



EAR, NOSE AND THROAT

(11) Nose I: Nasal Anatomy and Physiology

Leader: Maha Allhaidan

Done by: Shatha Al-Shanqeeti

Revised by: Arwa Almashaan

Doctor's note **Team's note** Not important **Important** **431 teamwork**

(431 teamwork do not highlight it in yellow, but put it in a yellow "box")

Objectives:

- Anatomy and physiology of the nose and paranasal sinuses.
- Blood and nerve supply of the external nose, nasal cavity, and paranasal sinuses.
- Functions of the nose and paranasal sinuses.
- Congenital anomalies
- Choanal atresia.

Highly Recommended Videos:

<https://www.youtube.com/watch?v=UGj7d1aNhsE>

<https://www.youtube.com/watch?v=SLMz43ZZC3w>

Postnatal development of the nose:

Chronology

At birth:

Frontal sinus furrows appear
Only two to three ethmoidal turbinates remain
Craniofacial ratio 8:1

Six months:

Nares double their birth diameter.

Lateral Bony Wall

In neonate:

- The nasal and orbital floors are located at the same level.
- Lateral nasal wall serves as the medial orbital wall.
- Maxilla contributes minimally in fetus and neonate.

In adult:

- Only the upper half of the lateral nasal wall forms the medial orbital wall
- The nasal floor is at a lower level than the orbital floor.

External Structures of the Nose

Skin:

Thin over the upper part of the nose and thicker over the lower part where it contains sebaceous glands.

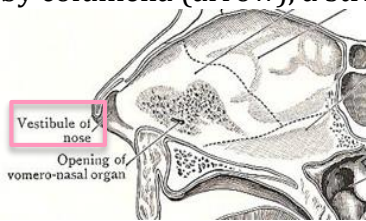
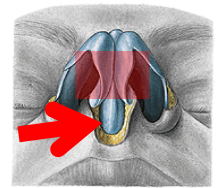
Nasal Muscles⁽¹⁾:

- The elevator muscle group: *procerus, levator labii superioris alaeque nasi.*
- The depressor muscle group: *alar nasalis, depressor septi nasi.*
- The compressor muscle group: *transverse nasalis.*
- The dilator muscle group: *dilator naris anterior and posterior.*

Nasal flaring: in respiratory distress to aid in respiration.

Anterior Nares (Nostrils):

Situated in the base of the nose and open downwards, they separated by columella (arrow), a strip of skin, connective tissue, and medial crura of the lower lateral cartilage.



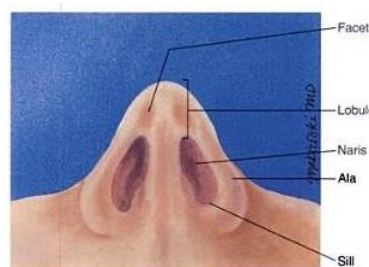
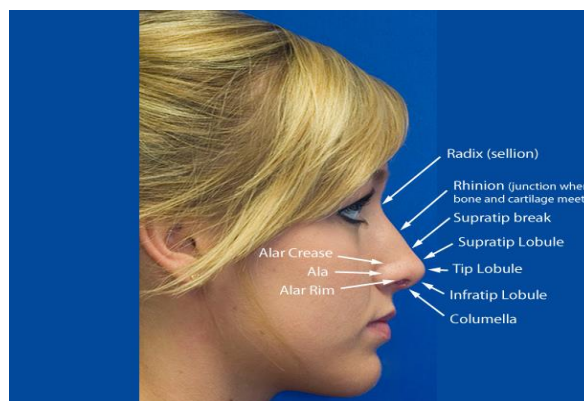
Inside the aperture of the nostril is a slight dilatation, the **vestibule**. It is lined by skin containing hairs and sebaceous glands, and extends as a small recess toward the apex of the nose.

The Lobule:

1- Alae

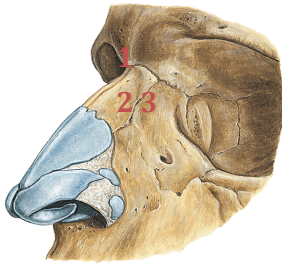
2- Lower lateral cartilages that form the medial and lateral crura

Anatomical Landmarks:



The Nasal Pyramid

The external nose is pyramidal in shape and is supported by skeletal framework.



- The upper part → **bony vault:**

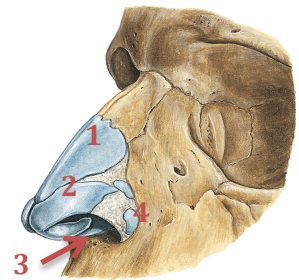
1. Nasal processes of frontal bones
2. Nasal bones
3. Ascending processes of maxillae

The nasion is the midline bony depression between eyes where the frontal and two nasal bones meet.

- The lower part → **cartilaginous vault:**

The cartilages are connected with each other and with the bones by continuous perichondrium and periosteum.

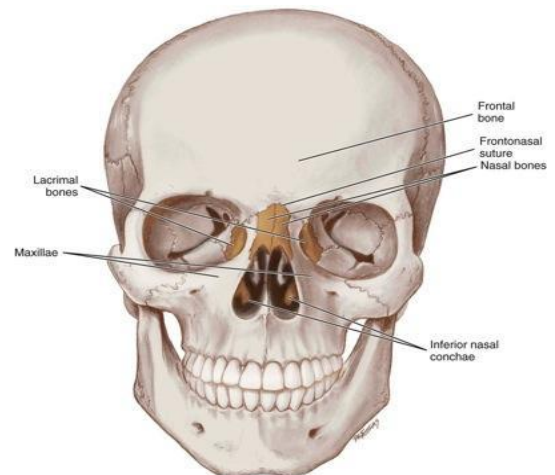
1. Upper lateral cartilages
2. Lower nasal cartilages
3. Quadrilateral cartilages of nasal septum
4. Alar cartilages



- The Piriform Aperture (Anterior Nasal Aperture):

It is a heart-shaped opening in the skull that is bounded by:

- Inferior borders of the **nasal bones superiorly**
- Nasal surfaces of the **maxilla laterally**
- The **anterior nasal spine inferiorly**



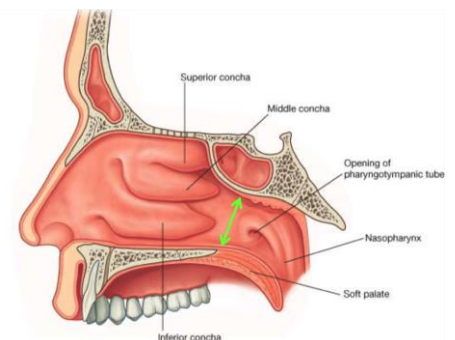
The Nasal Cavity

- Choanae (Posterior Nasal Aperture):

Two oval openings that communicate the nasal cavity with the nasopharynx⁽²⁾.

