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Head and Neck

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1. Discuss the anatomy of the tongue and comment on its applied anatomy

The tongue (L. lingua; G. glossa) is a mobile muscular organ covered with mucous membrane. It can assume a variety of shapes and positions. It is partly in the oral cavity and partly in the oropharynx.

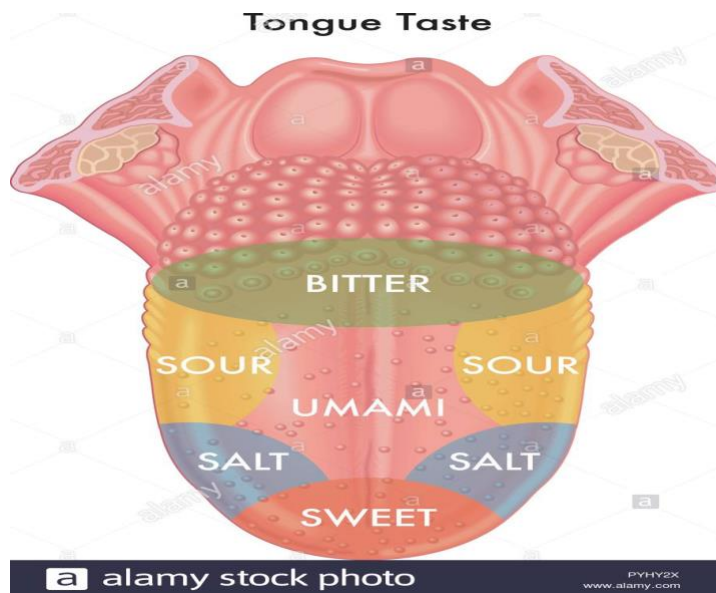


The tongue's main functions are:

- **Articulation (forming words during speaking) and**
- **Squeezing food into the oropharynx as part of deglutition (swallowing).**
- **The tongue is also involved with mastication, taste, and oral cleansing**

There are four basic taste sensations; Sweet, Sour, Bitter and Salty. A fifth taste called Umami result from tasting glutamate.

- ✓ Sweetness is detected at the apex



- ✓ Saltiness at the anterolateral margins
- ✓ Sourness at the posterolateral margin
- ✓ Bitterness at the posterior part of the tongue

PARTS AND SURFACES OF TONGUE

The tongue has a

- ❖ Root,
- ❖ Body, and
- ❖ Apex
- ❖ A curved dorsum
- ❖ Inferior surface.

The root of the tongue

Is the attached posterior portion, extending between the mandible, hyoid, and the nearly vertical posterior surface of the tongue.

It is the part of the tongue that rests on the floor of the mouth

The body of the tongue

The body of the tongue is the anterior, approximately two thirds of the tongue between root and apex.

The apex (tip) of the tongue:

Is the anterior end of the body, which rests against the incisor teeth The body and apex of the tongue are extremely mobile

The dorsum (dorsal surface) of the tongue

The tongue features two surfaces;

The more extensive, superior and posterior surface is the **dorsum of the tongue** (commonly referred to as the “top” of the tongue). The inferior surface of the tongue (commonly referred to as its “underside”) usually rests against the floor of the mouth. The margin of the tongue separating the two surfaces is related on each side to the lingual gingivae and lateral teeth. The dorsum of the tongue is characterized by a V-shaped groove, **the terminal sulcus** of the tongue, the angle of which points posteriorly to the **foramen cecum**

This small pit, frequently absent, is the non-functional remnant of the proximal part of the embryonic thyroglossal duct from which the thyroid gland developed.

