

# *Oral Histology*

*Lec.18*

*Dr.Nada AL-Ghaban*

## *Maxillary sinus*

***Paranasal sinuses:*** Are the air spaces within the pneumatic bones situated at the fronto-basal region of the skull, they open into the nasal cavity through their lateral walls. These form the boundaries of the nasal cavities.

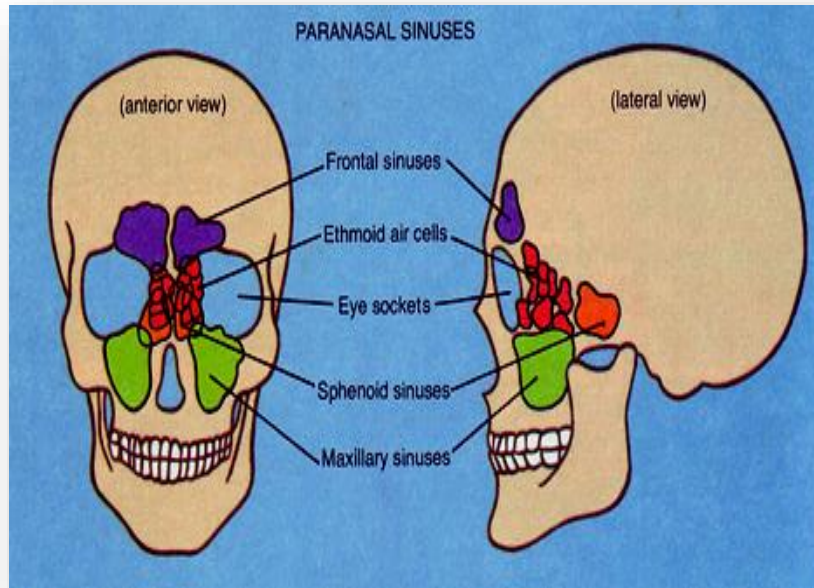
The sinuses are named for the facial bones in which they are located into:

- 1- Maxillary sinuses: surrounded the nasal cavity .
- 2- Frontal sinuses: above the eyes.
- 3- Ethmoid sinuses: between the eyes.
- 4- Sphenoid sinuses: behind the ethmoids .

Paranasal sinuses form developmentally through excavation of bone by air-filled sacs (pneumatic diverticula) from the nasal cavity. This process begins prenatally, and it continues through the course of an organism's lifetime

### ***Maxillary sinus:***

Is a large pneumatic space present in the body of the maxilla communicating with the environment through middle nasal meatus and the nasal vestibule .It is the largest of all sinuses. It is also known as antrum of **Highmore**. Highmore was the first person to describe the morphology and function of maxillary sinuses.



### ***Development of Maxillary sinus:***

It is the first sinus to develop and is filled with fluid at birth. The earliest phase of pneumatization is directed horizontally and posteriorly, whereas the later phase proceeds inferiorly toward the maxillary teeth.

This development places the floor of the sinus well below the floor of the nasal cavity. The shape of the sinus is a pyramid, with the base along the nasal wall and the apex pointing laterally toward the zygoma. The natural ostium of the maxillary sinus is located in the superior portion of the medial wall.

The anterior maxillary sinus wall houses the infra orbital nerve, which runs through the infraorbital canal along the roof of the sinus and sends branches to the soft tissues of the cheek. The thinnest portion of the anterior wall is above the canine tooth, called the canine fossa, which is an ideal entry site for addressing various disease processes of the maxillary sinus.

The roof of the maxillary sinus is the floor of the orbit. Behind the posteromedial wall of the maxillary sinus lies the pterygopalatine fossa, a small inverted space that houses several important neurovascular structures and communicates with several skull base foramina. The infra temporal fossa lies behind the posterolateral wall of the maxillary sinus.

The maxillary sinus starts developing at 4<sup>th</sup> months of I.U.L., it's development follows a number of morphogenic events :

- The horizontal shift of the palatal shelves occurs ,these shelves then fuse with each other and the oral cavity gets separated from the nasal chambers.
- Expansion of the lateral nasal wall, which starts folding ,and three nasal concha and three nasal meatus arise.
- The superior and the inferior meatus remain as shallow depressions along the lateral nasal wall. The middle meatus expands into the lateral nasal wall, and grows inferiorly to occupy the maximum space of the future sinus.
- The sinus appears and grows vertically ,it expands and modifies in form and it reaches it's final height after the eruption of all permanent teeth .

### ***Structure of the maxillary sinus:***

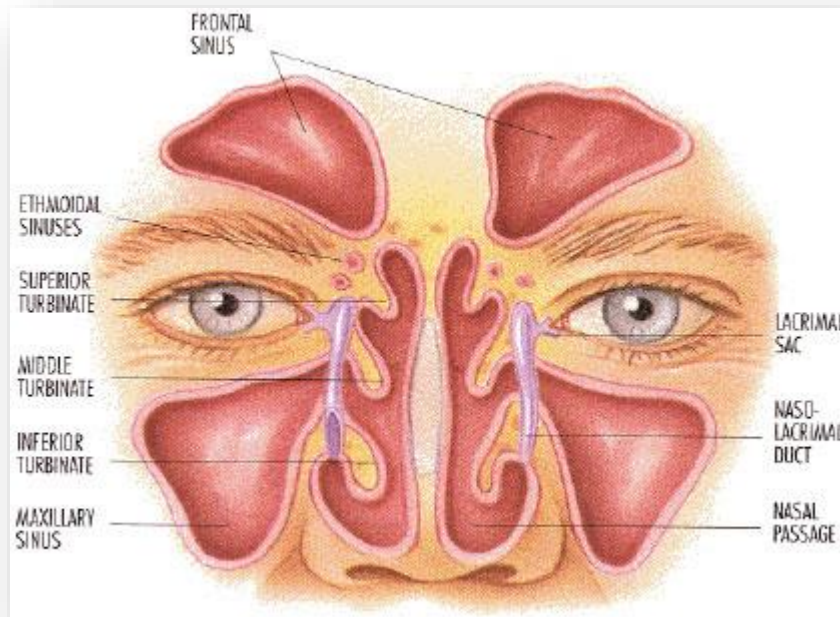
The maxillary sinus is a four-sided pyramidal cavity which is present in the maxillary body. It's walls are thin and these correspond to the **orbital** , **alveolar**, **anterior** and **infratemporal** aspects of the body of the bone.