Bounded by:

- **Body of sphenoid and ala of vomer superiorly,**
- **The horizontal plane of the palatine bone inferiorly,**
- **The vomer medially,**
- **And the medial pterygoid plate of sphenoid bone laterally.**



The Nasal Cavity (Fossa)

The nasal cavity extends from the nostrils anteriorly to the choanae posteriorly. The two cavities are separated by the nasal septum.

Each fossa communicates with:

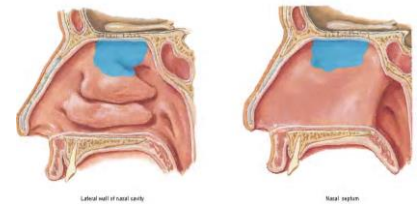
- 1- The paranasal sinuses through their Ostia
- 2- The nasopharynx through the choanae

The nasal fossae are lined with mucous membranes.

• Mucosal Lining:

- **Modified Skin** → *Keratinized stratified squamous epithelium* covering the vestibule. It contains sebaceous glands, sweat glands, and short, curved hair called **vibrissae**.

- **Olfactory** → Specialized *olfactory epithelium*. Present in the olfactory cleft, which occupies the area between the superior turbinate, cribriform plate, and the corresponding area of the septum.

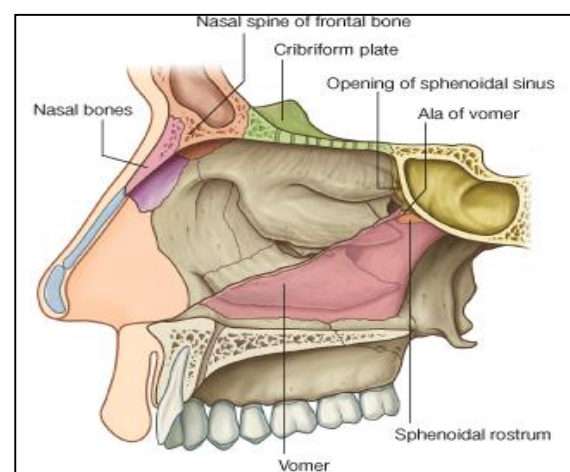
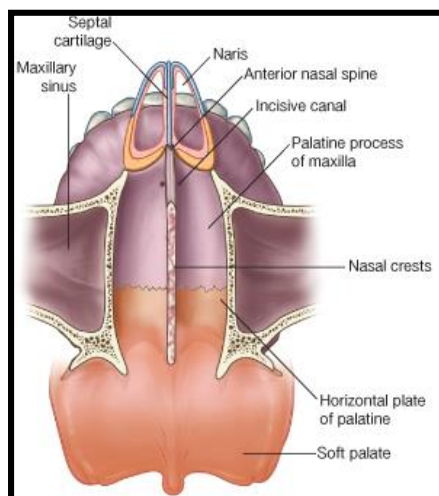


- **Respiratory mucosa** → *Ciliated pseudostratified columnar epithelium with goblet cells*.

It lines the lower two-thirds of the nasal septum, the lateral wall of the nose below the superior turbinate, and the floor of the nasal cavity. It extends into the sinuses through their Ostia and is thinner there. It is also continuous with the epithelia of the nasolacrimal duct and Eustachian tube.

• Boundaries of the nasal fossa:

- **Floor:** the **palatine process of the maxilla** in the anterior three quarters and the **palatine bone** in the posterior quarter.
- **Roof:** The nasal process of the **frontal bone anteriorly**, the **body of sphenoid posteriorly**, and the **cribriform plate of ethmoid**, through which olfactory nerve fibers pass, **in between**.

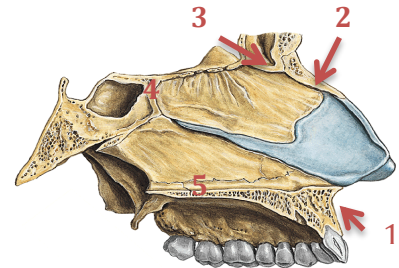
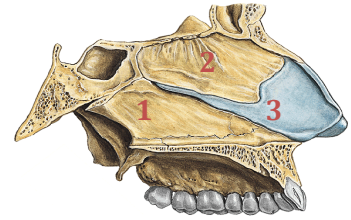


The Nasal Cavity (Fossa)

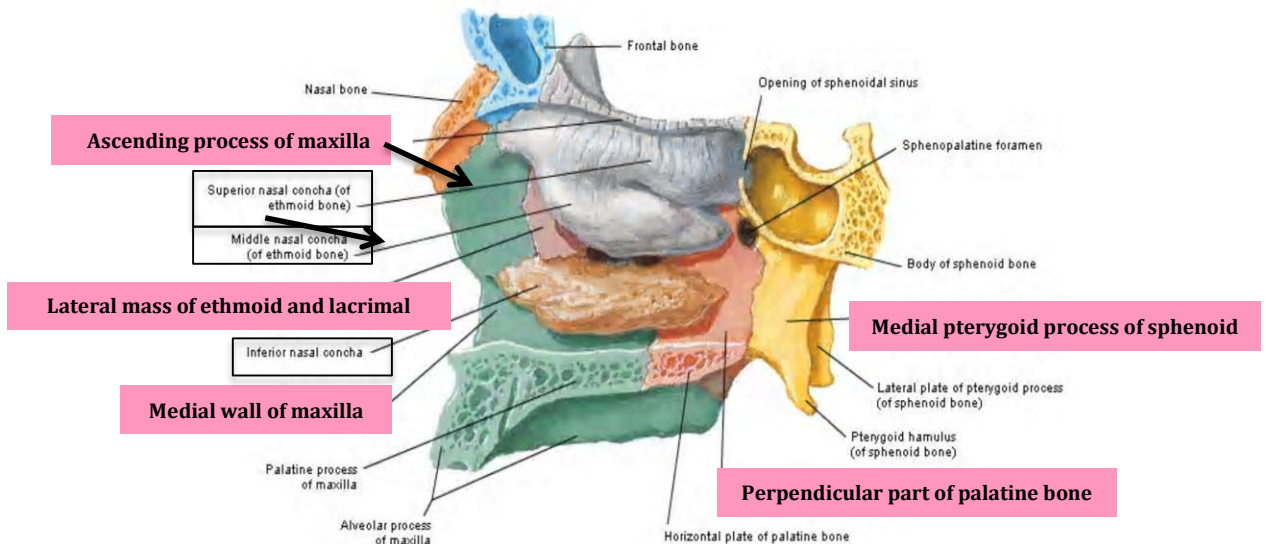
- **Medial Wall (Nasal Septum):**
The three main constituents are:
 - 1- Vomer
 - 2- Perpendicular plate of ethmoid
 - 3- Quadrilateral (Septal) cartilage

