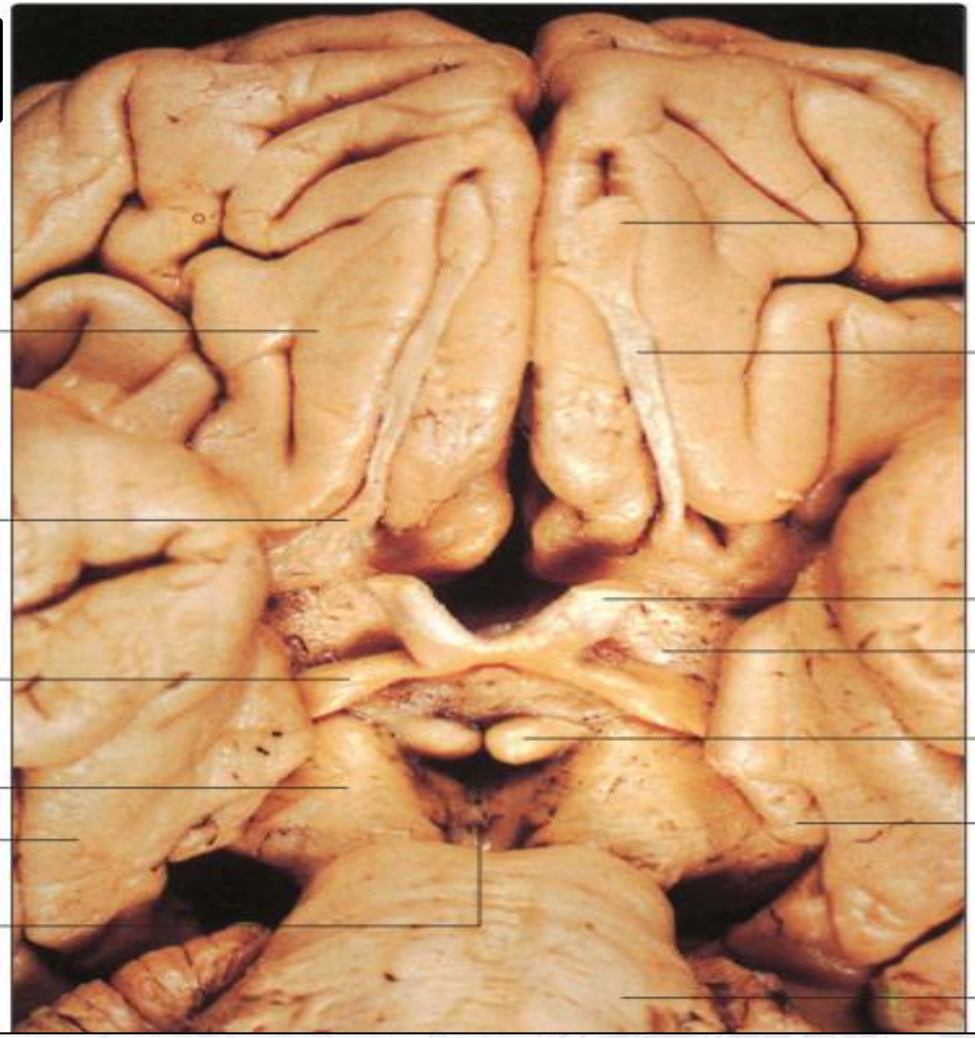
The Medial root:

Crosses midline through anterior commissure and joins the uncrossed lateral root of opposite side.

It connects olfactory centers of 2 cerebral hemispheres.

So each olfactory centre receives smell sensation from both halves of nasal cavity.

For illustration



Olfactory pathway:

1st neurone: Olfactory cells

2nd neurone: **Mitral cells** of olfactory bulb

Olfactory tract

- **lateral root** → **(center of smell)**
- **Medial root** → joins the lateral root of **opposite side**

Important note:

The olfactory projection is unique among the sensory systems in that it consists of two neurons between the sensory receptors and the cerebral cortex and does not project via the thalamus.

MCQs

1)The bulla ethmoidalis and hiatus semilunaris are parts of:
A- Superior meatus
B- Inferior meatus
C- Middle meatus
D- Sphenoethmoidal recess

2) All the following drains into the middle meatus except:
A- Frontal sinus
B- Anterior ethmoidal sinus
C- Posterior ethmoidal sinus
D- Maxillary sinus

3) The second order neuron in olfactory pathway is:
A) The olfactory bulb
B) The mitral cells
C) The optic chiasma
D) Olfactory receptors

4) The lateral root of olfactory tract ends in :
A- Cortex of the uncus
B- Anterior commisure
C- Cerebral hemisphers
D- None of them.

5) The anterior part of nasal cavity is supplied by:
A- Posterior ethmoidal nerve
B- pterygopalatine ganglion
C- Anterior ethmoidal nerve
D- Maxillary nerve

1) C 2) C 3) B 4) A 5) C