It's apex directs laterally and extends into the zygomatic process. It's base faces medially which forms the lateral wall of the nasal cavity. The base of the sinus is thinnest of all walls , and it presents a perforation at the level of *middle nasal meatus*. The floor of sinus is formed by the alveolar process of the maxilla ,the roof is formed by the orbital floor.

Some of the processes of the maxilla consequently become invaded by the air spaces. These spaces are called as recesses, found in descending order in zygomatic process , frontal process and palatine process of the maxilla.

The palatine recesses reduces the amount of the bone between the dental apices and the sinus space.

A very thin bone separates floor of the sinus and roots of the maxillary molars. Very rarely, there may be no bone separating the root apices from the sinus ,they are separated only by a sinus lining.



**The four sides are related to the surfaces of the maxilla as follows:**

- ❖ Anterior side to the facial surface of body.
- ❖ Inferior to the alveolar and zygomatic process.
- ❖ Superior to the orbital surface.
- ❖ Posterior to the the infratemporal surface.

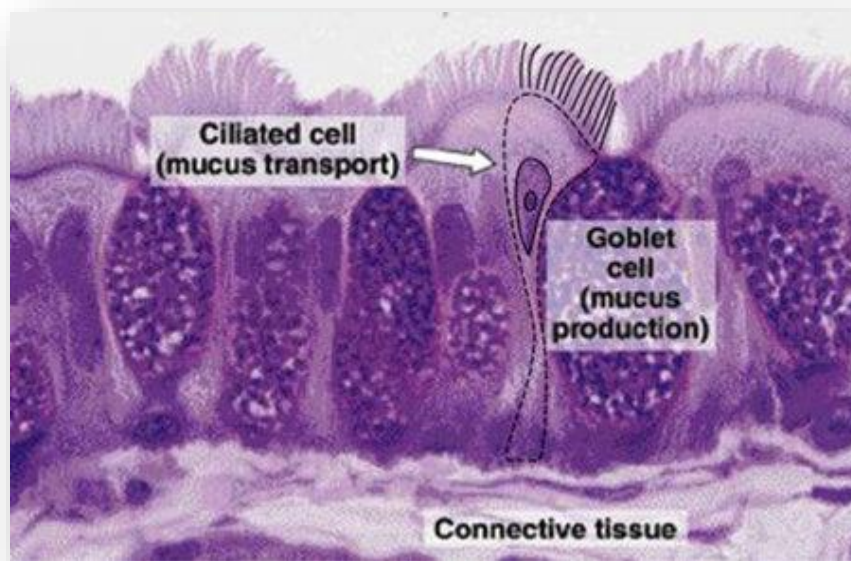
***Histological features:***

The space of the maxillary sinus is surrounded by three layers:

1.The epithelial layer :The epithelium is pseudostratified, columnar and ciliated, derived from the olfactory epithelium of the middle nasal meatus. The columnar ciliated cells are the most numerous cell type in maxillary sinus epithelium. Other cells are basal cells , columnar non-ciliated cells and secretory goblet cells, which produce mucous.

2.The basal lamina

3.The subepithelial layer, which includes the periosteum. ,this layer contains sub-epithelial glands, consist of acini with two types of secretory cells, serous and mucous cells, they secrete mixed secretory product.



## **Functions of maxillary sinus(paranasal):**

The biological role of the sinuses is debated, but a number of possible functions have been proposed:

- Decreasing the relative weight of the front of the skull, and especially the bones of the face.
- Increasing resonance of the voice.
- Providing a buffer against blows to the face.
- Insulating sensitive structures like dental roots and eyes from rapid temperature fluctuations in the nasal cavity.
- Humidifying and heating of inhaled air because of slow air turnover in this region.
- Regulation of intranasal and serum gas pressures
- Immunological defense: Production of bactericidal lysosome to the nasal cavity.

## ***Clinical considerations:***

1. Maxillary sinus due to its topographic location and its functional and systemic association with the orodontal complexes results in the transfer of pathological conditions between each other, either by mechanical connections or by way of blood or lymphatic pathways.

*(One of the main reasons the maxillary sinuses are especially prone to infection is their close proximity to the teeth).*

**2.**The base of the sinus is separated from the apices of maxillary molars and premolars by a thin bone or sometimes there may be no bone in between.

Surgical manipulation of these teeth often results in an oronasal fistula.

**3.**Presence of molar or premolar radicular cyst, hypercementosis, abscess or granuloma may also result in oronasal fistula.

**4.**Agensis (complete absence), Aplasia and hypoplasia(altered development and under development).

**5.**Inflammation of sinus is known as sinusitis. It cause headache with thick purulent, persistent discharge from the nose.