Other bones which contribute to the formation of the septum:

- 1- Anterior nasal spine of maxilla
- 2- Crests of nasal bones
- 3- Nasal spine of frontal bones
- 4- Rostrum and crest of sphenoid bone
- 5- Nasal crests of maxillary and palatine bones

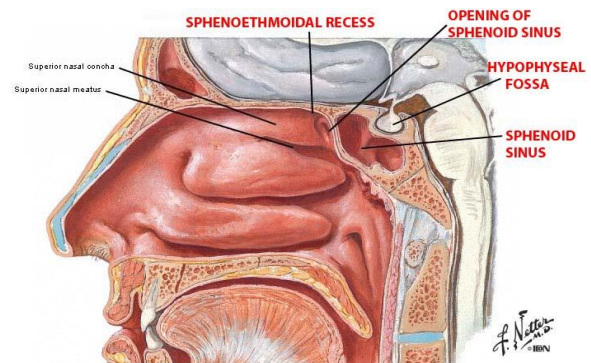


- **Lateral Wall:**



The main features of the lateral wall (2):

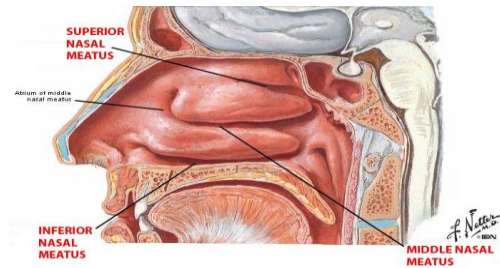
- **Turbinates (Conchae):** three bony elevations covered by mucus membranes; superior, middle, and inferior turbinates. They divide the nasal cavity into 4 groove-like air passages.
- **Meatus:** named after the turbinates, each lies below and lateral to the corresponding turbinate.
 - a. **Spheno-ethmoidal recess**
Lies **above the superior turbinate** and receives the ostium of **sphenoidal sinus**.



The Nasal Cavity (Fossa)

b. Superior Meatus

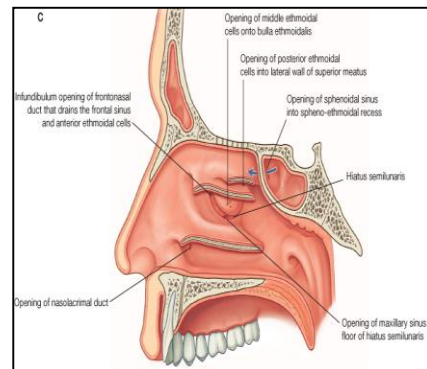
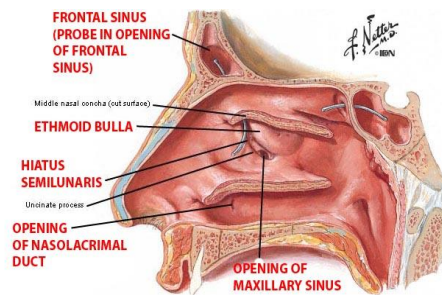
- i. Occupies the **posterior third of the lateral wall**.
- ii. Contains the ostia of **posterior ethmoidal cells**.



c. Middle meatus

Occupies the **posterior two thirds of the lateral wall**, it is the most complex and by far the most important because the ostia of **maxillary, anterior ethmoidal, and frontal sinuses** open into it.

It has a rounded swelling called **bullae ethmoidalis** that is formed by the middle ethmoidal air sinuses, which open on its upper border. A curved opening, the **hiatus semilunaris**, lies just below the bulla. The anterior end of the hiatus leads to a funnel-shaped channel called the **infundibulum**, which is continuous with the frontal sinus. The maxillary sinus opens through the hiatus semilunaris (3).



d. Inferior meatus

- i. Runs along the length of the lateral wall, between the inferior turbinate and the palate.
- ii. Receives the nasal opening of the **nasolacrimal duct**.

Ostiomeatal Complex (4):

A **common channel** that **links** the **frontal sinus, anterior and middle ethmoid sinuses** and the **maxillary sinus** to the middle meatus that allows air flow and mucociliary drainage.

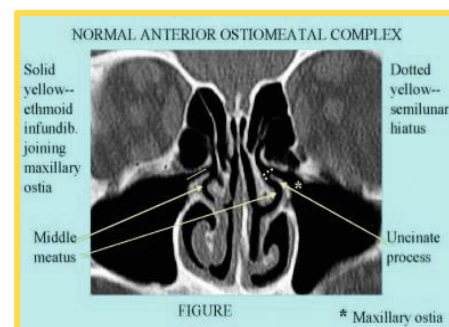
Composed of the following structures:

Uncinate process

Ethmoid bulla

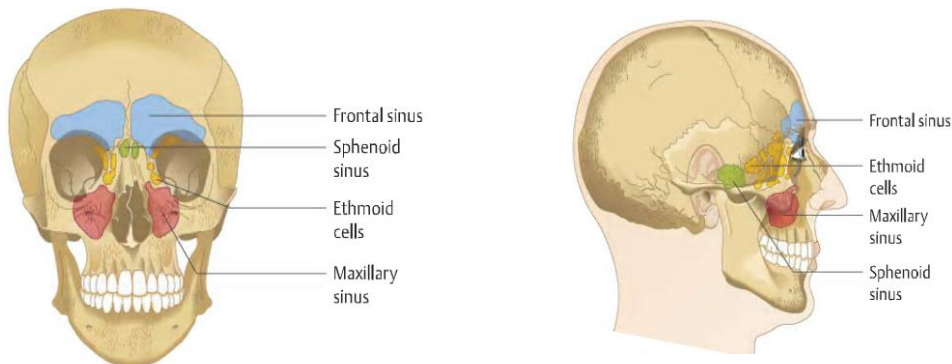
Middle turbinate

The spaces between these structures (**ethmoidal infundibulum, middle meatus, and hiatus semilunaris**).



