

PARANASAL AIR SINUSES

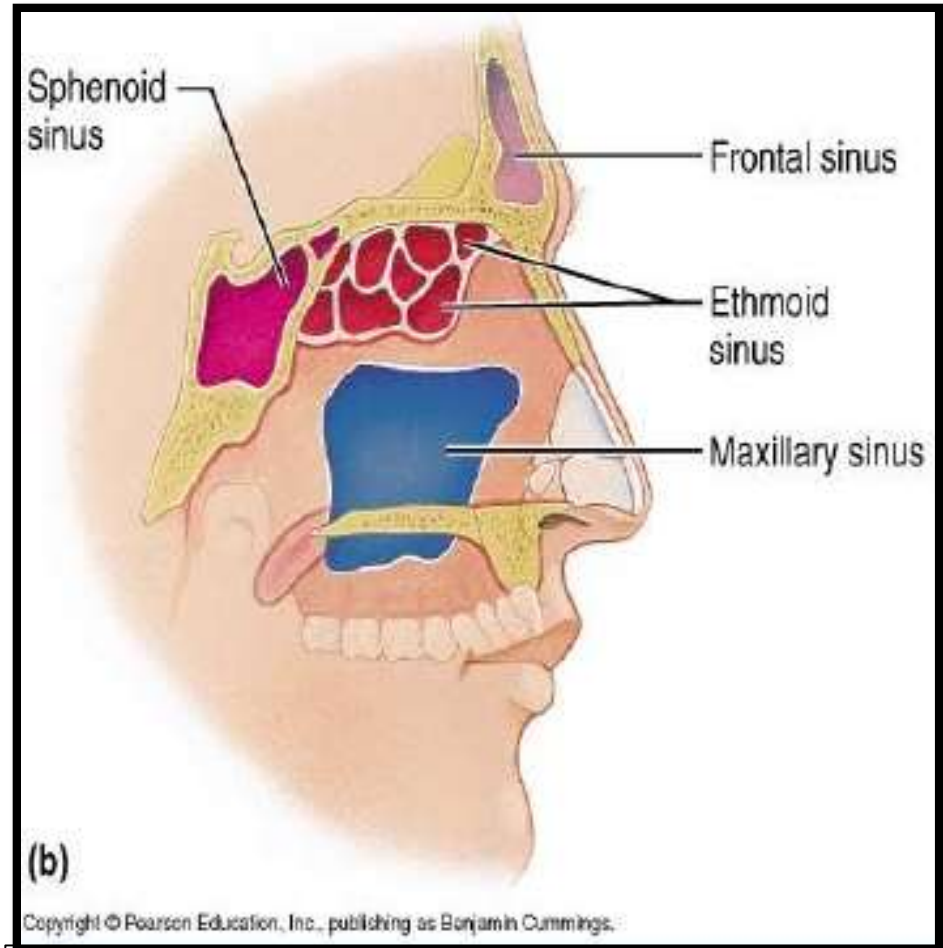
Presented by:-
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Associate Professor
Department of Anatomy

Lesson Plan

- ❖ **Introduction.**
- ❖ **Classification.**
- ❖ **Relationship to the orbit.**
- ❖ **Frontal Air Sinuses:**
 - Introduction.
 - Drainage & Nerve Supply.
 - Measurements.
 - Relations.
 - Applied Aspects.
- ❖ **Maxillary Air Sinuses:**
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 - Presenting Parts.
 - Drainage.
 - Arterial Supply.
 - Lymphatic drainage.
 - Nerve Supply.
 - Applied Aspects.
- ❖ **Ethmoidal Air Sinuses:**
 - Introduction.
 - Drainage.
 - Applied Aspects.
- ❖ **Sphenoidal Air Sinuses:**
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 - Drainage.
 - Relations.
 - Applied Aspects.

Introduction

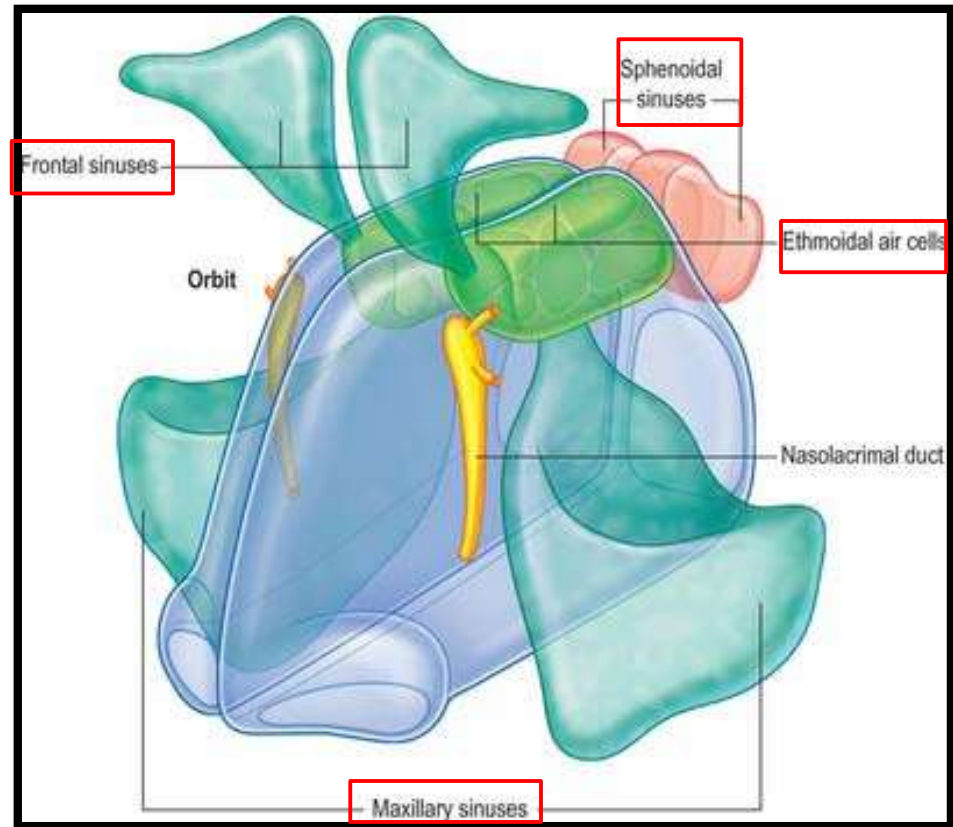
- ❖ Air-containing cavities in the bones around nasal cavity.
- ❖ Paranasal air sinuses develop as mucosal diverticulae of nasal cavity, invading the adjacent bones.
- ❖ Paranasal air sinuses perform the following **functions**:
 - Make the skull lighter.
 - Add resonance to the voice.
 - Act as air conditioning chambers by making the inspired air moist and warm.
 - Aid in growth of facial skeleton.



- ❖ Paranasal air sinuses are lined by respiratory epithelium and respiratory mucosa is **highly vascular** and contains a large number of **cavernous spaces** and **sinusoids** to warm the air.
- ❖ Respiratory mucosa also contains a large number of serous glands and secretion of these glands makes the air moist.

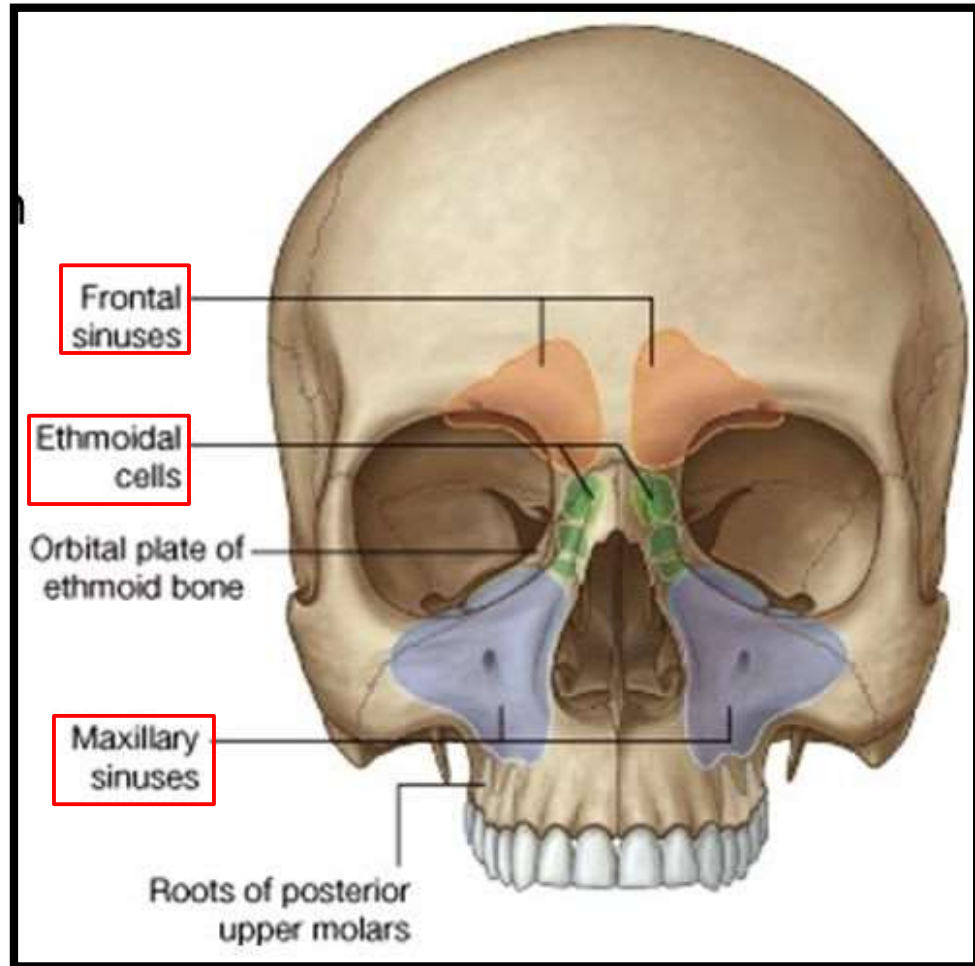
Classification

- ❖ Paranasal air sinuses are named after the bones containing them, *viz*,
 - Frontal air sinuses.
 - Ethmoidal air sinuses.
 - Maxillary air sinuses.
 - Sphenoidal air sinuses.
- ❖ All paranasal air sinuses are present in rudimentary form at birth **except frontal air sinuses**.



Relationship to the Orbit

- Frontal air sinus- above.
- Ethmoidal air sinuses- medial.
- Maxillary air sinus- below.
- Sphenoidal air sinus- behind.



Frontal Air Sinuses

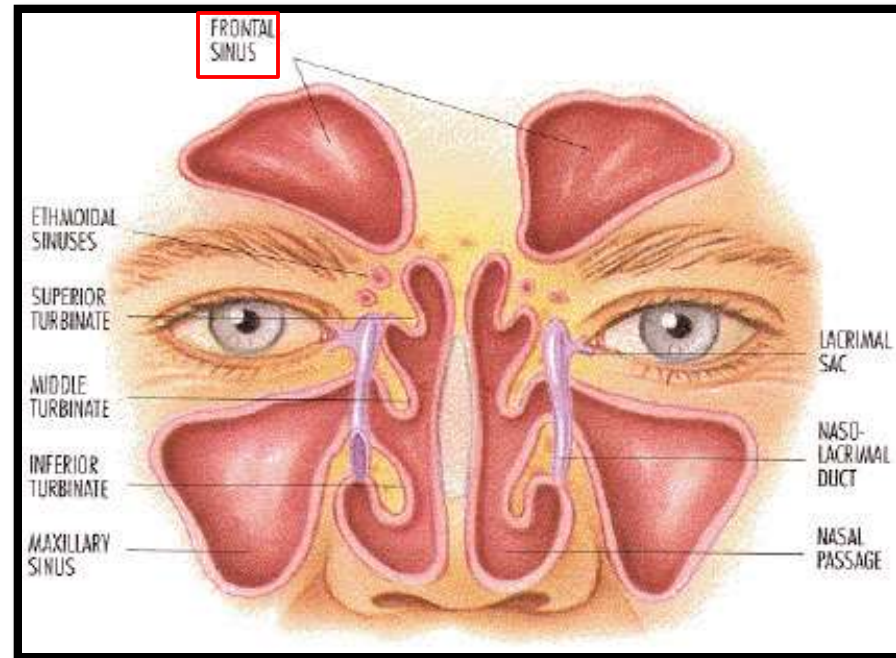
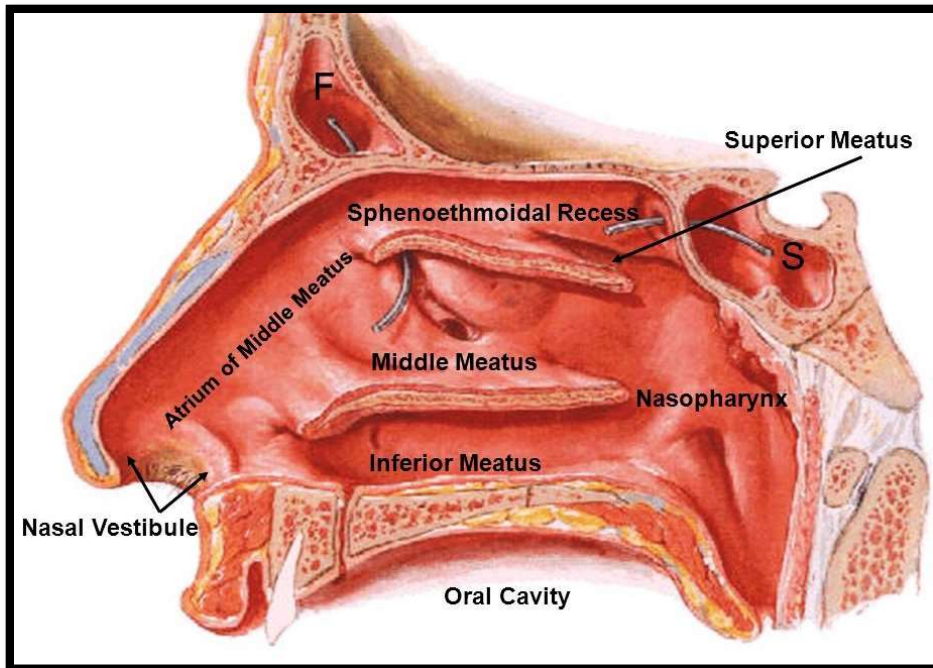
Introduction

- ❖ Frontal air sinuses are not present at birth.
- ❖ Start developing 2 or 3 years after birth.