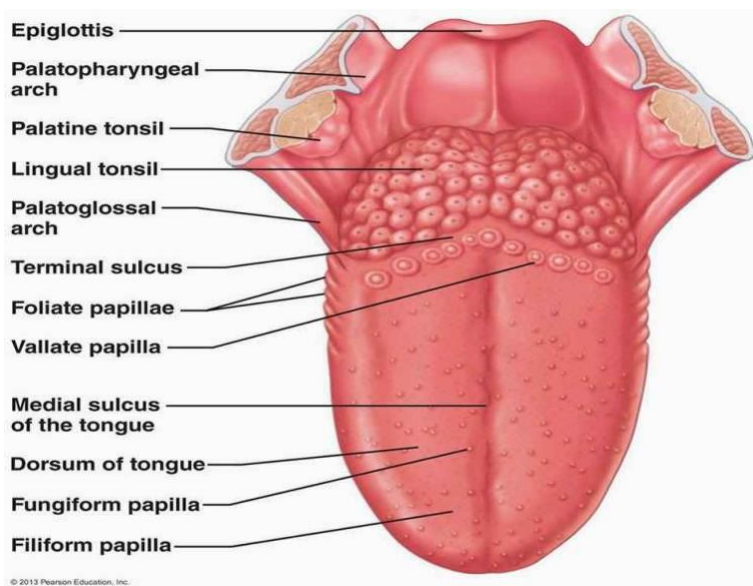
The terminal sulcus divides the dorsum of the tongue transversely into a

1. Presulcal anterior part in the oral cavity proper
2. Postsulcal posterior part in the oropharynx.

The margin of the tongue is related on each side of the lingual gingivae and the lateral teeth.

The mucosa of the anterior part of the tongue is relatively thin and closely attached to the underlying muscle. It has a rough texture because of numerous small lingual papillae (small nipple like process)

- ❖ Vallate papillae: large and flat topped, lie directly anterior to the terminal sulcus and are arranged in a V-shaped row. They are surrounded by deep circular trenches, the walls of which are studded with taste buds. The ducts of the serous glands of the tongue open into the trenches.
- ❖ Foliate papillae: small lateral folds of the lingual mucosa. They are poorly developed in humans.



- ❖ Filiform papillae: long and numerous, contain afferent nerve endings that are sensitive to touch. These scaly, conical projections are pinkish gray and are arranged in V-shaped rows that are parallel to the terminal sulcus, except at the apex, where they tend to be arranged transversely.
- ❖ Fungiform papillae: mushroom shaped pink or red spots scattered among the filiform papillae but most numerous at the apex and margins of the tongue.
- ❖ The vallate, foliate, and most of the fungiform papillae contain taste receptors in the taste buds.

The mucous membrane over the anterior part of the dorsum of the tongue is thin and closely attached to the underlying muscle. A shallow midline groove of the tongue divides the tongue into right and left halves called the median sulcus