Paranasal Sinuses

The paranasal sinuses are cavities in the interior of the **maxilla** and the **frontal, sphenoid, and ethmoid** bones. The sinuses develop as outgrowths from the nasal cavity; hence they all drain directly or indirectly into the nose. The lining of the sinuses (muco-endosteum) is continuous with the nasal mucosa. The sinuses develop mostly after birth, and their degree of development varies greatly. Their function is obscure but they provide **resonance to the voice, shape to the face** and some degree of **warmth and humidification to inspired air** ⁽²⁾.



A. Maxillary Sinuses:

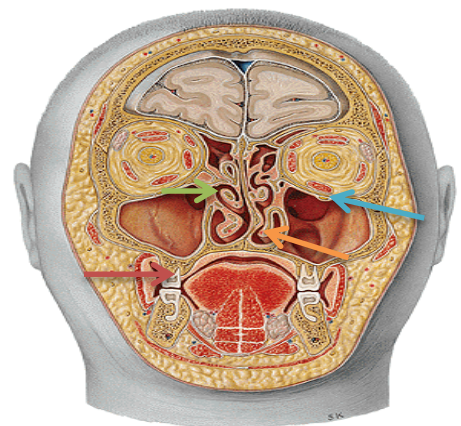
It is the largest of the sinus, with an average capacity of 15 ml in the adult. It is pyramidal in shape and occupies the body of maxilla. The base lies medially and the apex is in the zygomatic portion of the maxilla. Medial wall is the wall between the sinus and the nasal fossa. **The maxillary sinus drains into the middle meatus by means of the semilunar hiatus.**

The floor is formed by the alveolar process and hard palate:

- **In children**, the floor lies at or above the level of the floor of the nasal fossa.
- **In adults**, it lies about 1.25 cm below the floor of the fossa.
- The roots of several teeth may project into, or even perforate, the floor.

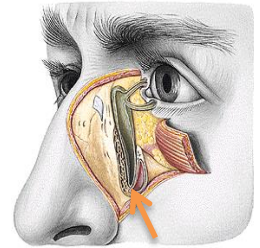
Relations of maxillary sinus:

- Orbit:** Separated from the antrum by the thin roof of the sinus, which contains the infraorbital nerve (**blue arrow**).
- Teeth** (**red arrow**): May produce elevations in the floor of the sinus and the number of related teeth depends on the size of the antrum. The first and second premolar are usually elevated
- Middle meatus of the nose** (**green arrow**): related to the upper part of the antrum.
- Inferior meatus of the nose** (**orange arrow**): Separated from the middle part of its medial wall by bone, which is usually thick in front and below but thinner above and behind.

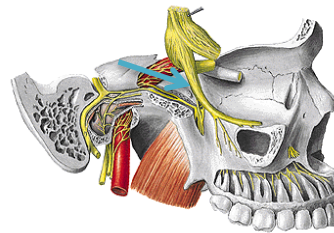
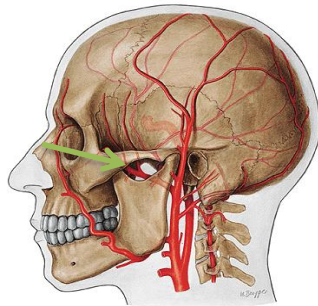


Paranasal Sinuses

- e. **Maxillary artery** (green arrow): Related to the posterior wall, where it occupies the pterygopalatine fossa. It may be approached through the antrum ligature.
- f. **Maxillary division of the 5th cranial nerve** (blue arrow): traverses the pterygopalatine fossa.
- g. **Nasolacrimal duct**: Passes downwards, medial to the antrum, to open into the inferior meatus.



Maxillary Sinus



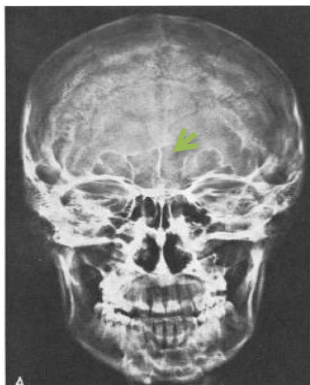
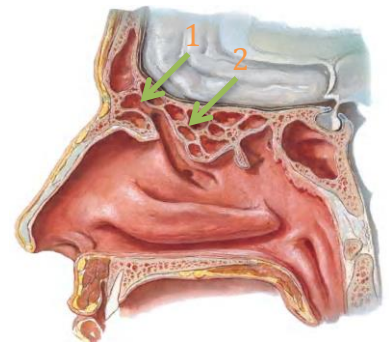
B. Ethmoidal Sinuses (labyrinths):

Consists of a number (approximately 7-15) thin-walled cavities within the lateral masses of the ethmoid bones, in the agger nasi, and middle turbinate.

The cells may invade any of the surrounding bones, including the frontal, sphenoid, and maxillary bones.

There are two groups of cells:

1. **Anterior**: Usually small and numerous. They open into the upper part of the hiatus semilunaris or above the bulla ethmoidalis, ultimately **draining into the middle meatus**.
2. **Posterior**: Usually large and few, they **open into the superior meatus**.



C. Frontal Sinuses:

The frontal sinus may be regarded as an anterior ethmoidal cell that has invaded the frontal bone postnatally. The right and left frontal sinuses, frequently of different sizes, are separated by a bony septum that is usually deviated to one side. The frontal sinus **drains into the middle meatus** in a variable manner **directly or by a frontonasal duct**, which opens into the frontal recess or the ethmoidal infundibulum. The frontal sinus commonly extends posteriorward in the roof of the orbit ⁽²⁾.