Number- 2.

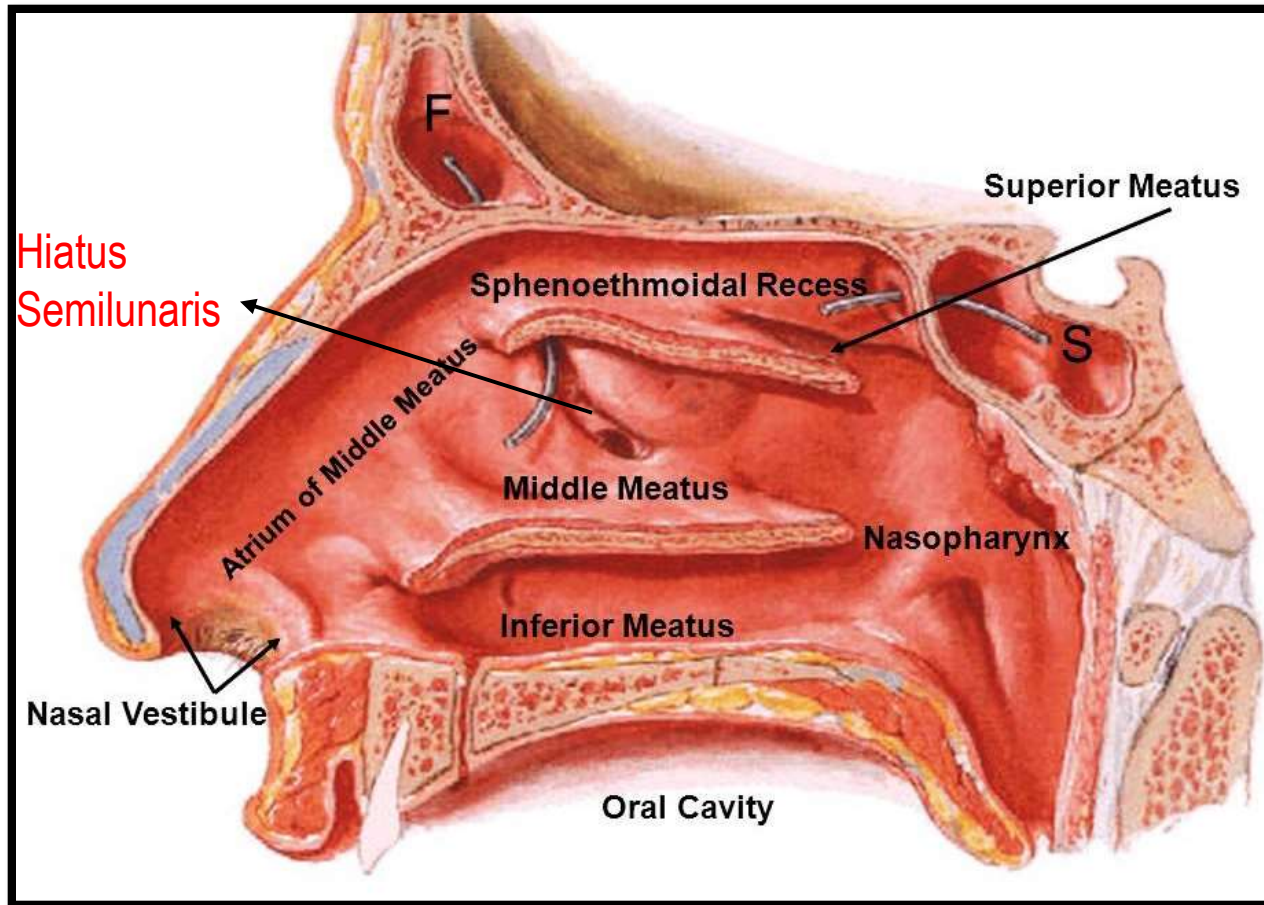
Shape- Triangular.

- ❖ Lie between inner and outer tables of frontal bone.
- ❖ Right frontal air sinus is separated from the left by a septum.



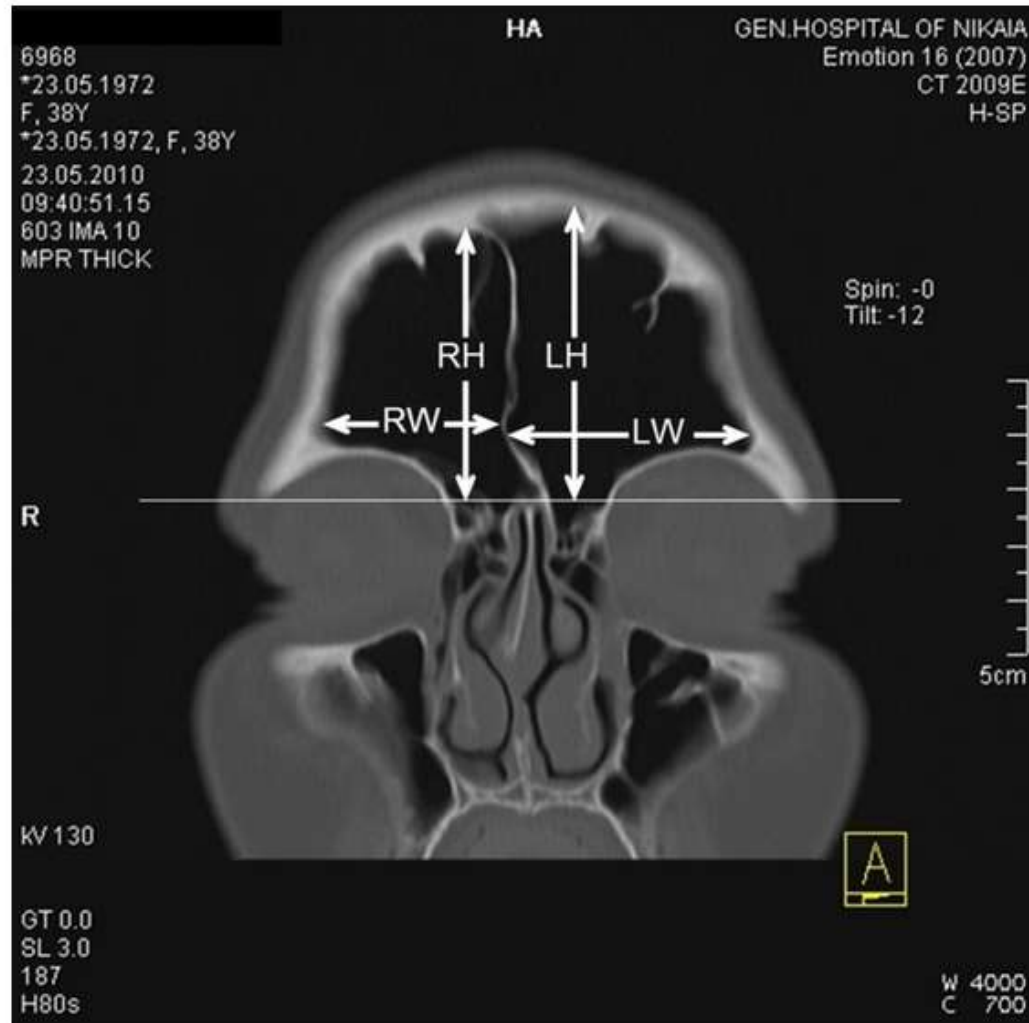
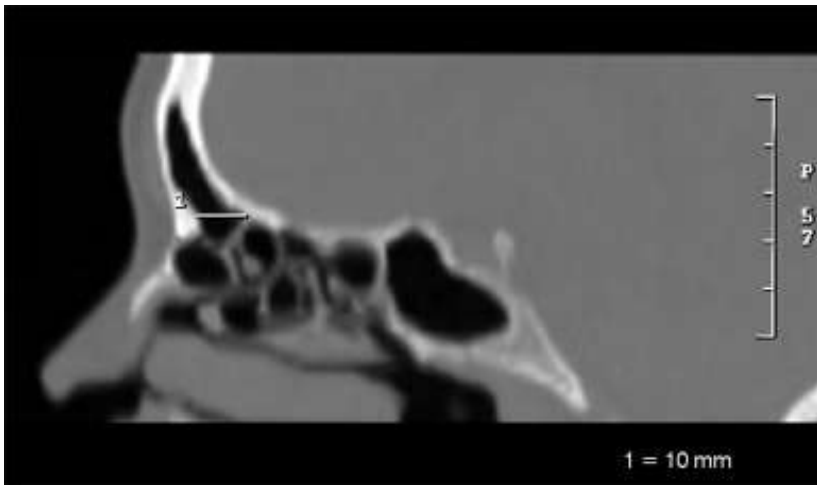
Drainage & Nerve Supply

- **Drainage-** Drains into **anterior part** of **hiatus semilunaris** of middle meatus through frontonasal duct.
- **Nerve Supply-** Supraorbital nerve.



Measurements

- Height- ~ 3 cm
- Width- 2.5 cm
- Anteroposterior- 1.8 cm



Relations of Frontal Air Sinus

Anterior-

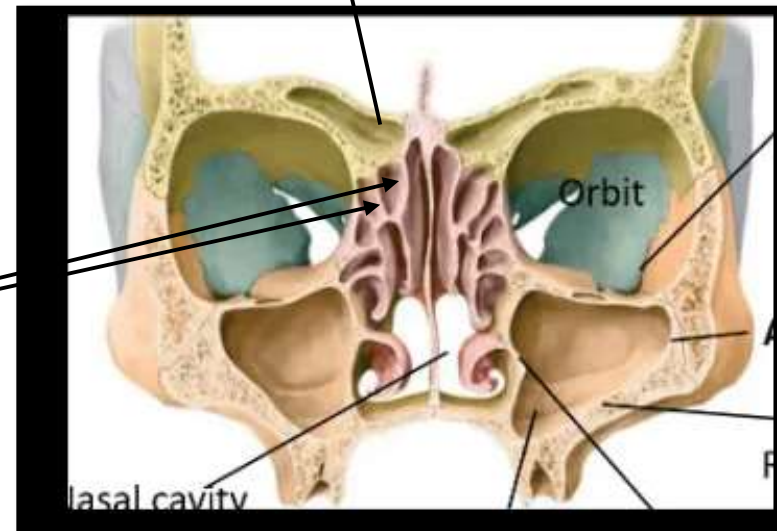
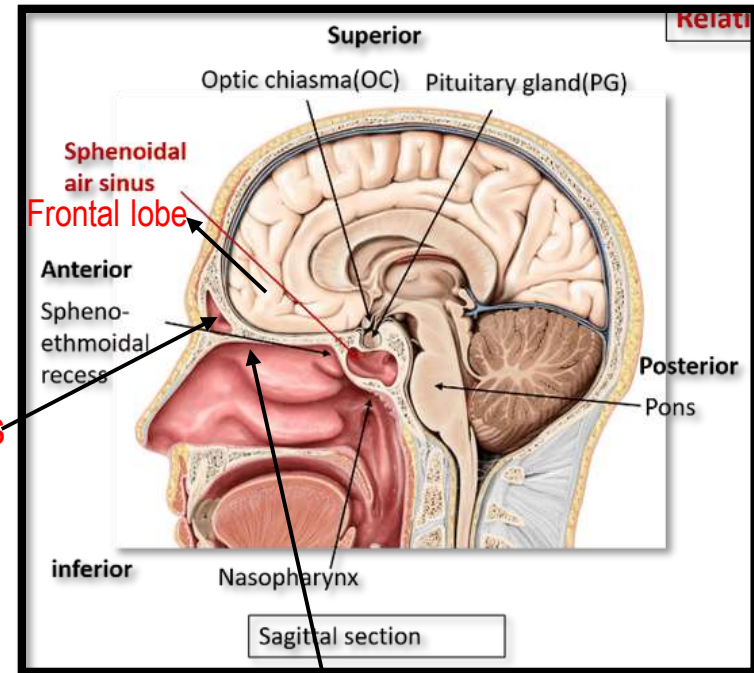
- Superciliary arch of forehead.