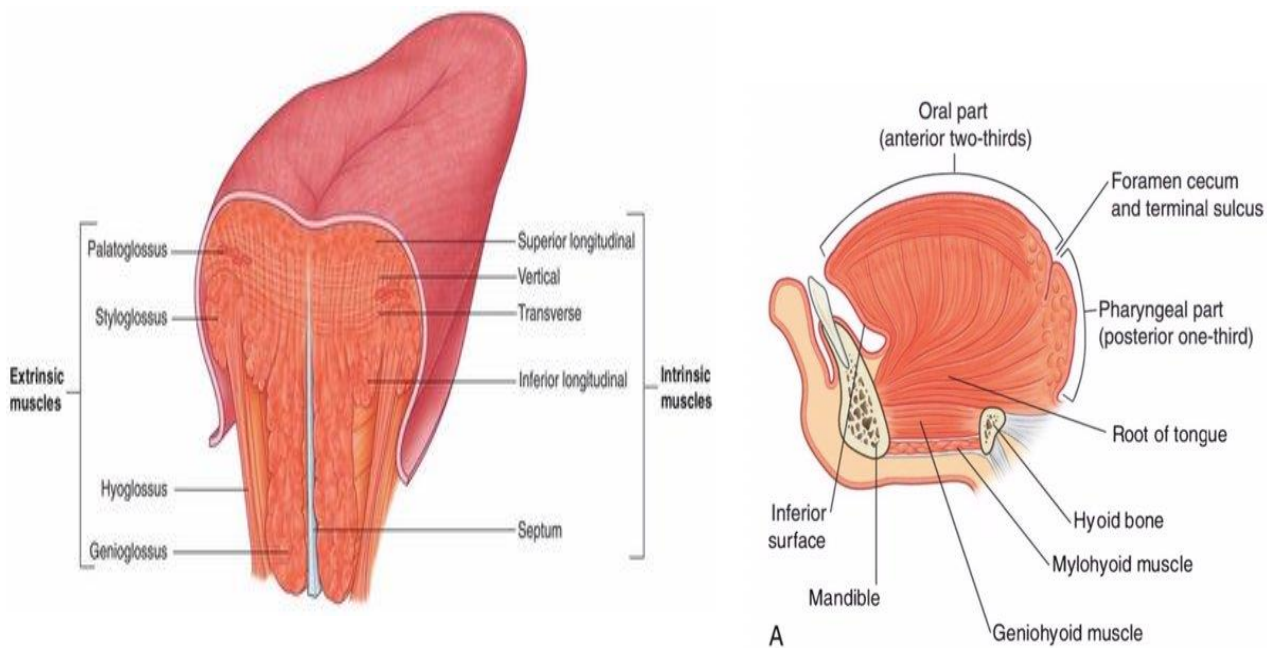
The mucosa of the posterior part of the tongue is thick and freely movable. It has no lingual papillae, but the underlying lymphoid nodules give this part of the tongue an irregular, cobblestone appearance. The lymphoid nodules are known collectively as the lingual tonsil. The pharyngeal part of the tongue constitutes the anterior wall of the oropharynx and can be inspected only with a mirror or downward pressure on the tongue with a tongue depressor. The inferior surface of the tongue is covered with a thin, transparent mucous membrane. This surface is connected to the floor of the mouth by a midline fold called the **frenulum of the tongue**. The frenulum allows the anterior part of

the tongue to move freely. On each side of the frenulum, a deep lingual vein is visible through the thin mucous membrane. A sublingual caruncle (papilla) is present on each side of the base of the lingual frenulum that includes the opening of the submandibular duct from the submandibular salivary gland.

Muscles of the tongue.

The tongue is essentially a mass of muscles that is mostly covered by mucous membrane

Extrinsic muscles alter the position of the tongue while intrinsic muscles alter its shape.