Paranasal Sinuses

Relations of frontal sinuses:

1. Anterior cranial fossa:

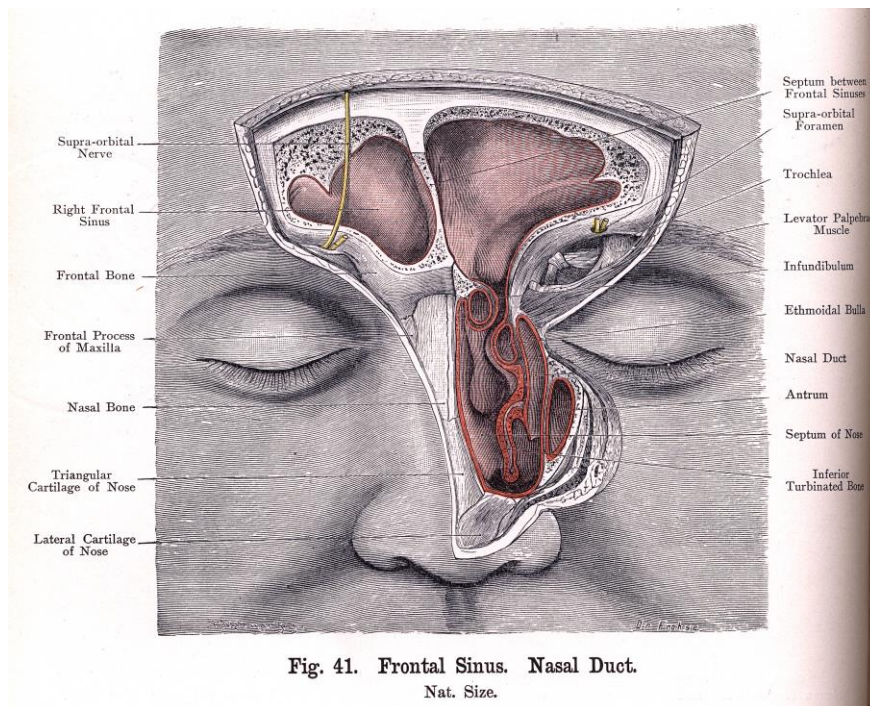
Separated from the sinus by the compact bone of the posterior wall.

2. Orbit:

Lies below the floor of the sinus. This is also compact bone, which may rarely be deficient.

3. Skin and periosteum of forehead:

Cover the anterior wall, which is of diploic bone and is related to supratrochlear and supraorbital nerves.

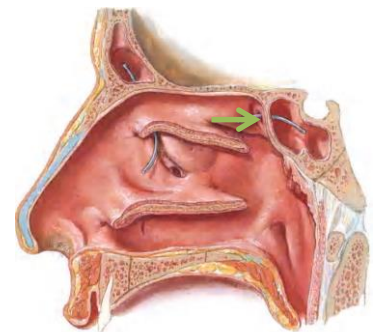
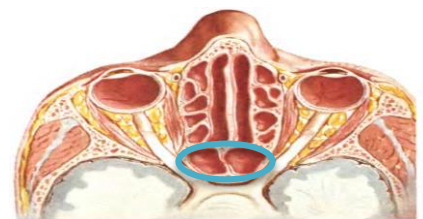


D. Sphenoidal Sinuses:

Lies behind the upper part of the nasal fossa. It occupies the body, and sometimes the wings and pterygoid processes of the sphenoid. The average capacity is about 7ml in the adult. The right and left sinuses are rarely symmetrical. They are separated by a septum, which may be deficient in part and is often oblique.

Ostium of sphenoid sinus:

Situated in the upper part of the anterior wall of the sinus. It communicates with the superior meatus indirectly through the sphenothmoidal recess.

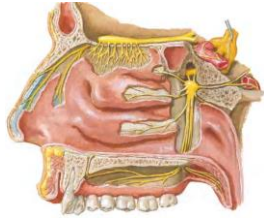


Paranasal Sinuses

Relations of the Sphenoidal Sinus:

Laterally → the **cavernous sinus** containing:

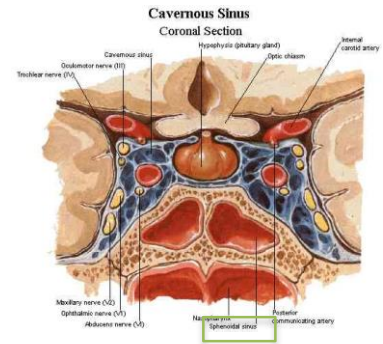
1. Cranial nerves: 3rd, 4th, 5th (ophthalmic and maxillary divisions), and 6th
2. Internal carotid artery
3. Optic nerve



Above the cavernous sinus →

Pituitary gland, optic chiasm, frontal lobe of brain, and olfactory tract.

- The pituitary gland may be approached surgically through the sinus.



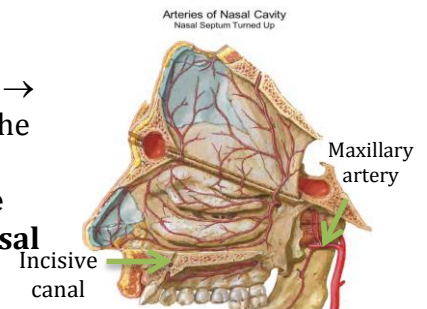
Blood Supply of the Nose and Paranasal Sinuses

Arterial Supply: the nasal fossae and paranasal sinuses are supplied by branches of the external and internal carotid arteries.

A. Derivatives of external carotid artery:

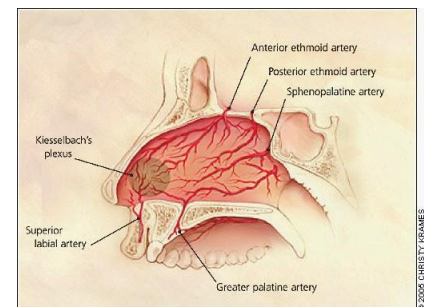
1. Maxillary artery

- **Sphenopalatine artery (the artery of epistaxis)** → **turbinates, meatus of the nose, and most of the septum.**
- **Greater palatine artery** → **anterior part of the septum** (via the incisive canal) and **lateral nasal wall.**



2. Facial artery → superior labial artery →

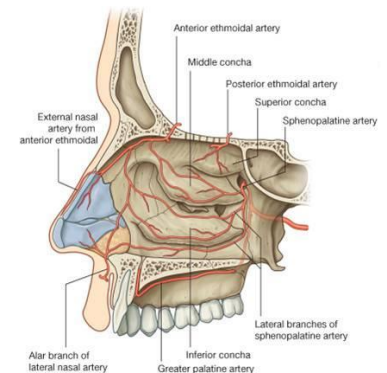
- Sends branches to the **tip of the septum** and **alae nasi.**
- Its anastomosis with a branch of the sphenopalatine artery and the greater palatine artery forms (**Kiesselbach's plexus**) in little's area.