Posterior-

- Meninges and frontal lobe of brain.

Inferior-

- Roof of nose.
- Roof of orbit (medial part).
- Ethmoidal air cells.



Applied Aspects

Frontal Headache (Office Headache)

- Headache from frontal sinusitis shows characteristic periodicity.
- It starts on waking, gradually increases and reaches its peak by about midday and then starts subsiding.

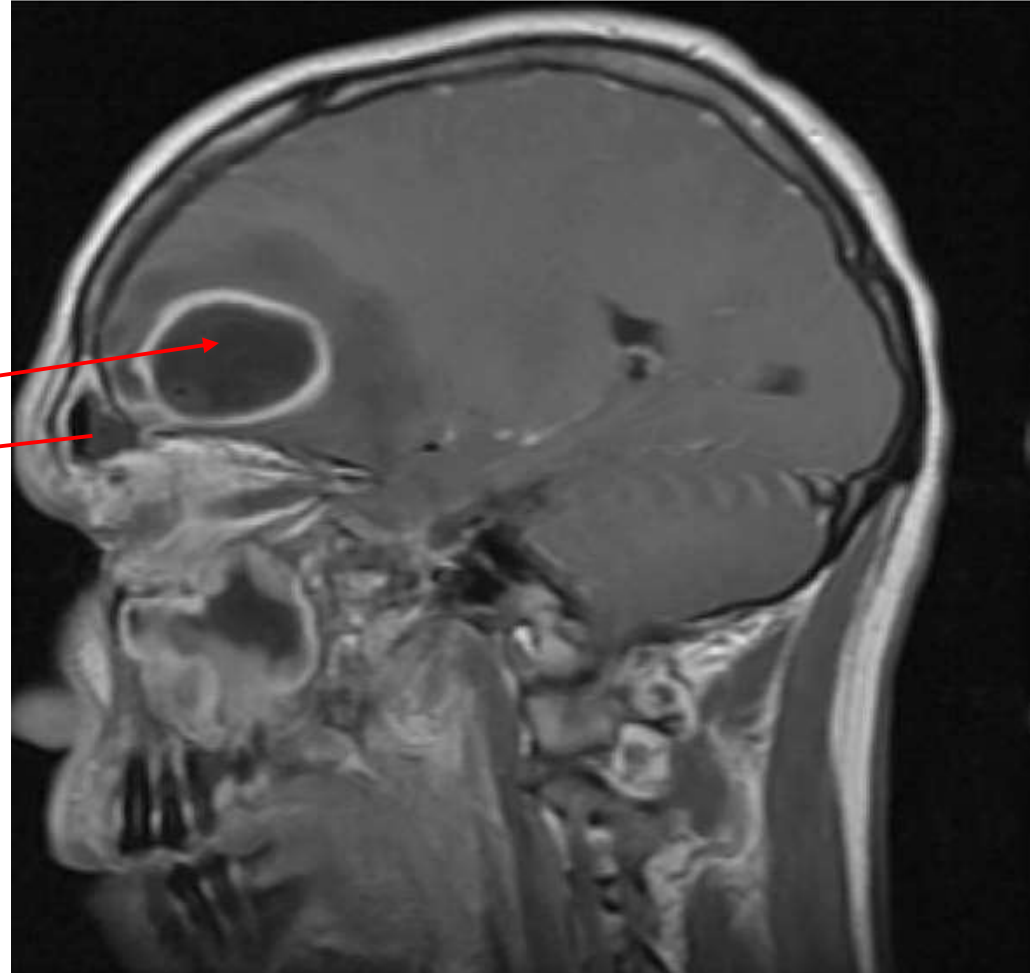


Applied Aspects contd...

Frontal Lobe Abscess-

- Infection of frontal air sinus may spread posteriorly into frontal lobe of brain causing frontal lobe abscess.

Frontal air sinus



Applied Aspects contd...

Orbital Cellulitis-

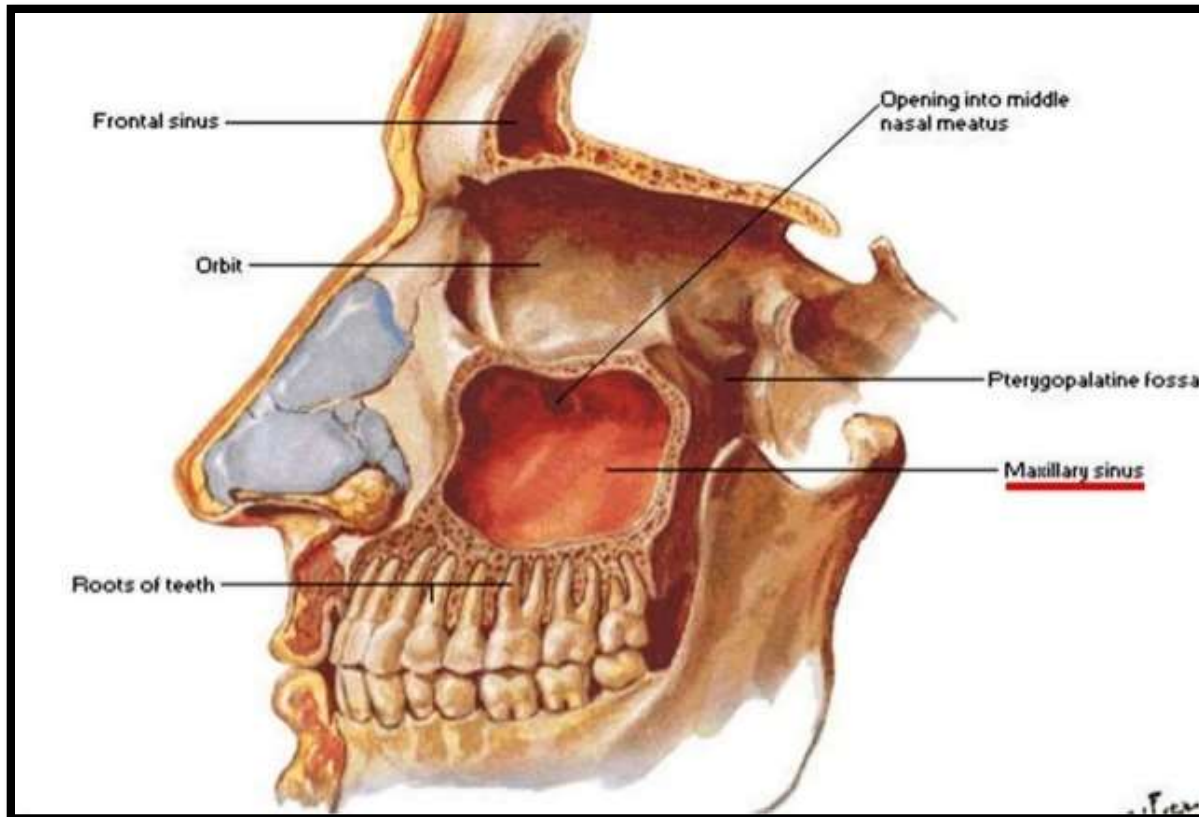
- Infection of frontal air sinus may spread inferiorly into orbit causing orbital cellulitis.



Maxillary Sinus (Antrum of Highmore)

Introduction

- Largest paranasal air sinus.
- Present in body of maxilla.
- **First to develop.**
- Appears around 4th month of intrauterine life.



Maxillary Sinus contd...

SHAPE- Pyramidal.

Base-

- Directed medially.
- Formed by a part of lateral wall of nose.
- **Opening** or **ostium of the sinus** is present in the upper part of base, close to the roof.

Apex-

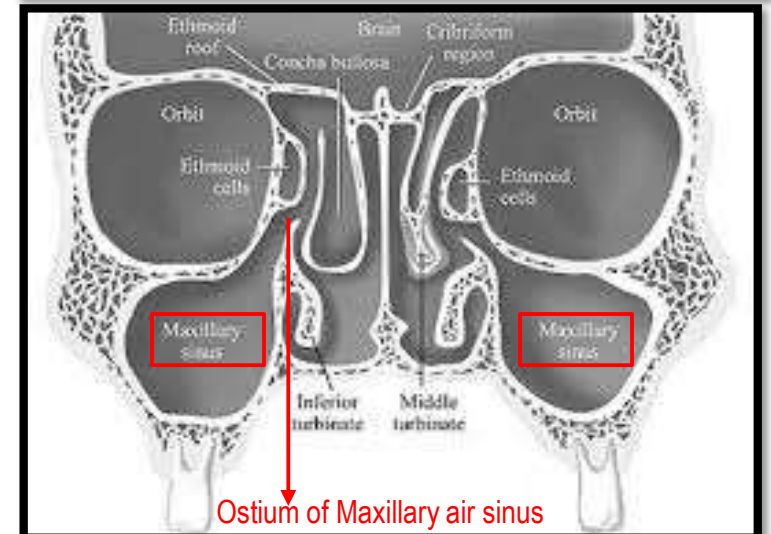
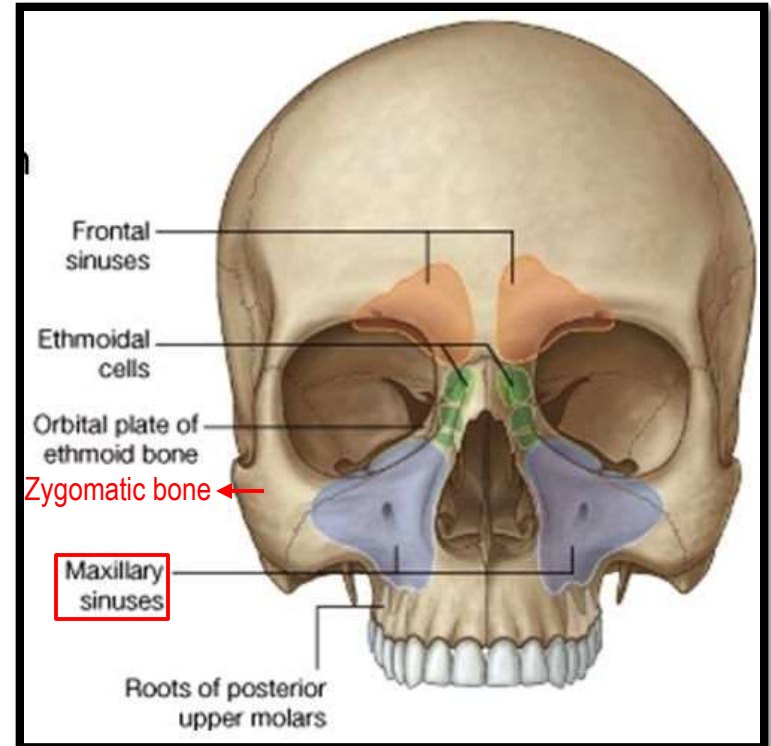
- Directed laterally.
- Extends into zygomatic process of maxilla.

