

The Nasal region

The Nose:

The nose consists of the external nose and the nasal cavity. The nasal septum divides both of these into right and left halves.

External Nose:

The external nose attaches to the forehead by the **root (bridge)** of the nose. It has two elliptical, external orifices called the **nostrils (nares)**, which are separated from each other by the **nasal septum**. The lateral margin, the **ala nasi**, is rounded and mobile.

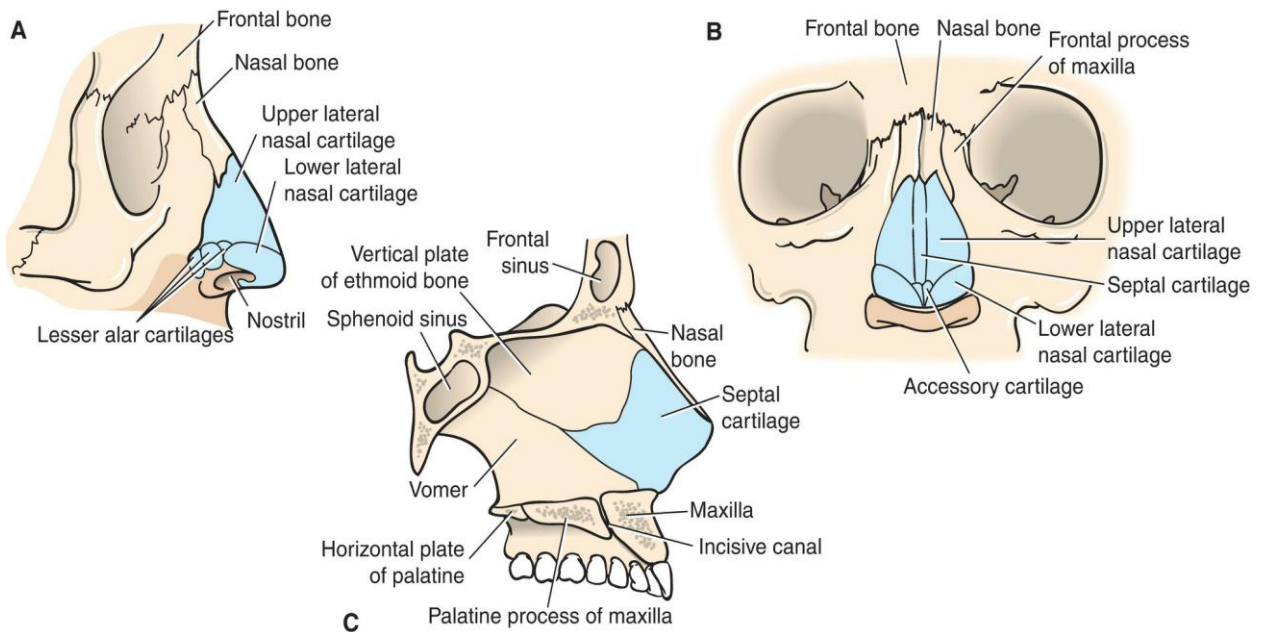
The **nasal bones**, the **frontal processes of the maxillae**, and the **nasal part of the frontal bone** are the peripheral bony elements. Below the bones, multiple **nasal cartilages** complete the framework. The nasal cartilages are plates of hyaline cartilage that make up the majority of the external nose.

External Nose Sensory Innervation

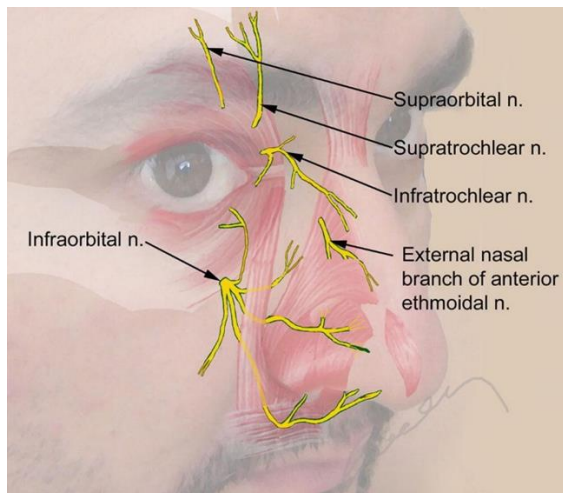
- The **infratrochlear** and **external nasal** branches of the ophthalmic nerve (CN V1) innervate the bridge and crest of the nose.
- The **infraorbital branch** of the maxillary nerve (CN V2) supplies the side of the nose.