B. Branches of internal carotid artery:

Ophthalmic artery → **Anterior and posterior ethmoid arteries** → the supply the **roof of the nose, anterior parts of the septum, lateral wall of the nose, and the ethmoidal and frontal sinuses.**

- Bleeding from these sites is seen above the levels of the middle turbinate.



Blood Supply of the Nose and Paranasal Sinuses

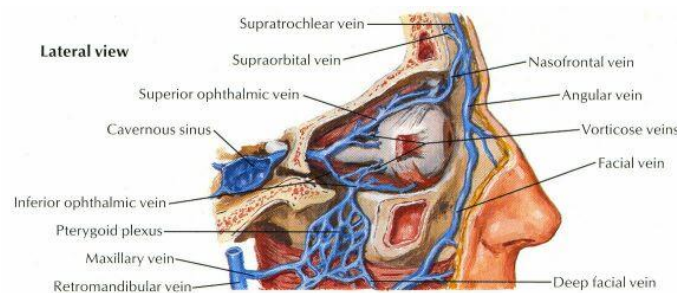
Frontal Sinus	Supraorbital and supratrochlear divisions of ophthalmic artery
Ethmoid Sinus	Sphenopaltine and anterior and posterior ethmoidal arteries
Sphenoid Sinus	Posterior ethmoidal and sphenopalatine arteries
Maxillary Sinus	Superior alveolar and infraorbital arteries (divisions of maxillary)

Venous Drainage:

The veins form a cavernous plexus beneath the mucous membrane.

They open into:

- **Sphenopalatine** and **greater palatine veins** → Pterygoid plexus → Maxillary vein → **External jugular vein.**
- **Anterior and posterior ethmoidal veins** → Ophthalmic vein → **Cavernous sinus.**
- **Angular, lateral nasal, and superior labial veins** → Facial vein → **Internal jugular vein.**



- The pterygoid venous plexus and facial vein also communicate with the cavernous sinus:

Pterygoid venous plexus → Emissary vein → Cavernous sinus.

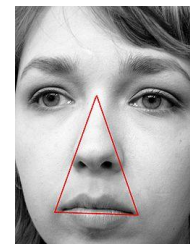
Facial vein →

1. Angular vein → Nasofrontal vein → Superior ophthalmic vein → Cavernous sinus
2. Deep facial vein → Pterygoid venous plexus → Emissary vein → Cavernous sinus

- *The Dangerous Area of the Face (Bermuda Triangle):*

It is the area between the root of the nose and the 2 angles of the mouth. The veins that drain this region (mostly facial vein) are:

1. Connected to the cavernous sinus
2. Valveless, which facilitates retrograde flow of blood from the face to the cavernous sinus. Any infection in this area may lead to cavernous sinus thrombosis and intracranial complications.



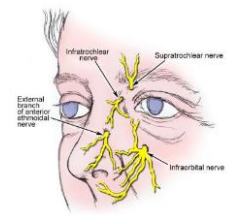
Nerve Supply of the Nose and Paranasal Sinuses

Nerve Supply of the Nose:

1. External Nose (Skin)

It is innervated by the ophthalmic (V1) and maxillary (V2) divisions of the trigeminal nerve (CN V).

- **Ophthalmic (V1)** → The superior aspect of the nose, including the tip→
 - Infratrochlear nerve
 - Supratrochlear nerve
 - External nasal branch of the anterior ethmoidal nerve
- **Maxillary (V2)** → Inferior and lateral aspects of the nose →
 - Infraorbital nerve



2. Nasal Cavity

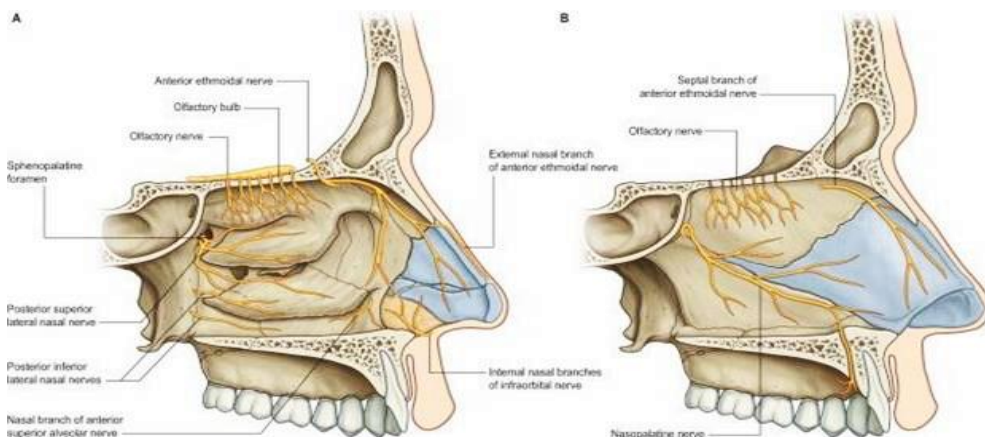
• Olfactory Sensation:

Olfactory nerve→ The roof and the uppermost parts of the medial and lateral walls.

• General sensation:

Trigeminal nerve (CN V)→ Ophthalmic and maxillary divisions (via sphenopalatine ganglion)

- Lateral wall:
 1. Anterior ethmoidal nerve (V1) → **Lateral internal nasal branch**.
 2. Sphenopalatine nerve (V2) → **Lateral posterior inferior branch**
 3. Sphenopalatine ganglion (V2) → **Lateral posterior superior nasal branch** (Short sphenopalatine nerve)
- Nasal septum:
 1. Sphenopalatine ganglion (V2) →
 - a. Nasopaltine nerve (Long sphenopalatine nerve)
 - b. Medial posterior superior branch.
 2. Anterior ethmoidal nerve (V1) → Medial internal nasal branch.



Nerve Supply of the Nose and Paranasal Sinuses

- **Autonomic Fibers:**

Sensory branches of the sphenopalatine ganglion supplying the nasal mucosa carry postganglionic secretomotor fibers from the sphenopalatine fibers ganglions to the nasal glands.

Autonomic fibers control the vascular tone and secretion of the nasal mucous glands.