Roof-

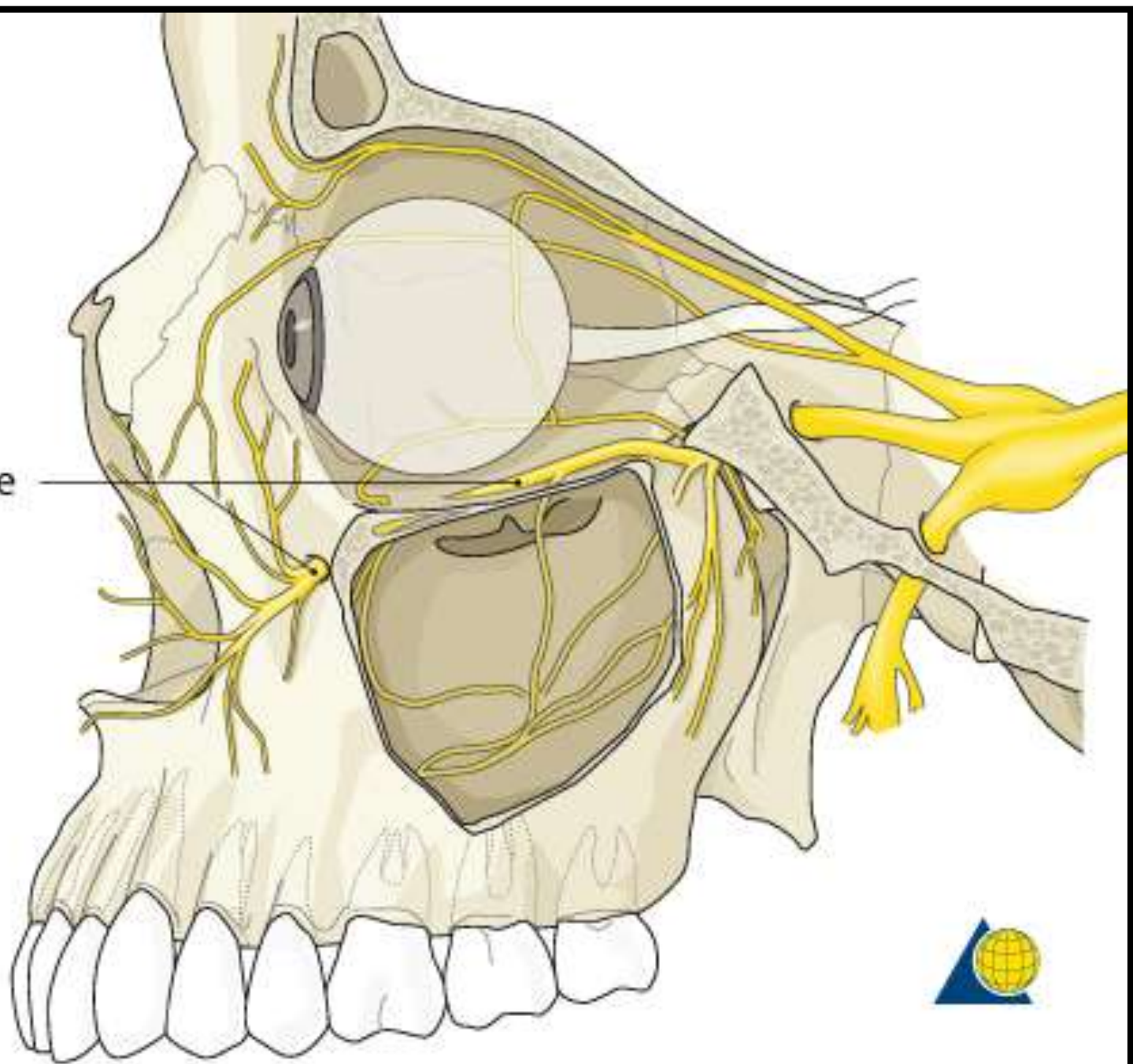
- Formed by the floor of orbital cavity.
- **Infraorbital nerve** and **artery** traverse the **roof** in a bony canal.

Floor-

- Formed by the alveolar process of maxilla.
- Lies **~1.25 cm** below the floor of nasal cavity.

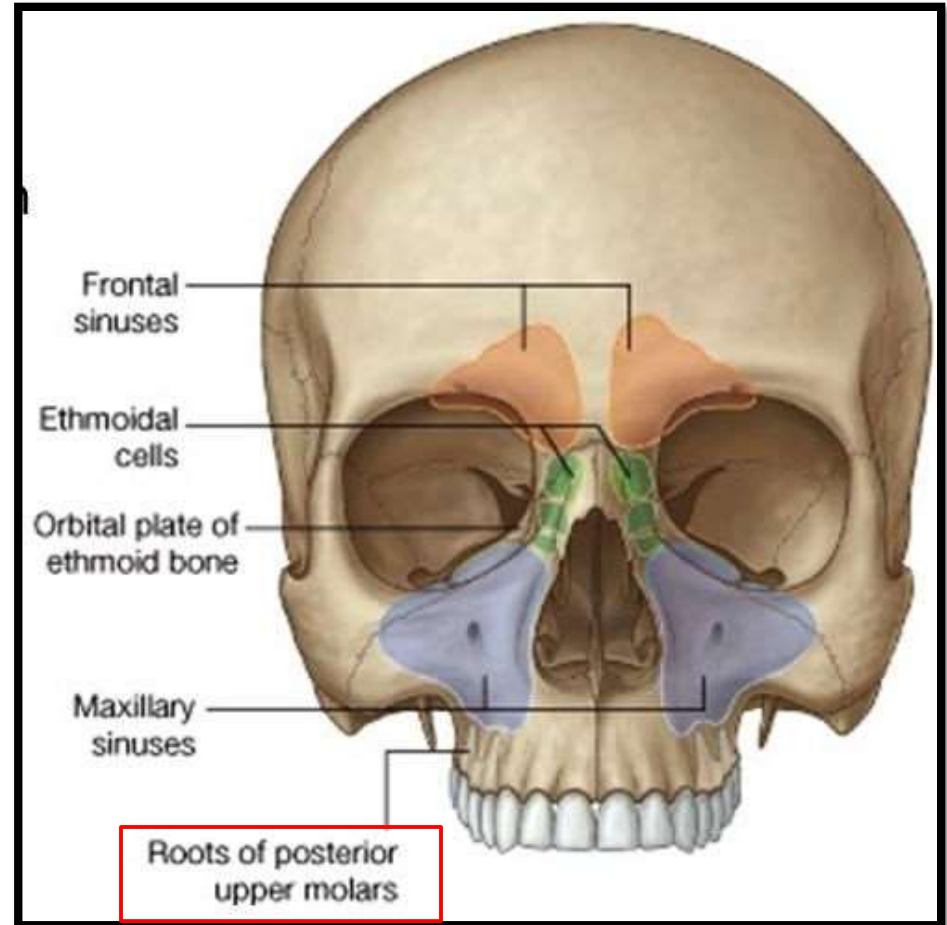


Infraorbital nerve



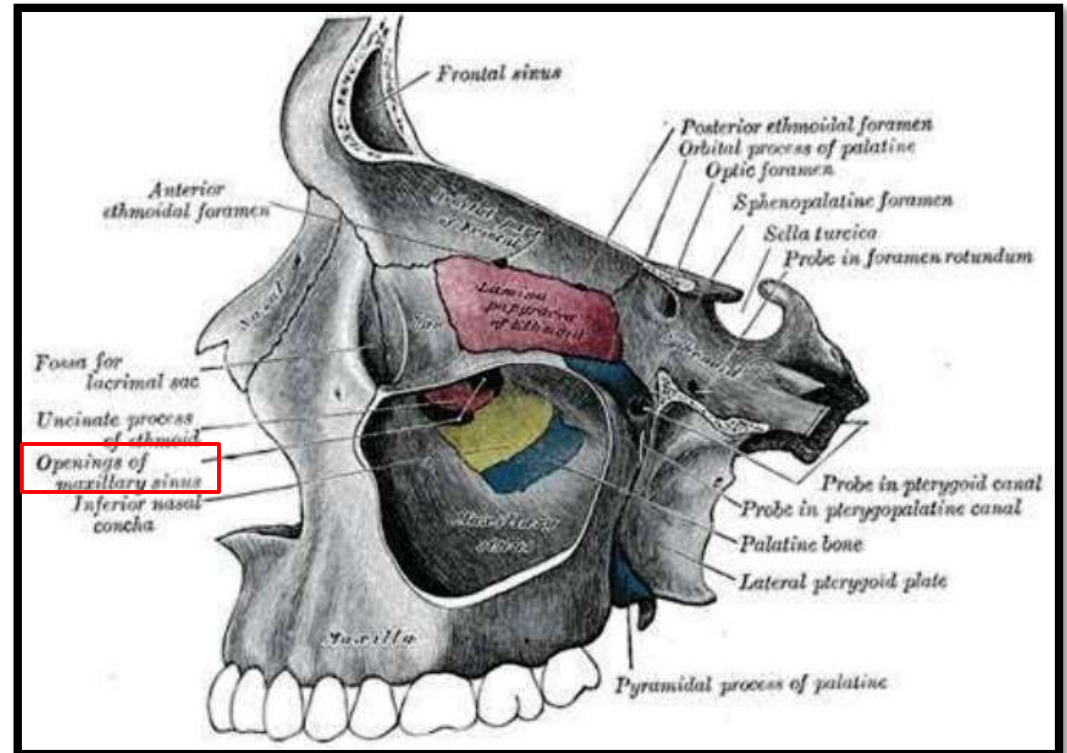
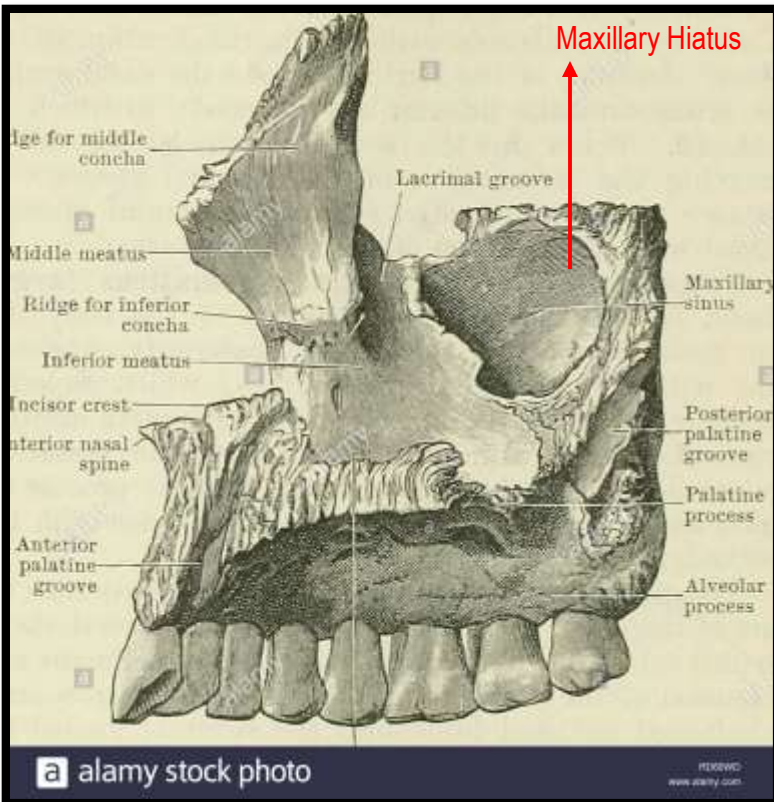
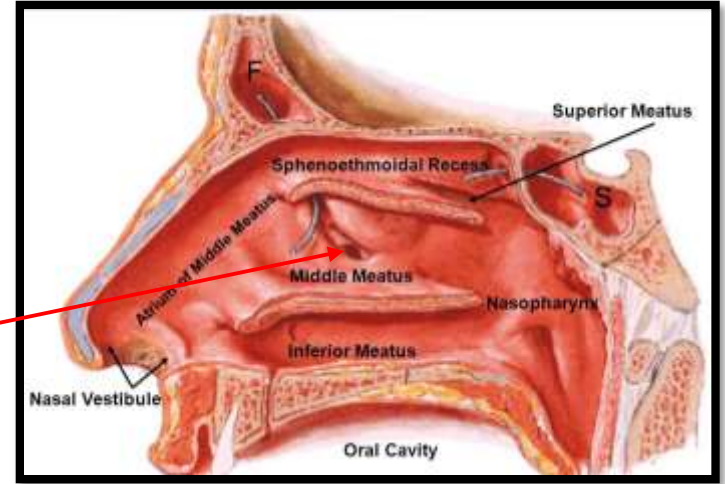
Floor of Maxillary Sinus contd...

- The level of floor corresponds to the ala of nose.
- Normally the roots of first and second molar teeth project into the floor.
- Sometimes roots of third molar, first and second premolars may project into the floor.
- Rarely, root of canine may project into the floor.
- Sometimes roots of teeth are separated from the sinus only by a thin layer of mucosa.