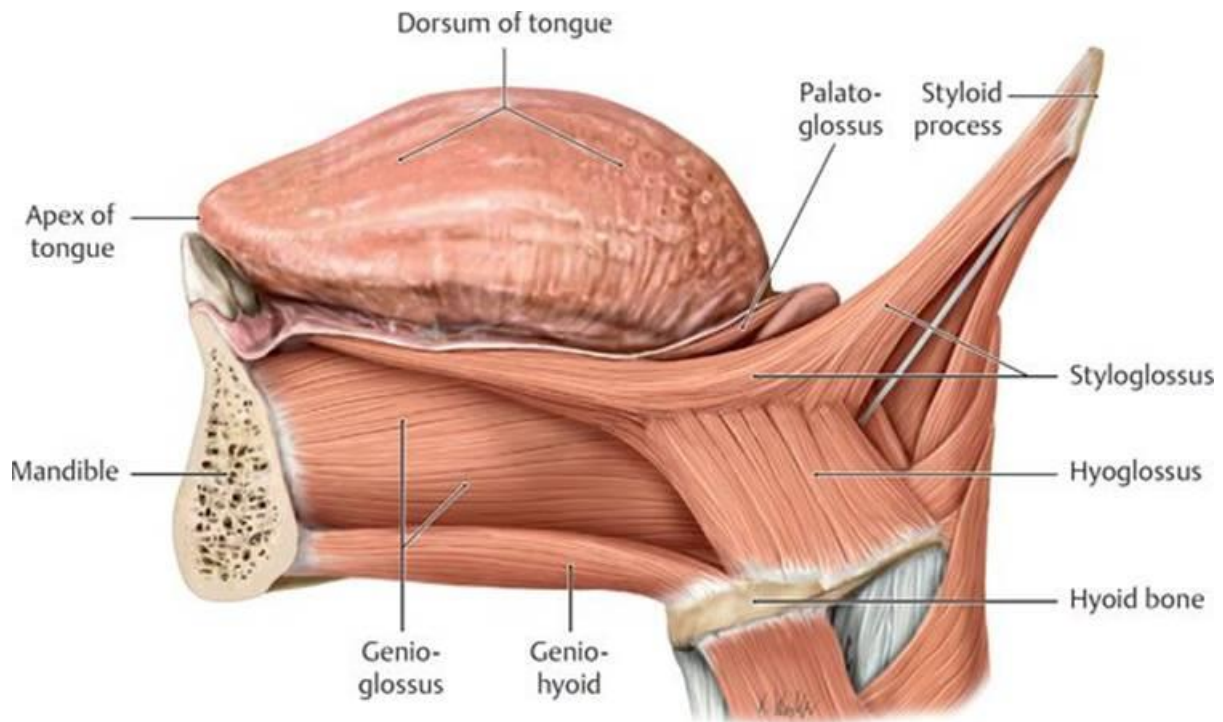


Muscles of the tongue

The four intrinsic and four extrinsic muscles in each half of the tongue are separated by a **median fibrous lingual septum**, which merges posteriorly with the lingual aponeurosis .

The muscles of the tongue do not act in isolation, and some muscles perform multiple actions. Parts of a single muscle are capable of acting independently, producing different, even antagonistic actions.

Extrinsic Muscles of the tongue.



These include:

- ✓ genioglossus
- ✓ Hyoglossus
- ✓ styloglossus
- ✓ palatoglossus

They originate outside the tongue and attach to it

They mainly move the tongue but they can alter its shape as well.

The extrinsic muscles move the tongue as a whole. They pass to the tongue from the symphysis of the mandible, the hyoid, styloid process and the soft palate

| Muscle | Shape and position | Main action |
|--------------|--|--|
| Genioglossus | Fan-shaped muscle; constitutes bulk of tongue | Bilateral activity depresses tongue, especially central part, creating a longitudinal furrow; posterior part pulls tongue anteriorly for protrusion; a most anterior part retracts apex of |

| | | |
|---------------|---|--|
| | | protruded tongue; unilateral contraction deviates (“wags”) tongue to contralateral side |
| Hyoglossus | Thin, quadrilateral muscle | Depresses tongue, especially pulling its sides inferiorly; helps shorten (retrude) tongue |
| Styloglossus | Small, short triangular muscle | Retrudes tongue and curls (elevates) its sides, working with genioglossus to form a central trough during swallowing |
| Palatoglossus | Narrow crescent-shaped palatine muscle; forms posterior column of isthmus of fauces | Capable of elevating posterior tongue or depressing soft palate; most commonly acts to constrict isthmus of fauces |