Sympathetic → vasoconstriction.

Parasympathetic → vasodilation and increased nasal secretion.

Pathway of Autonomic Fibers:

Postganglionic sympathetic fibers pass from the superior cervical ganglion → deep petrosal nerve.

Preganglionic parasympathetic fibers pass via the sensory root of the facial nerve → greater petrosal branch.

- The deep petrosal and great petrosal nerves merge to form the vidian nerve (Nerve of the pterygoid canal) → pterygopalatine ganglion → parasympathetic fibers synapse with the postganglionic secreto-motor fibers.

- Pterygopalatine ganglion gives terminal branches carrying the postganglionic sympathetic and parasympathetic fibers to their targets in the nasal cavity (blood vessels and nasal glands).

Lymphatic drainage:

The lymphatic vessels arise from a continuous network in the superficial part of the mucous membrane.

- **Submandibular Lymph Nodes**

Collect lymph from the external nose and anterior part of the nasal cavity.

- **Upper Deep Cervical Nodes**

Drain the rest of the nasal cavity, either directly or through the retropharyngeal nodes.

Functions of the Nose:

1. *Respiration:*

The nose is the primary passage for the inspiratory air current in a continuous stream over the inferior and middle turbinates where it's divided by anterior ends of these turbinates into two streams above and below each turbinate to increase the contact surfaces with the mucosa for better conditioning of the inspired air to the lungs.

2. *Purification of inspired air:*

Large particles are detected by the **vibrassies** of the nasal vestibule and the smaller particles are dealt with by **lysosomal enzymes**, **macrophages** and **antibodies** in the **mucosal blankets** of the nasal fossa.

3. *Humidification and warming of inspired air ⁽⁵⁾:*

Vascular mucosa increases relative humidity to 95% before air reaches the nasopharynx. Physiologic nasal fluids and ciliary function are vital to maintain immune defense through normal mucociliary flow. A number of nasal neurovascular reflexes occur as well. The nasopulmonary reflex suggests that pressure on one nasal sidewall causes ipsilateral pulmonary congestion.

4. *Olfaction:*

Carried out in the superior part of the nasal fossa in the olfactory area where the odors of nearly 30 odorant types are carried by the olfactory nerve ending across the olfactory filament to the olfactory bulb where it is perceived as an odor, a sense which is intimately related to taste (agusia).

5. *Part of the buttress function of the facial skeleton:*

6. *Cosmeses*

7. *Adding tone to the speech*

8. *Lightening of the facial skeleton over the neck:*

Caused by the pneumatization of the nose and paranasal sinuses.

9. **Nasal Cycle ⁽⁵⁾:**

This cycle causes turbinate hypertrophy to periodically alternate between the 2 sides of the nose, causing periodic unilateral obstruction approximately every 3 hours. During the nasal cycle, the airway that conducts most of the airflow, and with it, most of the transfer of heat and water mass, undergoes some airway surface liquid dehydration, while the other airway maintains enough hydration to allow continuous mucociliary clearance.

Nasal Resistance ⁽⁵⁾:

Nasal airway resistance accounts for more than 50% of total airway resistance. The nasal cavity has been modeled as 2 resistors in parallel. The 3 components of nasal resistance are as follows: the nasal vestibule, nasal valve, and nasal cavum.

A. Congenital Nasal Atresia

- Atresia and stenosis of anterior nares:
Non-canalization of an epithelial plug between the medial and lateral nasal processes.
Bilateral → incompatible with life (intrauterine death).
Treated by excision.

- Atresia of posterior nares (Choanal Atresia):
Definition: A rare congenital condition where the back of the nasal passage (choana or posterior nares) is blocked. Females are more commonly affected than males.
Etiology: Failure of canalization of the posterior bucconasal membrane.
Types: Bony (most common), membranous, or mixed. Could be uni or bilateral.
Degree: Complete unilateral, complete bilateral, incomplete unilateral, incomplete bilateral.
- Unilateral the most common and is usually asymptomatic, diagnosed by history of unilateral rhinorrhea.

Unilateral Choanal Atresia:

Usually diagnosed later in life. Patients present with unilateral nasal obstruction and unilateral excessive watery discharge. Managed by **elective surgical repair**.

Bilateral Choanal Atresia:

Usually presents at birth with nasal discharge and attacks of cyclic cyanosis and respiratory obstruction that is relieved by crying. **It is an emergency because the neonate is an obligate nasal breather.** Isolated anomaly in 60-70% but may be linked to **CHARGE** association:
Coloboma: A hole in one of the structures of the eye, such as the iris, retina, choroid, or optic disc.

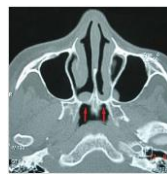
Hear disease

Atresia

Retarded growth

Gential hypoplasia

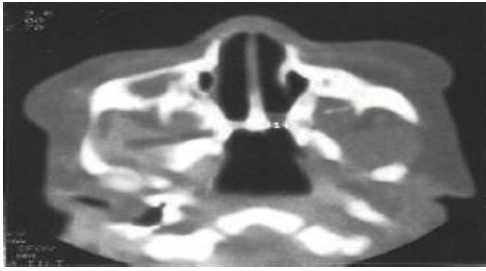
Ear deformity



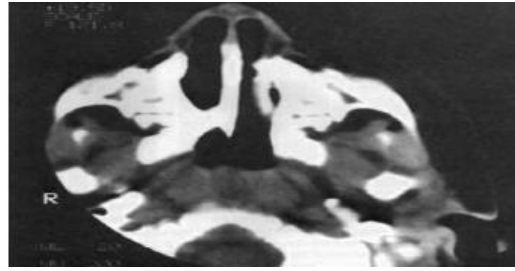
Diagnosis: Clinical examination → mirror test → placing a mirror in front of the nose and watching for the fog that indicates airflow.

- Total absence of nasal airflow
- Inability to pass a catheter into the nasopharynx (suction at birth)
- Endoscopy (Post-rhinotomy)
- Radiographs

Congenital Anomalies of the Nose



CT – Bilateral Choanal Atresia



CT- Unilateral Choanal Atresia

Management:

Immediate airway support with oral airway, McGovern nipple, or intubation.

Emergency, definitive surgery.

Transnasal perforation or transpalatal excision with indwelling tubes to prevent reclosure.