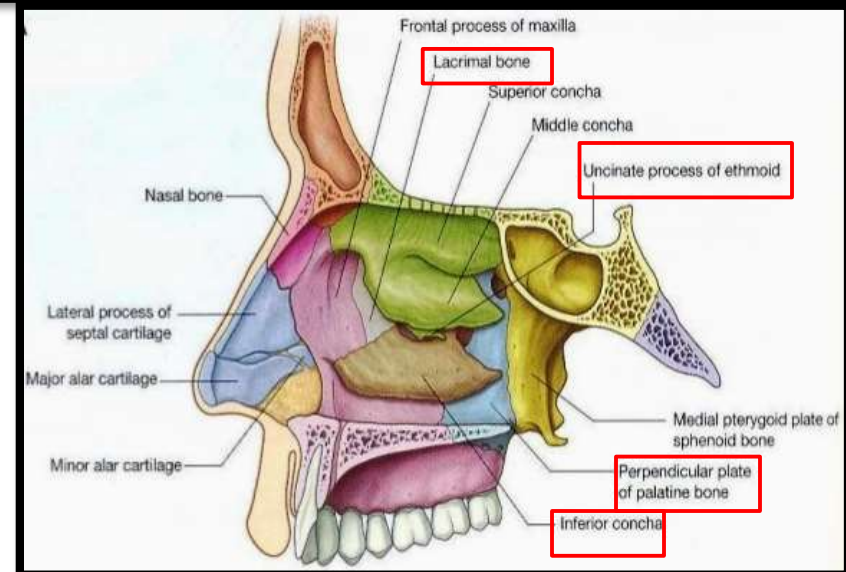
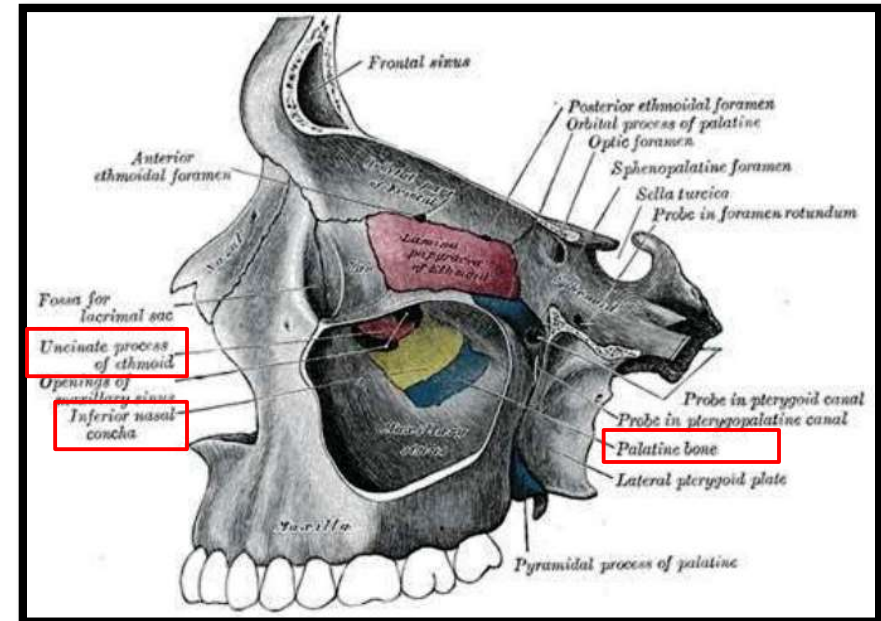
Base of Maxillary Sinus

- It is formed by medial surface of body of maxilla and some other bones.
- In maxilla, medial surface of its body presents a large maxillary hiatus.
- In the skull, base of maxillary sinus presents a small opening (ostium).



Reduction of large maxillary hiatus to small ostium

- It occurs by the following bones:
- Uncinate process of **ethmoid**.
- Descending process of **lacrimal**.
- Ethmoidal process of **inferior nasal concha**.
- Perpendicular plate of **palatine**.



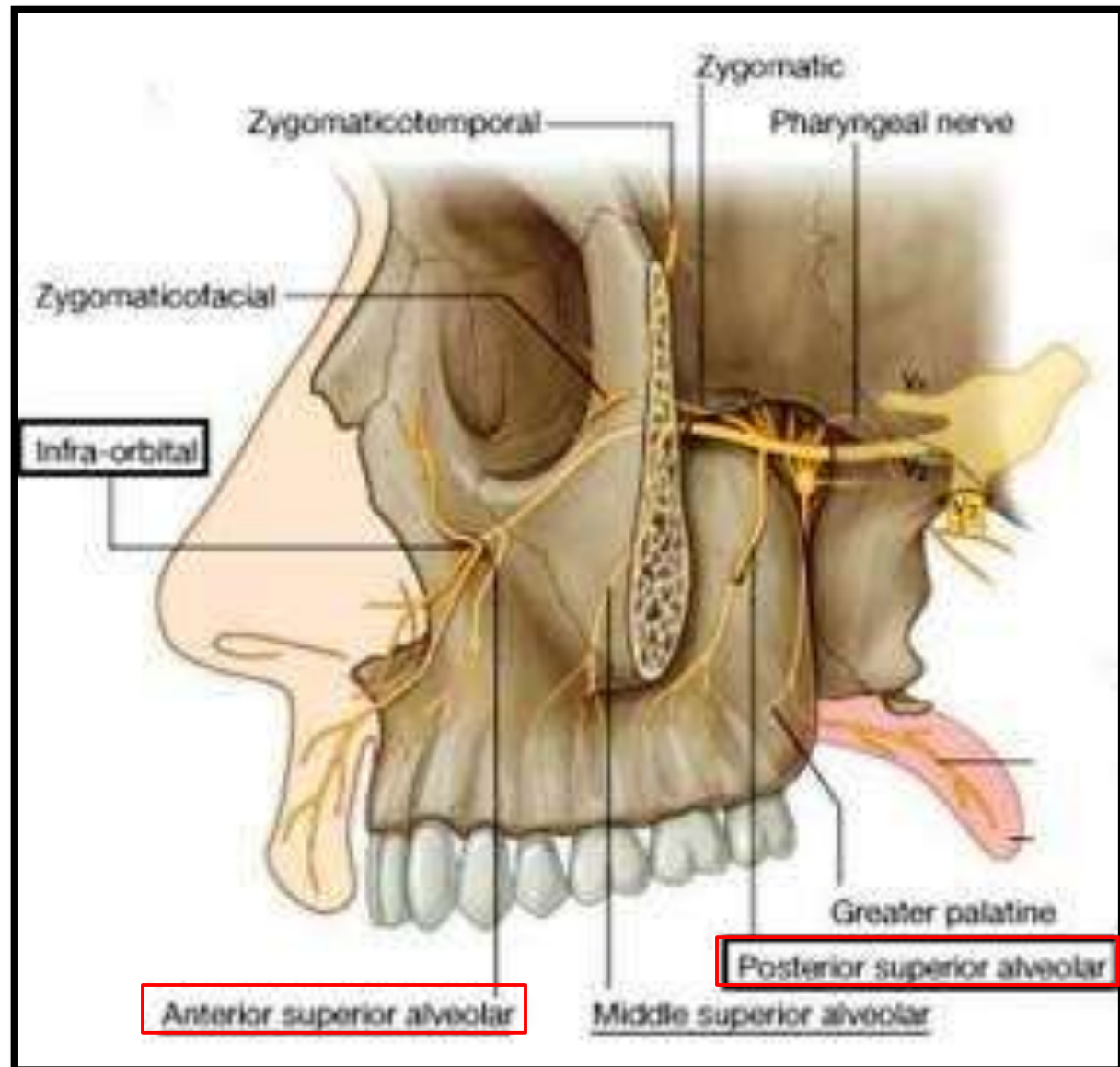
Maxillary Sinus contd...

Anterior wall-

- Has a curved bony canal for **anterior superior alveolar nerve** – **Canalis Sinuosus**.

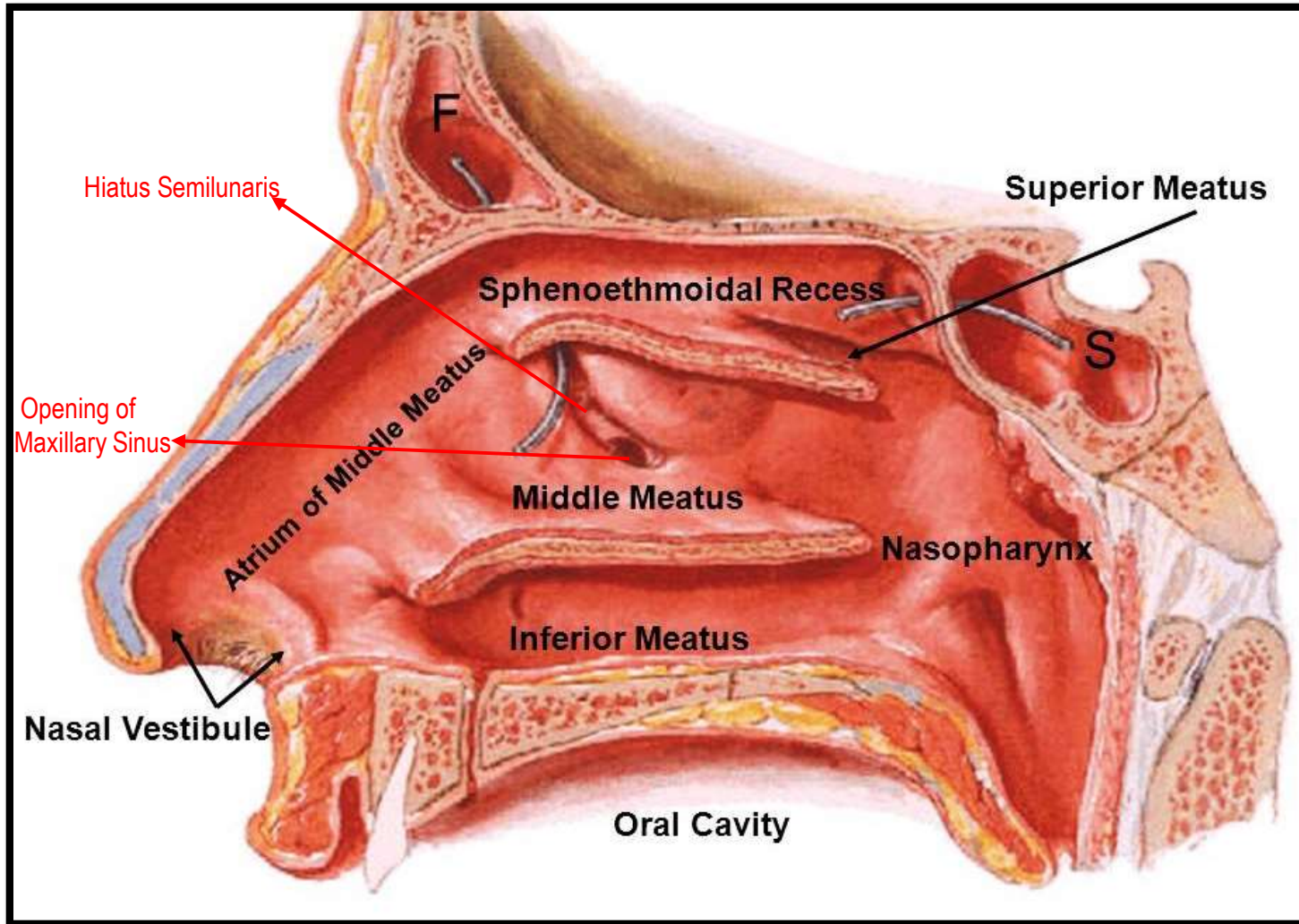
Posterior wall-

- Separates the sinus from infratemporal and pterygopalatine fossae.
- It is pierced by the **posterior superior alveolar nerves** and vessels.



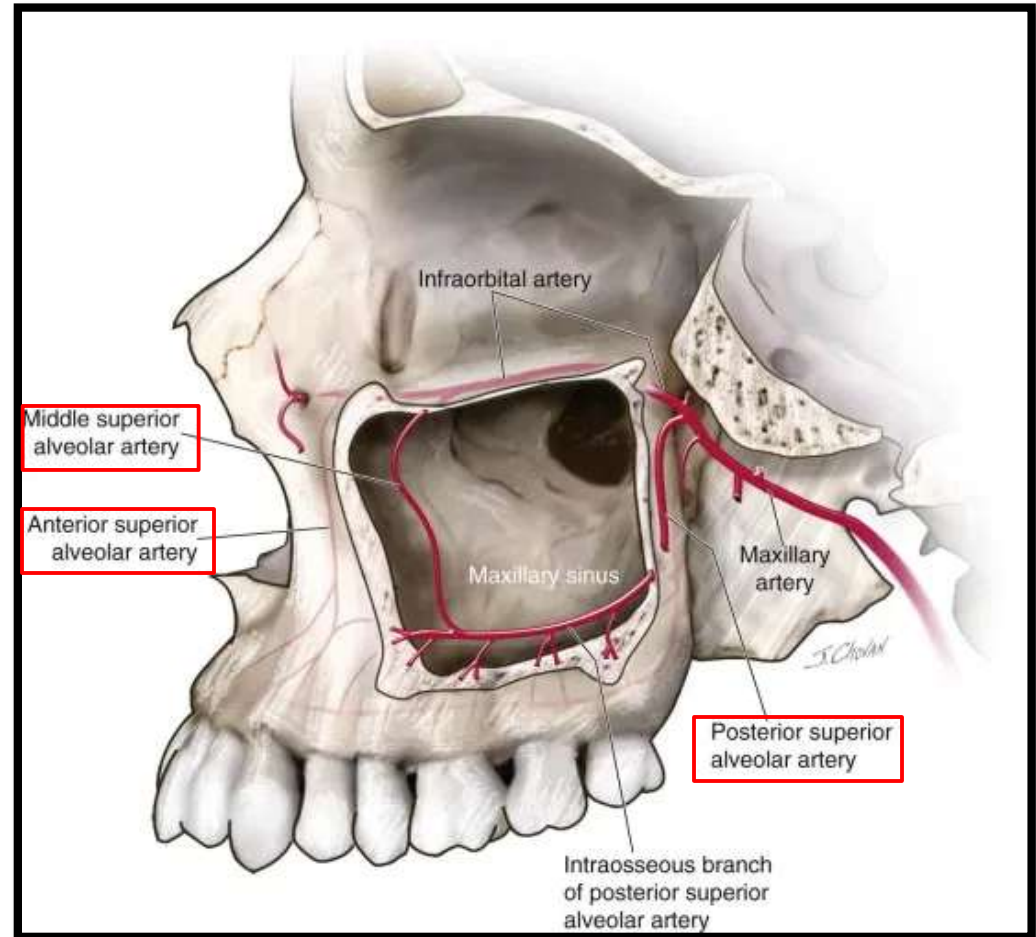
Drainage

- In posterior part of hiatus semilunaris of middle meatus.