Intrinsic Muscle of the tongue

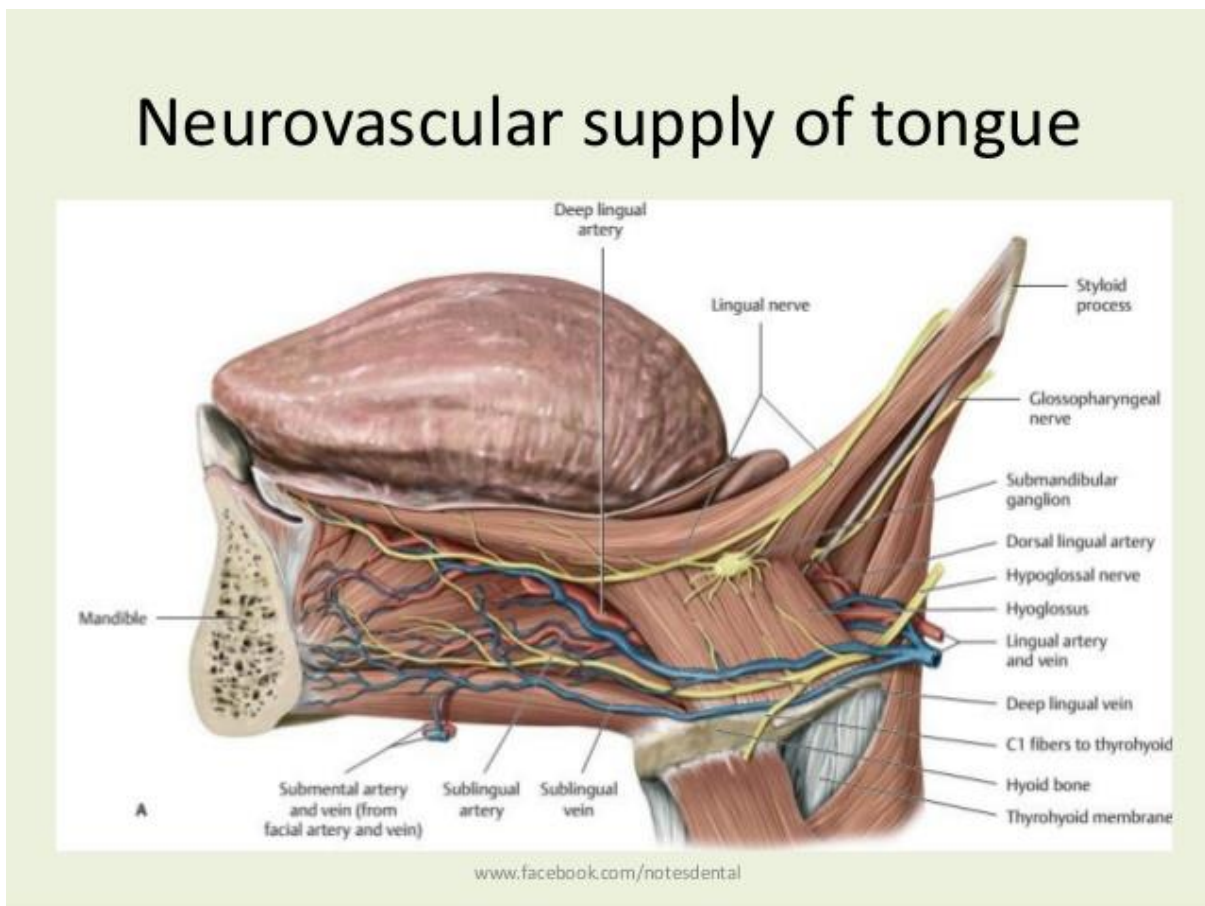
They include:

- ✓ superior longitudinal muscle
- ✓ inferior longitudinal muscle
- ✓ transverse muscle
- ✓ vertical muscles
- They have their attachments entirely within the tongue and are not attached to bone

| Muscles | Shapes and position | Main action(s) |
|-----------------------|--|---|
| Superior longitudinal | Thin layer deep to mucous membrane of dorsum | Curled tongue longitudinally upward, elevating apex and sides of tongue; shortens (retrudes) tongue |
| Inferior longitudinal | Narrow band close to inferior surface | Curled tongue longitudinally downward, depressing apex; shortens (retrudes) tongue |

| | | |
|------------|--------------------------------------|--|
| Transverse | Deep to superior longitudinal muscle | Narrows and elongates (protrudes) tongue |
| Vertical | Fibers intersect transverse muscle | Flattens and broadens tongue |

Venous drainage



The veins of the tongue are the dorsal lingual veins, which accompany the lingual artery;

The deep lingual veins, which begin at the apex of the tongue, run posteriorly beside the lingual frenulum to join the sublingual vein

The sublingual veins in elderly people are often varicose (enlarged and tortuous)