BEFORE SURGERY



AFTER SURGERY

B. Congenital Nasal Masses

1. *Nasal Dermoid*: (the most common congenital nasal anomaly).

Definition: Epithelial-lined cavities (cysts) or sinus tracts consisting of both ectodermal and mesodermal elements, including hair follicles, sebaceous glands, and sweat glands.

Site: Intranasal

Extranasal → anywhere in the midline from the columella base to the glabella (the nasal bridge is the most common site).

Clinical Features: Symptoms →



- Mass (intra or extranasal), sinus tracts (pit) with an opening on the skin, or a combination of the two.
- Intermittent discharge of sebaceous material or pus from the opening.
- Hair protruding from site (pathognomonic)
- Broadening of the nasal dorsum



Signs → firm, slowly growing, non-compressible

mass that does not transilluminate.

Negative furstenberg test → lesion does not expand with crying, valsalva maneuver, or bilateral compression of jugular veins.

Congenital Anomalies of the Nose

Diagnosis: CT (visualizing defects of the skull base), MRI (visualizing the soft tissue and diagnosing intracranial extension → the preferred imaging study), **Biopsy is contraindicated.**

Treatment: Surgical excision.

2. Nasal Glioma

Definition: Uncapsulated collection of glial cells situated outside the CNS. 15% of gliomas connect with the dura.

Site:

Intranasal → usually arises from the lateral wall (unlike encephalocele)

Extranasal → usually located at glabella level or nasomaxillary suture (unlike dermoids which usually occur in the midline).

Clinical Features:

Symptoms →

Extranasal → red or bluish lump

Intranasal → mimics polyps: unilateral nasal mass, unilateral obstruction, snoring, epistaxis, or cerebrospinal rhinorrhea.

Signs →

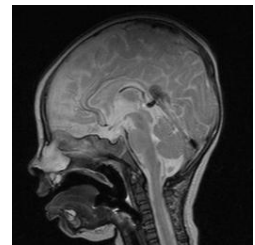
Firm, uncompressible, nonpulsatile mass that does not transilluminate.

Negative Furstenberg test.

May have telangiectasias of the overlying skin.

Diagnosis: Same as dermoid

Treatment: Surgical excision



3. Nasal Encephalocele

Definition: Herniation of neural tissue (meninges and/or brain) through defects in the skull with subarachnoid connection.

- Meningocele: contains meninges
- Encephalomeningocele: brain matter and meninges
- Encephalomeningocystocele: communicates with the ventricle

20% of encephaloceles occur in the cranium, 15% are nasal. They always have intracranial connections.

Clinical Features:

Symptoms → bluish mass over the glabella or inside the nose that enlarges with crying. May be associated with CSF leakage.

Signs → Soft, **compressible, pulsatile mass** that **transilluminates. Positive Furstenberg test.**

Diagnosis: Same as dermoid.

Treatment: Surgical excision.



Any nasal mass in a child should be evaluated for congenital midline mass
Congenital nasal masses have the potential for intracranial connection. Biopsy of a lesion with intracranial connection may lead to meningitis or CSF leakage, biopsy is contraindicated before imaging is done.

Baby, less than 6 months, presents with snoring and mouth breathing → rule out congenital causes (it's not adenoid because the adenoid is lymph and immunity is from the mother during the first 6 month of life)

Resources:

1. Dr. Mohammad Aloulah Slides and 430 team work.
2. <http://emedicine.medscape.com/article/835134-overview#showall>
3. https://www.dartmouth.edu/~humananatomy/part_8/chapter_52.html
4. Lippincott's Clinical Anatomy By Systems
5. <http://radiopaedia.org/articles/ostiomeatal-complex>
6. <http://emedicine.medscape.com/article/874822-overview>

Summary

1. Anatomy of the nose

External nose supported by bony part and cartilaginous part.

Nasal cavity extends from the nostrils anteriorly to the choanae posteriorly. It has 2 oval opening that communicate the nasal cavity with the nasopharynx which is Choanae. It has floor, roof, median wall (**Septum**), and lateral wall (**Turbinates** or conchae and **meatus**)

Meatus

- *Spheno-ethmoidal recess* → **sphenoidal sinus**.
- *Superior meatus* → **posterior ethmoidal cells**.
- *Middle meatus* → maxillary, anterior ethmoidal, frontal sinuses.
- *Inferior meatus* → opening of the nasolacrimal duct.

Mucosal lining Modified skin (Keratinized stratified squamous epithelium), Olfactory (Specialized olfactory epithelium), and Respiratory mucosa (**Ciliated pseudostratified columnar epithelium with goblet cells**).

2. Paranasal sinuses

Maxillary: the largest and in relation with orbit, teeth, middle and inferior meatus of the nose, maxillary artery, maxillary branch of trigeminal nerve, and nasolacrimal duct

Ethmoidal Sinuses (labyrinths): Consists of a number (approximately 7-15) thin-walled cavities grouped into Anterior and Posterior groups

Frontal Sinuses: the right and left frontal sinuses has different size with bony septum deviated to one side. It is in relation with anterior cranial fossa, orbit, and skin and periosteum of forehead.

Sphenoidal Sinuses: Lies behind the upper part of the nasal fossa. It is in relation laterally with cavernous sinus, and above the cavernous sinus (Pituitary gland, optic chiasm, frontal lobe of brain, and olfactory tract.)

3. Blood Supply of the Nose and Paranasal Sinuses

From External Carotid Artery: **maxillary artery** (Sphenopalatine artery and Greater palatine artery) **and facial artery** (superior labial artery).

From Internal Carotid Artery: **Ophthalmic artery** (Anterior and posterior ethmoidal arteries)

Venous drainage to Cavernous sinus, external and internal jugular veins.

4. Nerve supply

5. Function of the nose:

Respiration, Purification of inspired air, Humidification and warming of inspired air, Smelling, Speech

6. Congenital Anomalies

Congenital nasal atresia: atresia or stenosis of anterior nares, or posterior nares (Choanal atresia).

Congenital nasal masses: nasal dermoid, nasal glioma, and nasal encephalocele.

MCQ's

1. The frontal sinus drain into:

- A. Superior meatus.
- B. Middle meatus.
- C. Inferior meatus.

Ans: B

2. Anterior ethmoidal artery branch of

- A. External carotid artery
- B. Facial artery
- C. Ophthalmic artery

Ans: C

For mistakes or feedback

ENTteam432@gmail.com