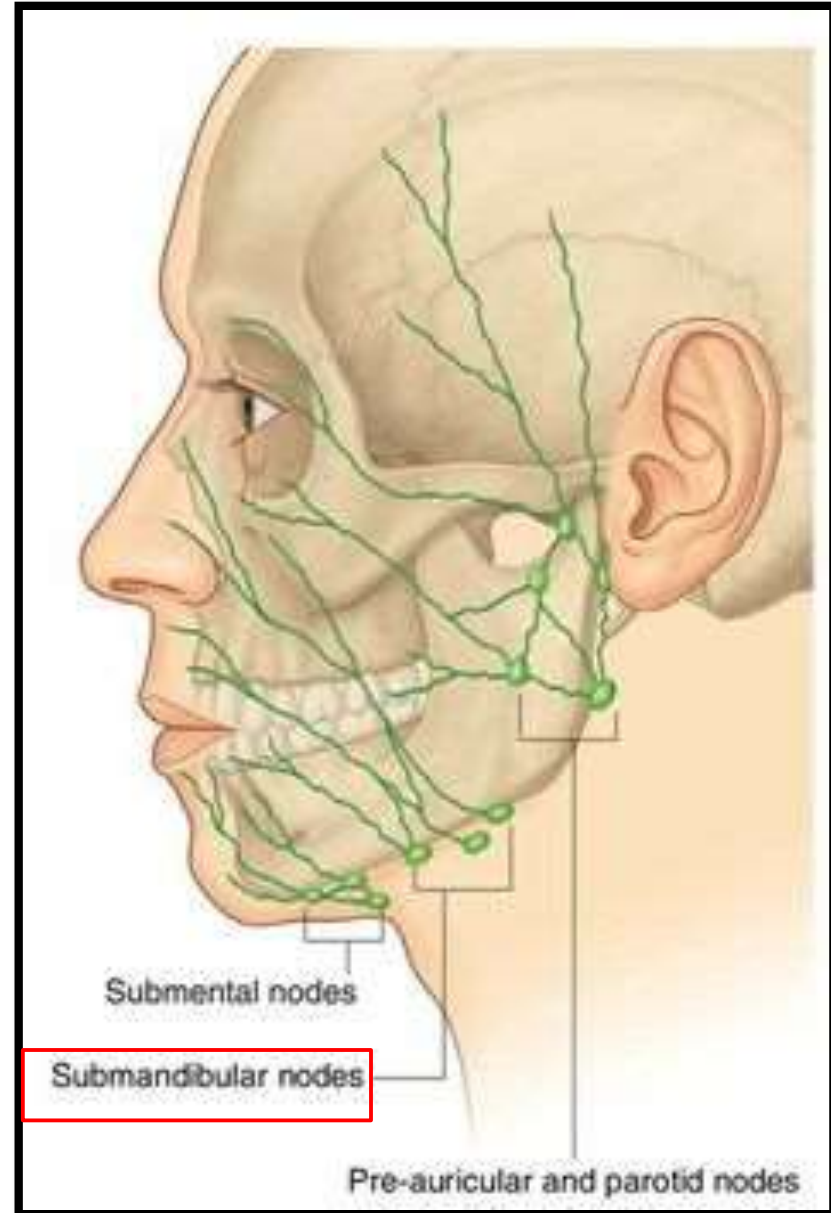
Arterial Supply

- Anterior superior alveolar artery.
- Middle superior alveolar artery.
- Posterior superior alveolar artery.



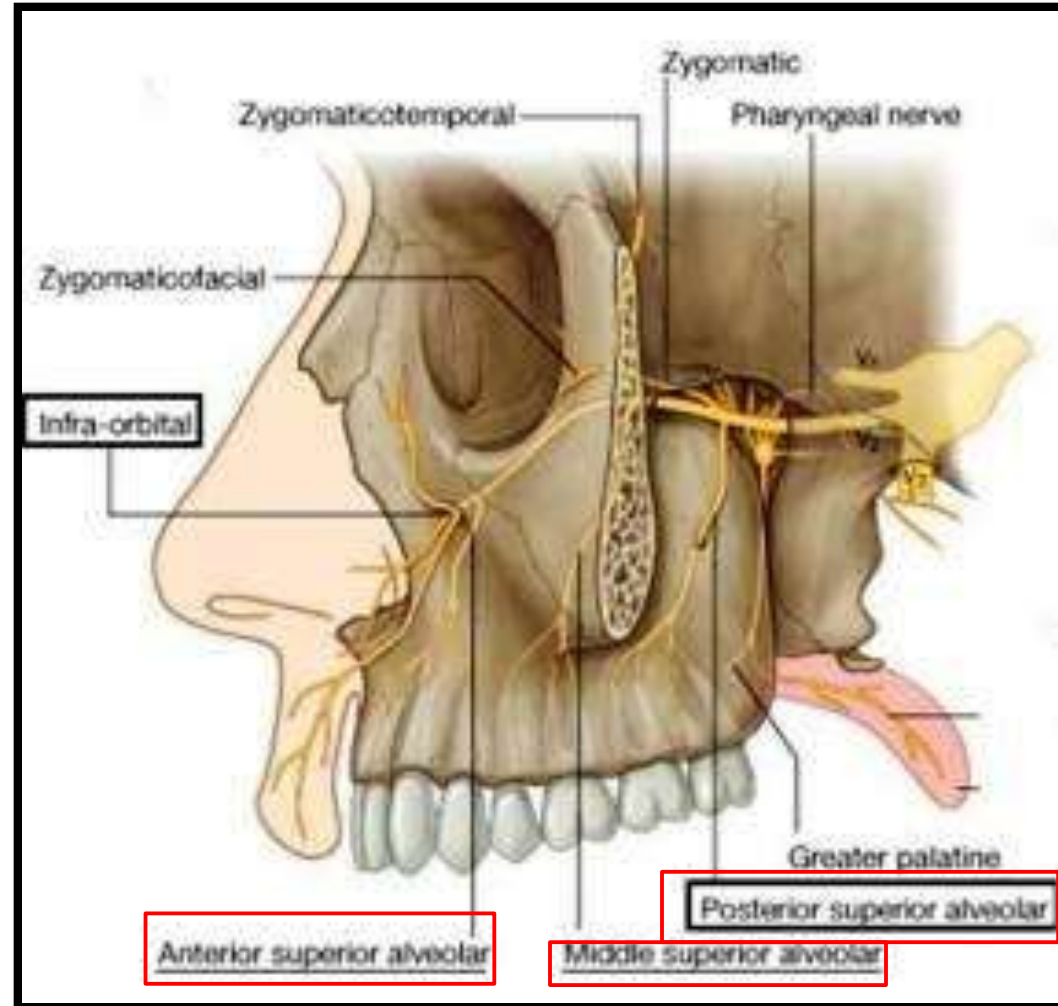
Lymphatic Drainage

- Submandibular lymph nodes.



Nerve Supply

- Anterior superior alveolar nerve.
- Middle superior alveolar nerve.
- Posterior superior alveolar nerve.



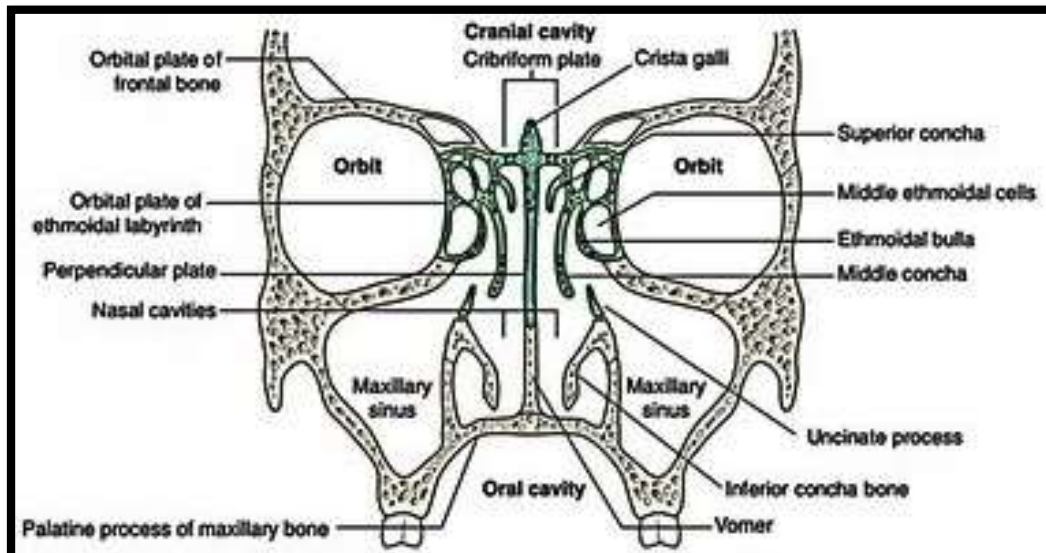
Applied Aspects

Maxillary Sinusitis-

- Maxillary sinus is the most commonly infected paranasal air sinus.
- The opening of maxillary sinus is in a disadvantageous position for natural drainage.

Sources of infection:

- Infected nose.
- Carious upper premolar and molar teeth.
- Infected frontal and anterior ethmoidal air sinuses.



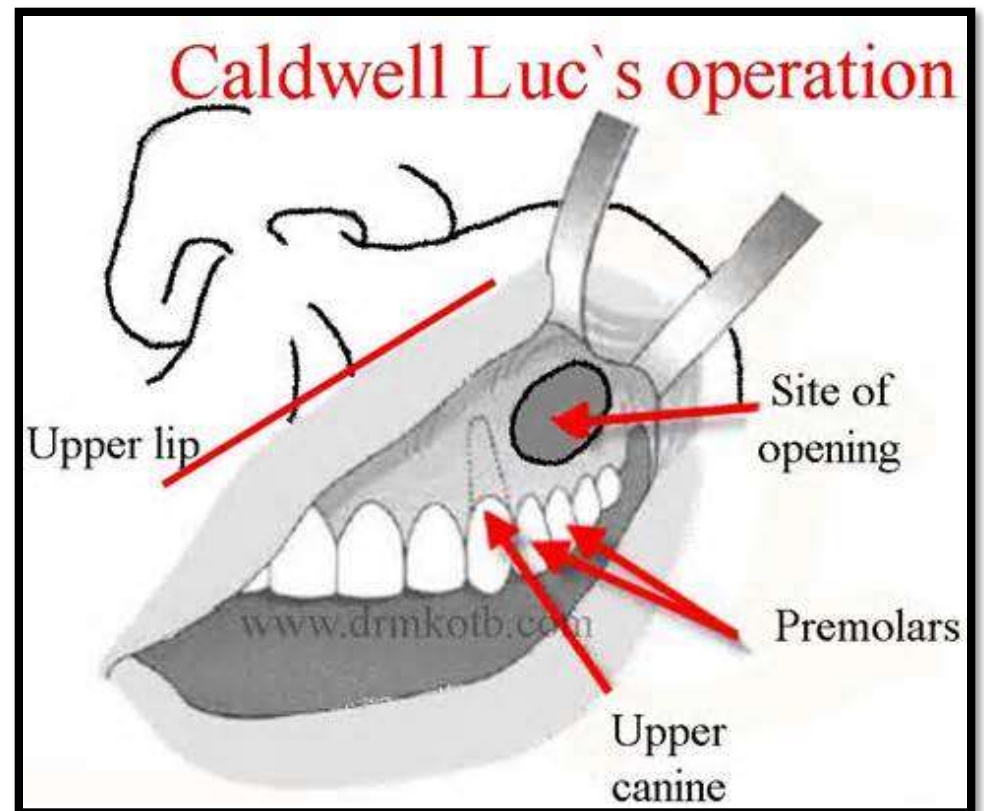
Surgical Drainage of Maxillary Sinus

Antral puncture (Antrostomy)-

- Trocar and canula are passed below the inferior nasal concha in an outward and backward direction.

Caldwell-Luc operation-

- Maxillary sinus is opened through gingiva-labial sulcus.



Applied Aspects contd...

Carcinoma of Maxillary Sinus-

- Arises from mucosa of the sinus.