All these lingual veins terminate, directly or indirectly, in the IJV

The lymphatic drainage of the tongue

- Lymph from the tongue takes four routes
- Lymph from the posterior third drains into the **superior deep cervical lymph nodes**
- Lymph from the medial part of the anterior two thirds drains directly to the **inferior deep cervical lymph nodes**
- Lymph from the lateral parts of the anterior two thirds drains to the **submandibular lymph nodes**
- The apex and frenulum drain to the **submental lymph nodes**
- The posterior third and the medial part of the anterior two thirds drain bilaterally

Innervation of the Tongue

Motor innervation

- All muscles of the tongue, except the palatoglossus (actually a palatine muscle supplied by the vagus nerve(X) of the pharyngeal plexus), receive motor innervation from the hypoglossal nerve (CN XII)

Motor innervation

Sensory innervation

The anterior two thirds of the tongue are supplied by:

- the lingual nerve (CN V₃) for general sensation
- the chorda tympani, a branch of the facial nerve (CN VII) transferring nerve fibers to the lingual nerve, for taste

The posterior third of the tongue and the vallate papillae are supplied by:

- the lingual branch of the glossopharyngeal nerve (CN IX) for both general sensation and taste
- Another contribution is made by the internal laryngeal branch of the vagus (CN X) for general sensation and taste
- Hence CN VII, CN IX, and CN X provide nerve fibers for taste; those from CN VII are ultimately conveyed by CN V₃

Applied Anatomy

Lingual Carcinoma

- A lingual carcinoma in the posterior part of the tongue metastasizes to the superior deep cervical lymph nodes on both sides, whereas a tumor in the anterior part usually does not metastasize to the inferior deep cervical lymph nodes until late in the disease.
- Because these nodes are closely related to the IJV, metastases from the tongue may be widely distributed through the submental and submandibular regions and along the IJVs in the neck.

Frenectomy

- An overly large lingual frenulum (tongue-tie/ ankyloglossa) interferes with tongue movements and may affect speech
- In unusual cases, a frenectomy (cutting the frenulum) in infants may be necessary to free the tongue for normal movement and speech

Thyroglossal Duct Cyst

- A cystic remnant of the thyroglossal duct, associated with development of the thyroid gland, may be found in the root of the tongue and be connected to a sinus that opens at the foramen cecum
- Surgical excision of the cyst may be necessary
- Most thyroglossal duct cysts are in the neck, close or just inferior to the body of the hyoid bone

Question 2

Write an essay on air sinus

The nasal cavity is a rough cylindrical midline, airway passage that extends from the nasal ala anteriorly to the choana posteriorly. It is divided in the midline by nasal septum.

The paranasal sinuses are air-filled extensions of the respiratory part of the nasal cavity into the following cranial bones: **frontal, ethmoid, sphenoid, and maxilla**. They are named according to the bones in which they are located.

They are four paired sinuses in human, they are lined with pseudostratified columnar epithelium, and they are;