External Nose Blood Supply

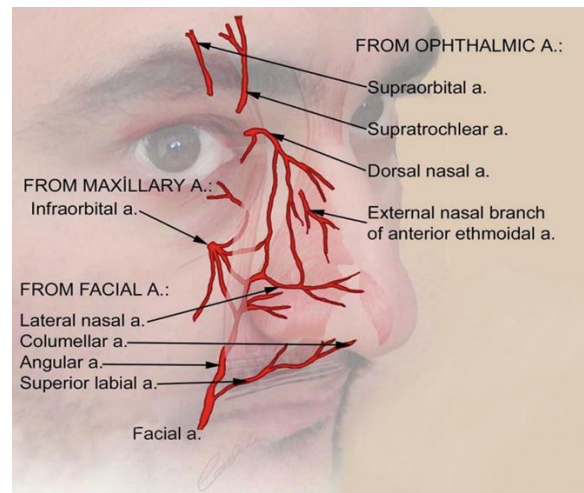
- Branches of the **ophthalmic** and **maxillary arteries** supply the skin of the external nose.
- Branches from the **facial artery** supply the skin of the ala and the lower part of the septum.



The external nose and nasal septum. **A.** Lateral view of bony and cartilaginous skeleton of external nose. **B.** Anterior view of bony and cartilaginous skeleton of the external nose. **C.** Bony and cartilaginous skeleton of the nasal septum.



Nerve supply of the external nose



blood supply of the external nose

Nasal Cavity

The nasal cavity extends from the **nostrils** in front to the **posterior nasal apertures (choanae)** behind, where the nose opens into the nasopharynx. The **nasal vestibule** is the area of the nasal cavity lying just inside the nostril.

Roof (Apex)

The roof is narrow and is formed anteriorly by the nasal and frontal bones, in the middle by the cribriform plate of the ethmoid, and posteriorly by the downward sloping body of the sphenoid.

Floor (Base)

The floor of the nasal cavity is the superior surface of the hard palate.

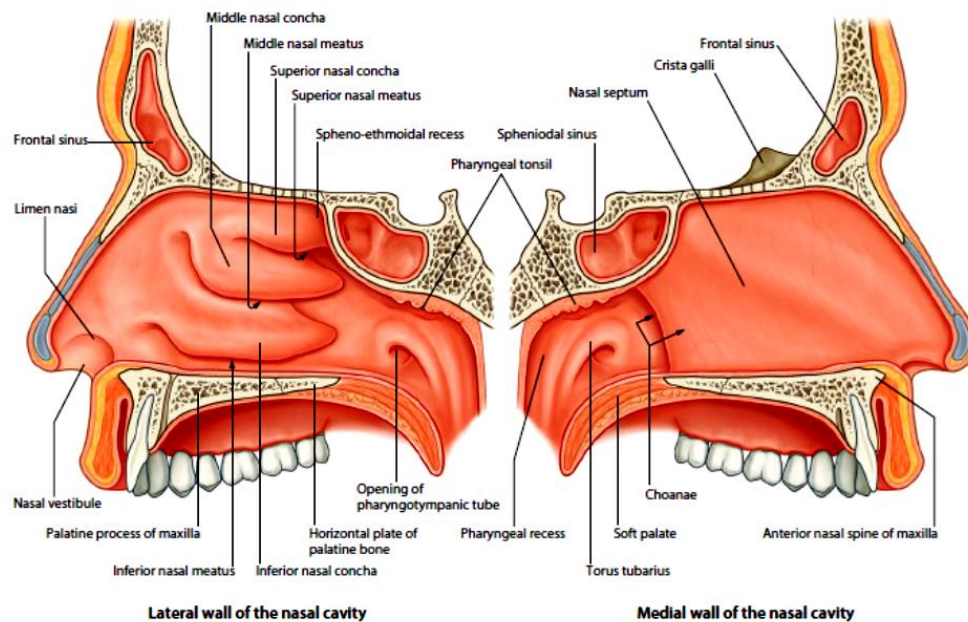
Lateral Wall

The lateral wall has three projections of bone: the **superior, middle, and inferior nasal conchae**. The **sphenoethmoidal recess** is a small area above the superior concha. It receives the opening of the **sphenoid air sinus**. The space below each concha is a **meatus**. So there are three meatus:

- The **superior meatus** lies below the superior concha. It receives the openings of the **posterior ethmoid sinuses**.
- The **middle meatus** lies below the middle concha. It has a rounded swelling called the **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 into a funnel-shaped channel called the **infundibulum**, which is continuous with the **frontal sinus**. The maxillary sinus opens into the middle meatus through the **hiatus semilunaris**.
- The **inferior meatus** lies below the inferior concha and receives the opening of the lower end of the **nasolacrimal duct**.