Clinical Features-

Due to upward invasion:

- Proptosis (protrusion of eyeball).
- Diplopia (double vision).
- Pain and anaesthesia over the face below the orbit.

Due to downward invasion:

- Swelling or even ulceration of palatal roof of oral cavity.

Due to medial invasion:

- Nasal obstruction.
- Epistaxis.
- Epiphora (overflow of tears).

Due to lateral invasion:

- Swelling on the face and palpable mass in gingiva-labial sulcus.

Due to posterior invasion:

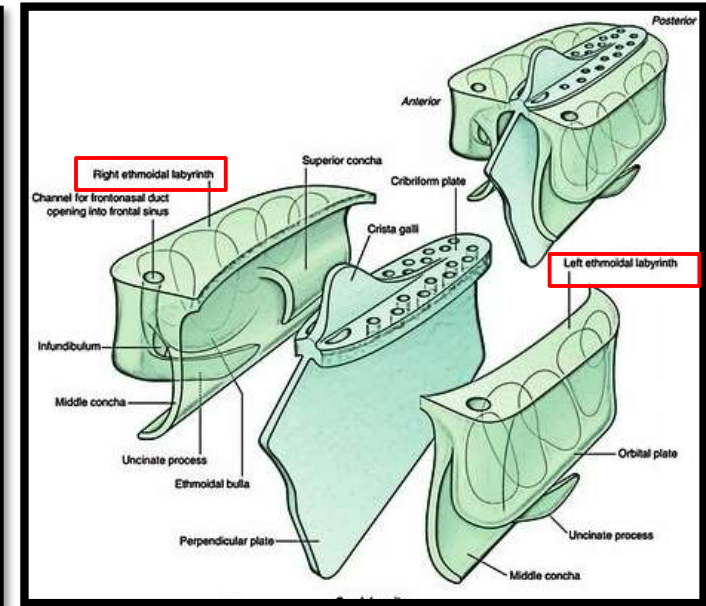
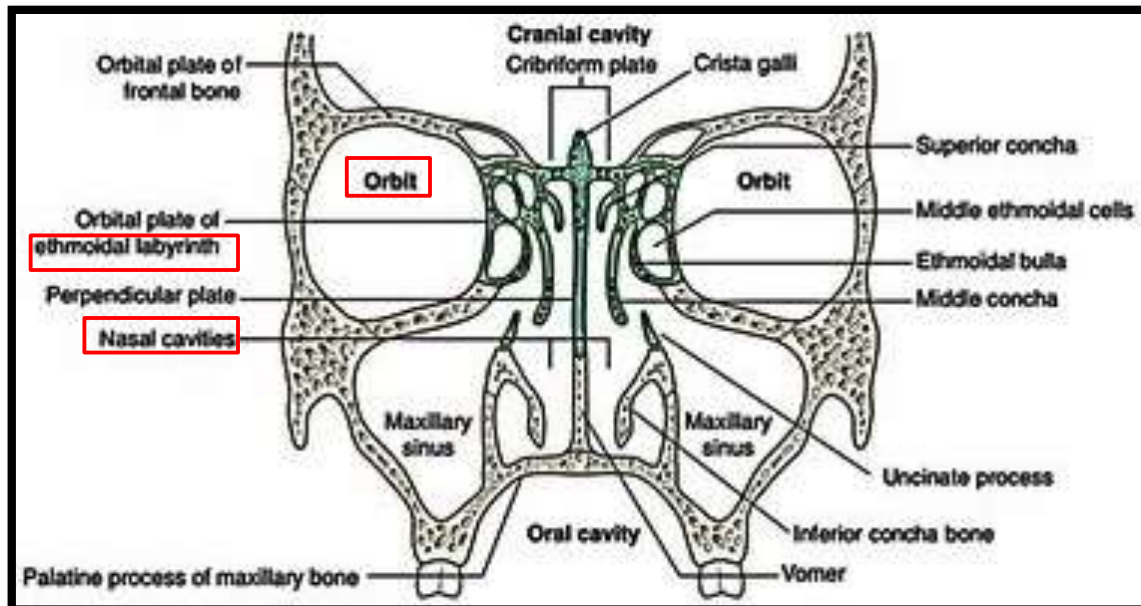
- Referred pain to upper teeth.



Ethmoidal Sinuses

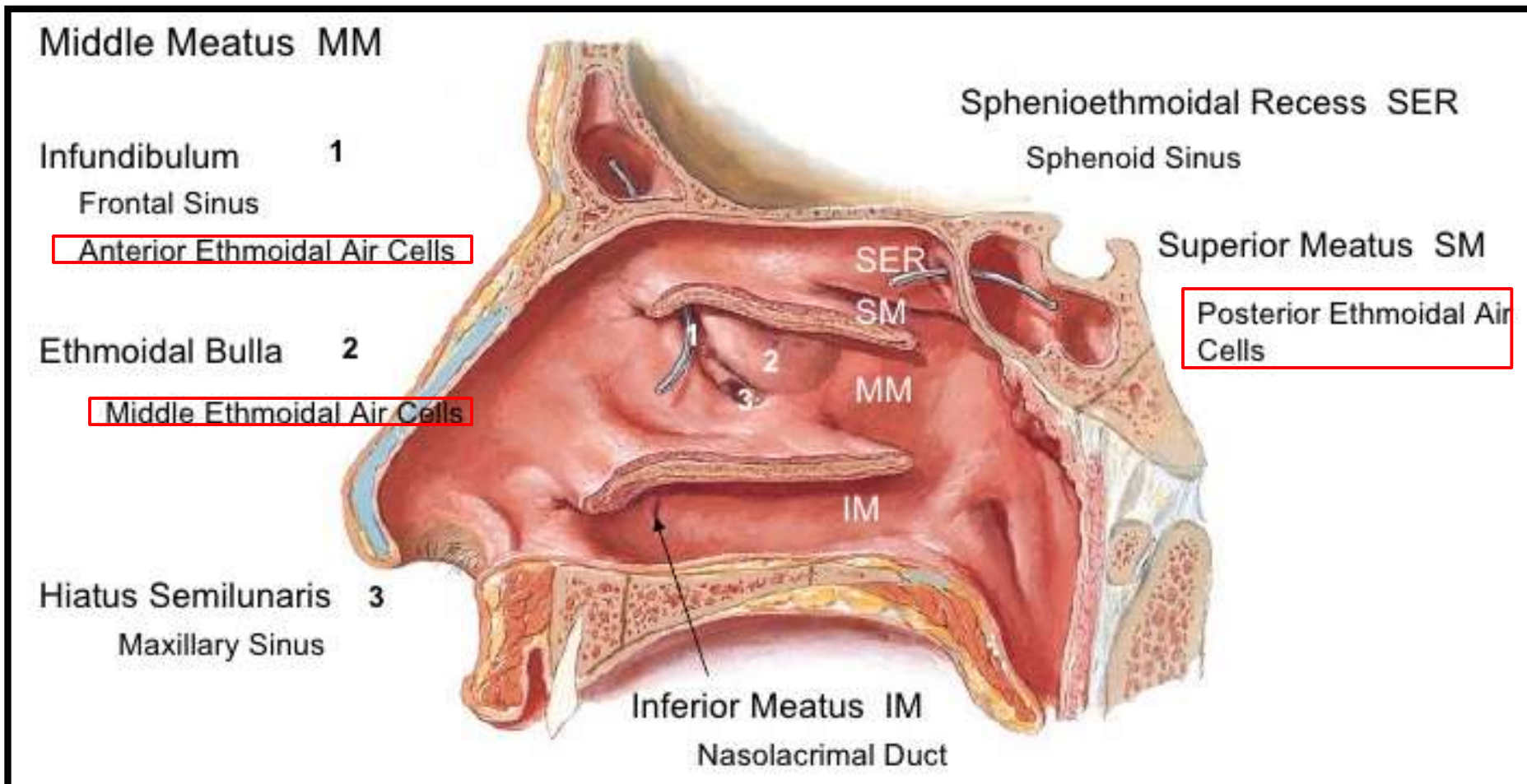
Introduction

- ❖ Present within labyrinth of ethmoid bone.
- ❖ Between upper part of lateral nasal wall and orbit.
- ❖ 3 groups:
 - Anterior (up to 11 air cells).
 - Middle (1-3 air cells).
 - Posterior (1-7 air cells).



Drainage

- **Anterior group** drains into middle part of **hiatus semilunaris** of middle meatus.
- **Middle group** drains on the surface of **bulla ethmoidalis** of middle meatus.
- **Posterior group** drains into posterior part of **superior meatus**.



Applied Aspects

Ethmoidal Sinusitis-

- Often associated with infection of other sinuses.

Clinical Features-

- ❖ Localized pain over bridge of nose.
- ❖ Due to invasion into the orbit-
- Orbital cellulitis.

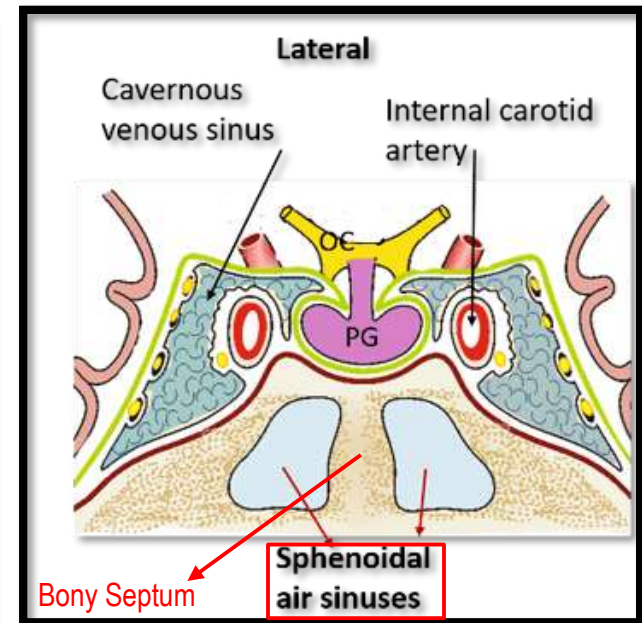
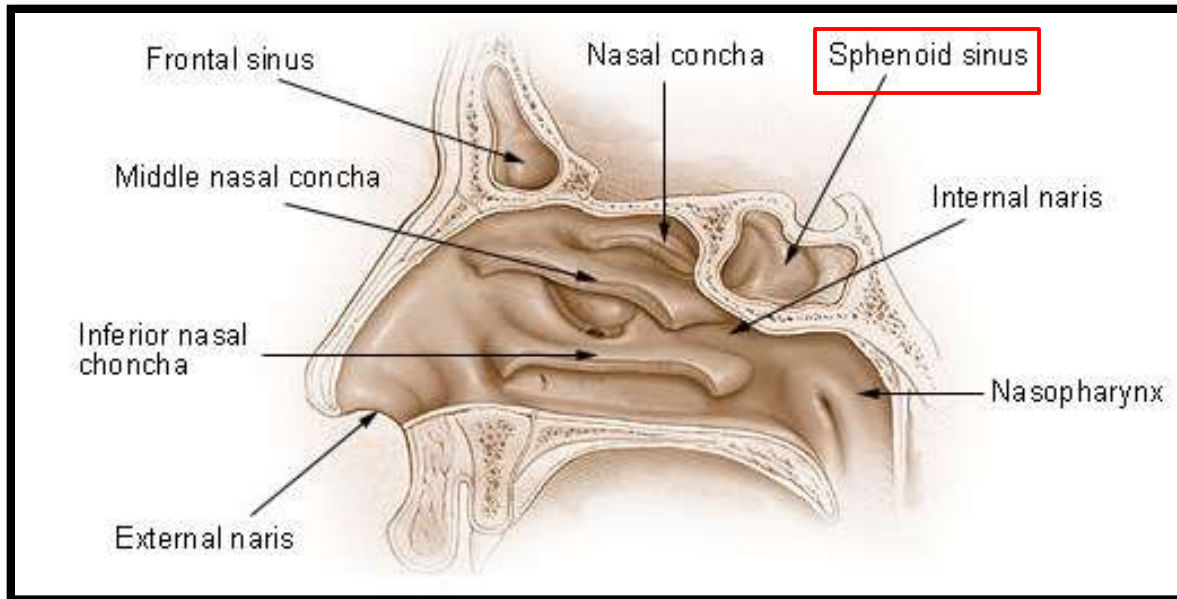