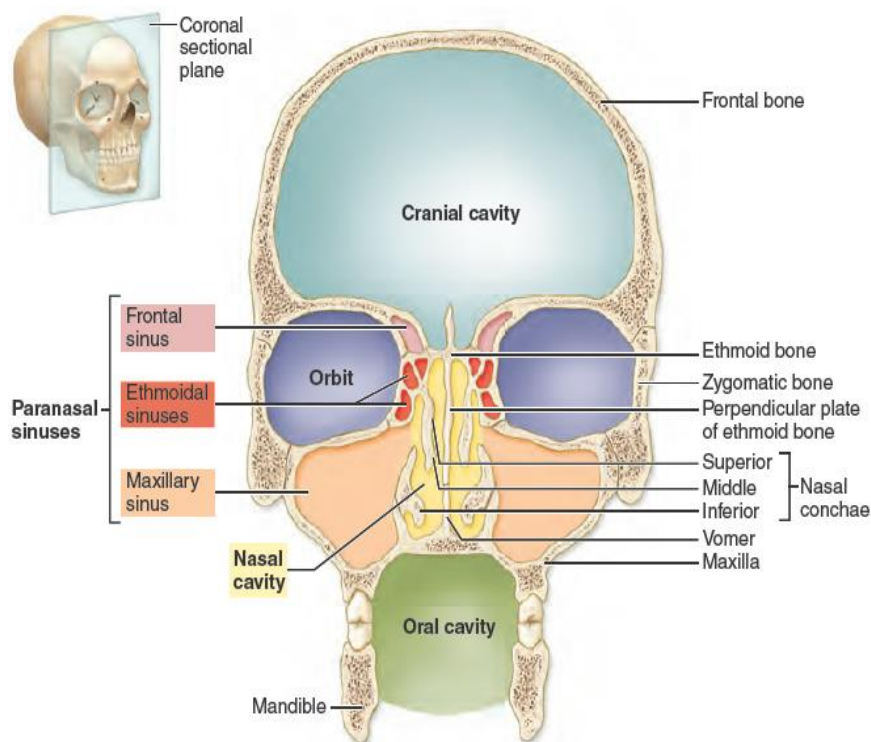


Diagram of Anterior view of the face showing the paranasal sinuses

Frontal Sinuses

The right and left frontal sinuses are between the outer and inner tables of the frontal bone, posterior to the superciliary arches and the root of the nose. Frontal sinuses are usually detectable in children by 7 years of age. The right and left sinuses each drain through a frontonasal duct into the ethmoidal infundibulum, which opens into the semilunar hiatus of

the middle nasal meatus. The frontal sinuses are innervated by branches of the supra-orbital nerves (CN V1). The right and left frontal sinuses are rarely of equal size, and the septum between them is not usually situated entirely in the median plane. The frontal sinuses vary in size from approximately 5 mm to large spaces extending laterally into the greater wings of the sphenoid. *Often a frontal sinus has two parts: a vertical part in the squamous part of the frontal bone, and a horizontal part in the orbital part of the frontal bone.* One or both parts may be large or small. When the supra-orbital part is large, its roof forms the floor of the anterior cranial fossa and its floor forms the roof of the orbit

Ethmoid sinuses

The ethmoidal sinuses are small invaginations of the mucous membrane of the middle and superior nasal meatus into the ethmoid bone between the nasal cavity and the orbit. The ethmoidal cells on each side fill the ethmoidal labyrinth. Each cluster of cells is separated from the orbit by the thin orbital plate of the ethmoidal labyrinth, and from the nasal cavity by the medial wall of the ethmoidal labyrinth. The ethmoidal cells usually are not visible in plain radiographs before 2 years of age but are recognizable in CT scans. The anterior ethmoidal cells drain directly or indirectly into the middle nasal meatus through the ethmoidal infundibulum. The middle ethmoidal cells open directly into the middle meatus and are sometimes called “bullar cells” because they form the ethmoidal bulla, a swelling on the superior border of the semilunar hiatus. The posterior ethmoidal cells open directly into the superior meatus. The ethmoidal cells are supplied by the anterior and posterior ethmoidal branches of the nasociliary nerves (CN V1)

Sphenoidal Sinuses

The sphenoidal sinuses are located in the body of the sphenoid, but they may extend into the wings of this bone. They are unevenly divided and separated by a bony septum. Because of this extensive pneumatization (formation of air cells), the body of the sphenoid is fragile. Only thin plates of bone separate the sinuses from several important structures: the optic nerves and optic chiasm, the pituitary gland, the internal carotid arteries, and the cavernous sinuses. The sphenoidal sinuses are derived from a posterior ethmoidal cell that begins to invade the sphenoid at approximately 2 years of age. In some people, several posterior ethmoidal cells invade the sphenoid, giving rise to multiple sphenoidal sinuses that open separately into the sphenoidal recess.

The posterior ethmoidal arteries and the posterior ethmoidal nerves that accompany the arteries supply the sphenoidal sinuses.

Nose and Nasal Cavities

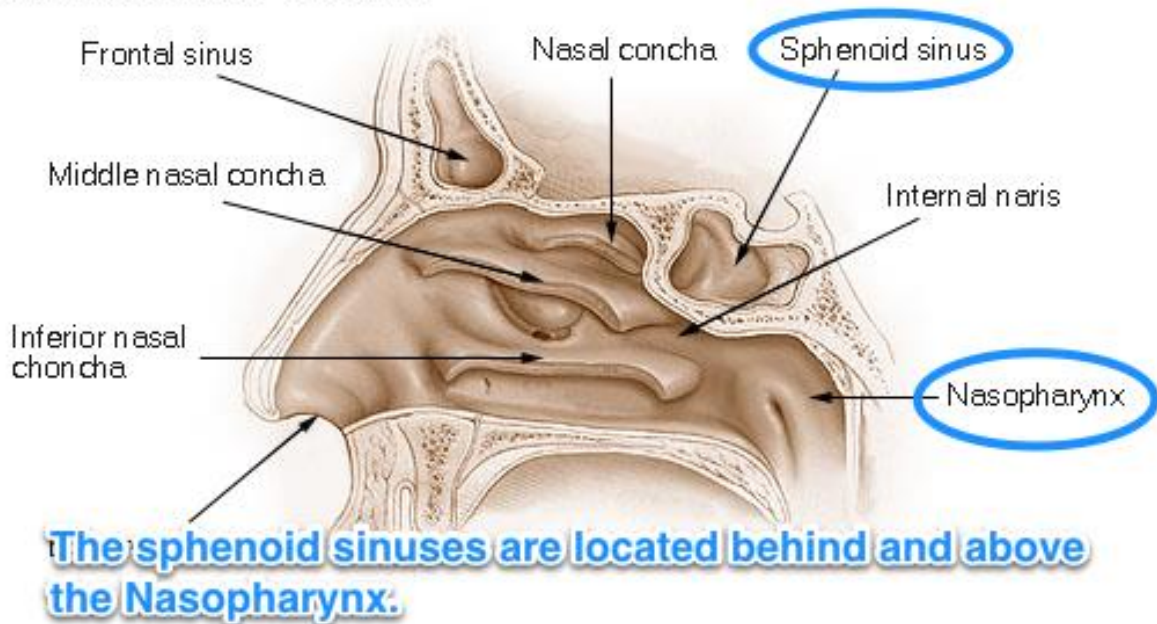


Diagram of the sphenoid sinuses.

Maxillary sinuses

The maxillary sinuses are the largest of the paranasal sinuses. They occupy the bodies of the maxillae and communicate with the middle nasal meatus

- The apex of the maxillary sinus extends toward and often into the zygomatic bone.
- The base of the maxillary sinus forms the inferior part of the lateral wall of the nasal cavity.
- The roof of the maxillary sinus is formed by the floor of the orbit.
- The floor of the maxillary sinus is formed by the alveolar part of the maxilla.

The roots of the maxillary teeth, particularly the first two molars, often produce conical elevations in the floor of the sinus. Each maxillary sinus drains by one or more openings, the maxillary ostium (Ostia), into the middle nasal meatus of the nasal cavity by way of the semilunar hiatus. The arterial supply of the maxillary sinus is mainly from superior alveolar branches of the maxillary artery however, branches of the descending and greater palatine

arteries supply the floor of the sinus. Innervation of the maxillary sinus is from the anterior, middle, and posterior superior alveolar nerves, which are branches of the maxillary nerve.

Clinical Anatomy

1. Inflammation (such as rhinitis, sinusitis): the paranasal sinuses are joined to the nasal cavity via small orifices called Ostia. These become blocked easily by allergic inflammation or by swelling in the nasal lining that occurs with cold.
2. Cancer: malignancies of the paranasal sinuses comprise approximately 0.2% of all malignancies. About 80% of these malignancies arise in the maxillary sinus.
3. Sinus disorder: Patients frequently describe their facial pain problem as a “sinus headache”