Sphenoidal Sinuses

Introduction

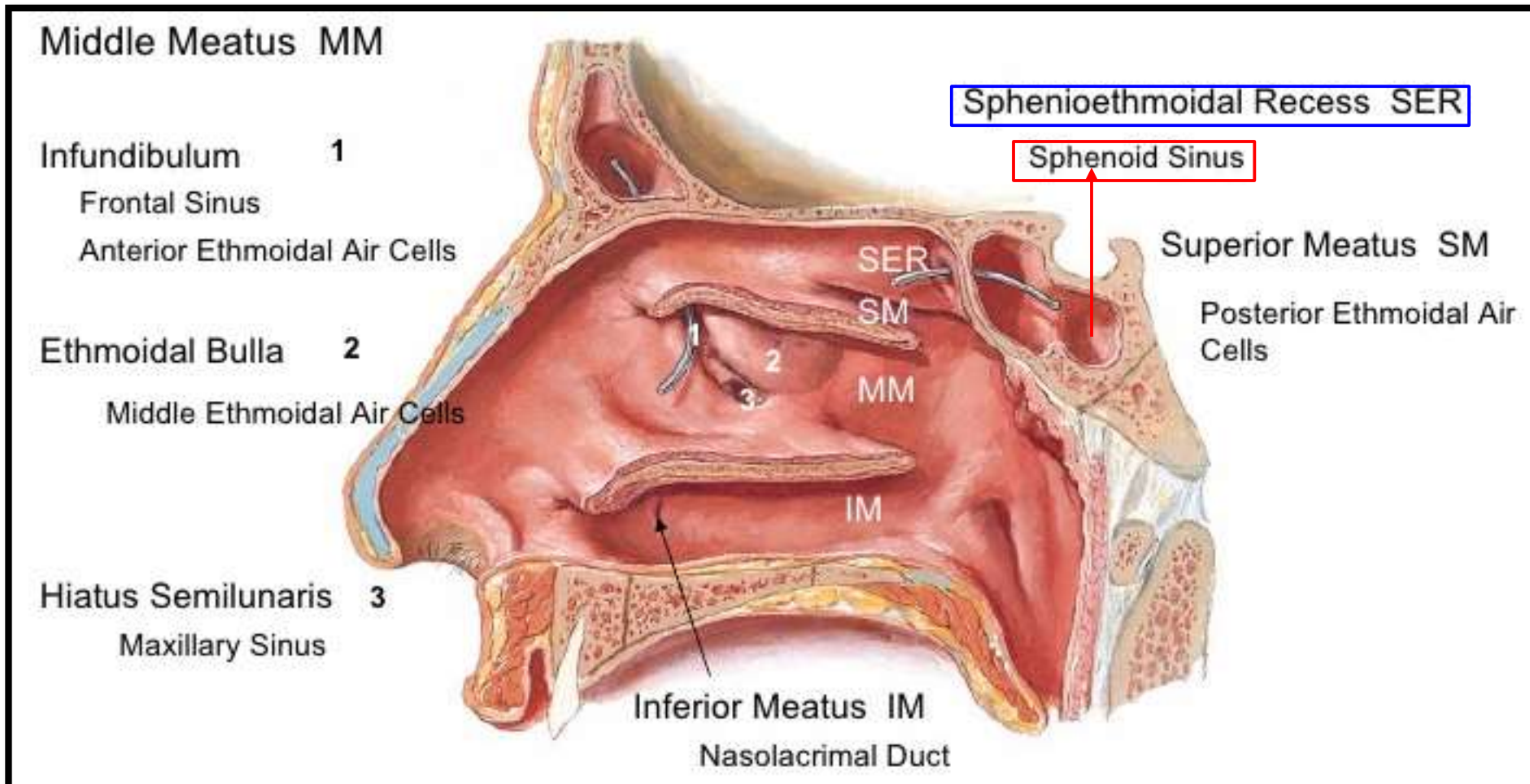
Number-

- 2 (right and left)
- ❖ Lie within the body of sphenoid bone.
- ❖ Separated from each other by a bony septum.



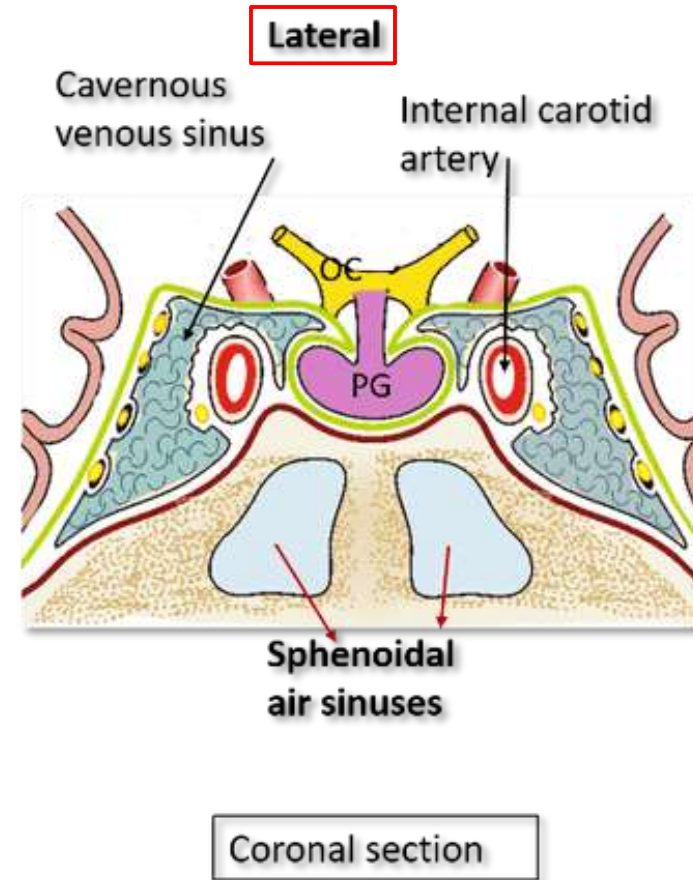
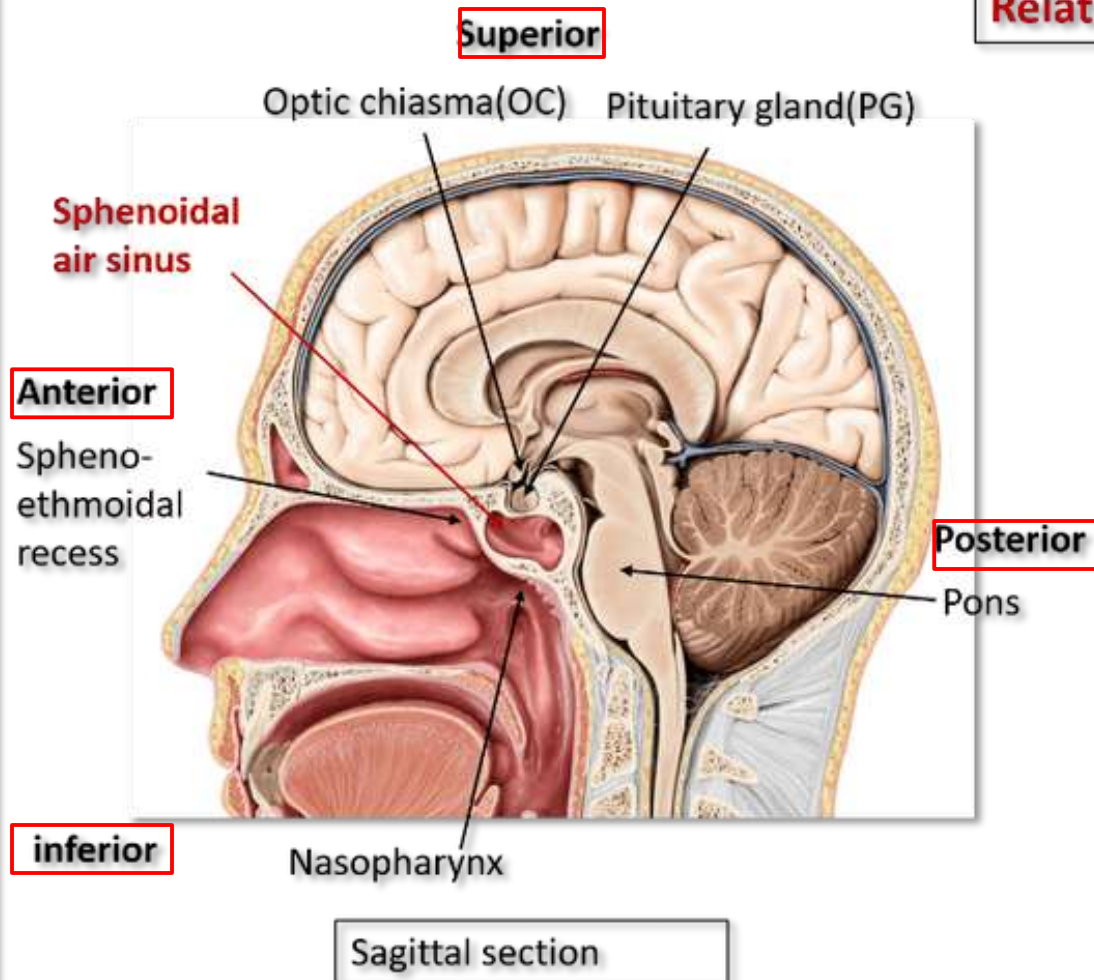
Drainage

- Into **sphenoethmoidal recess**.



Relations

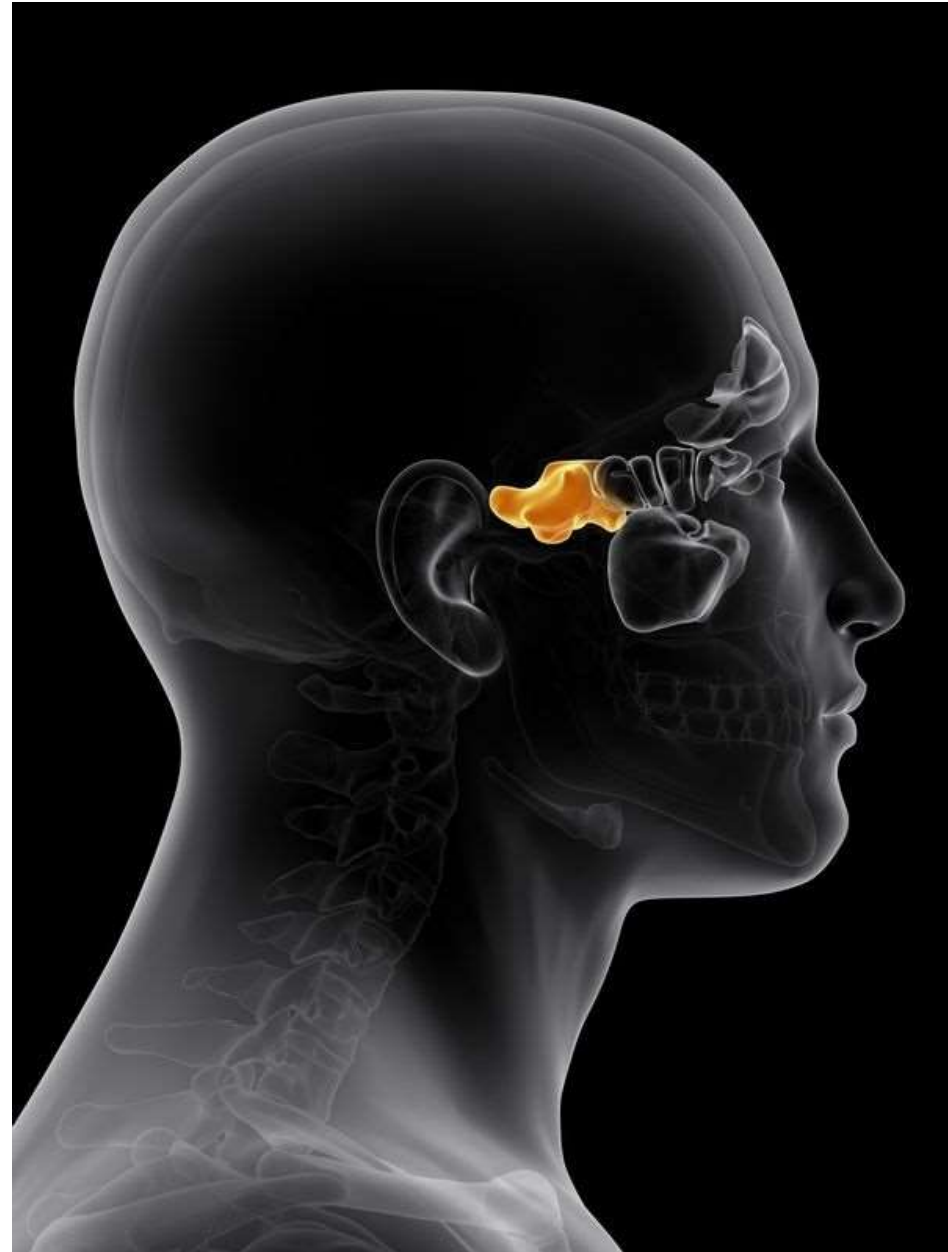
Relations of sphenoidal Air sinuses



Applied Aspects

Sphenoidal Sinusitis-

- One of The Most Dangerous Sinus Infection.
- It is rare in isolation.
- It is usually a part of pansinusitis.
- It may be associated with infection of posterior ethmoidal sinuses.



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Thank You!