Medial Wall

The nasal septum forms the medial wall. The **vertical (perpendicular) plate of the ethmoid** forms the upper portion; the **vomer** makes up the lower part; the **septal cartilage** forms the anterior part. The septum rarely lies in the midline, thus increasing the size of one half of the nasal cavity and decreasing the size of the other.



Nasal Cavity Mucous Membrane

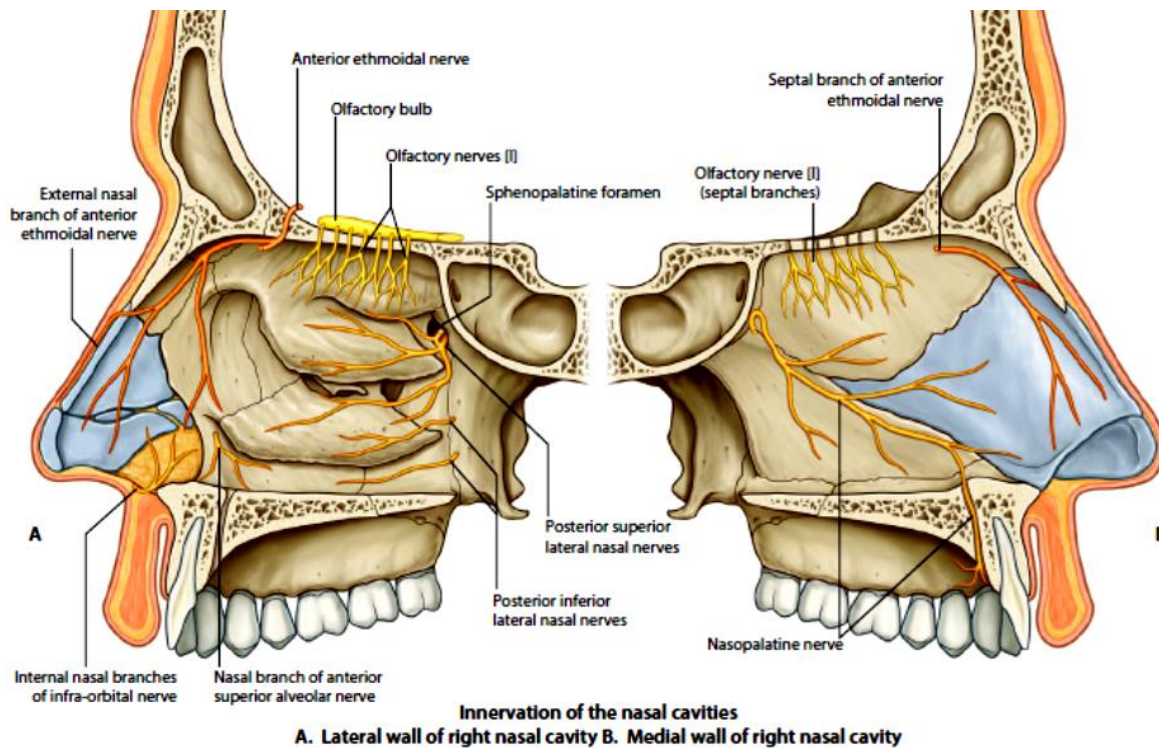
The **vestibule** is lined with modified skin and has coarse hairs. A small **olfactory region** above the superior concha is lined with olfactory mucous membrane and contains nerve endings sensitive to the reception of smell. The remainder of the nasal cavity (except for the vestibule) is the **respiratory region**; it is lined with respiratory mucous membrane.

A large plexus of veins occupies the submucous connective tissue in the respiratory region. The presence of warm blood in the venous plexuses serves to warm the inspired air as it enters the respiratory system. The presence of mucus on the surfaces of the conchae moistens the area and traps foreign particles and organisms in the inspired air, which are then swallowed and destroyed by gastric acid.

Nasal Cavity Nerve Supply

The **olfactory nerves (I)** from the olfactory mucous membrane ascend through the cribriform plate of the ethmoid bone to the olfactory bulbs.

The nerves of **general sensation** are branches of the **ophthalmic division (V1)** and the **maxillary division (V2)** of the trigeminal nerve.



Nasal Cavity Blood Supply

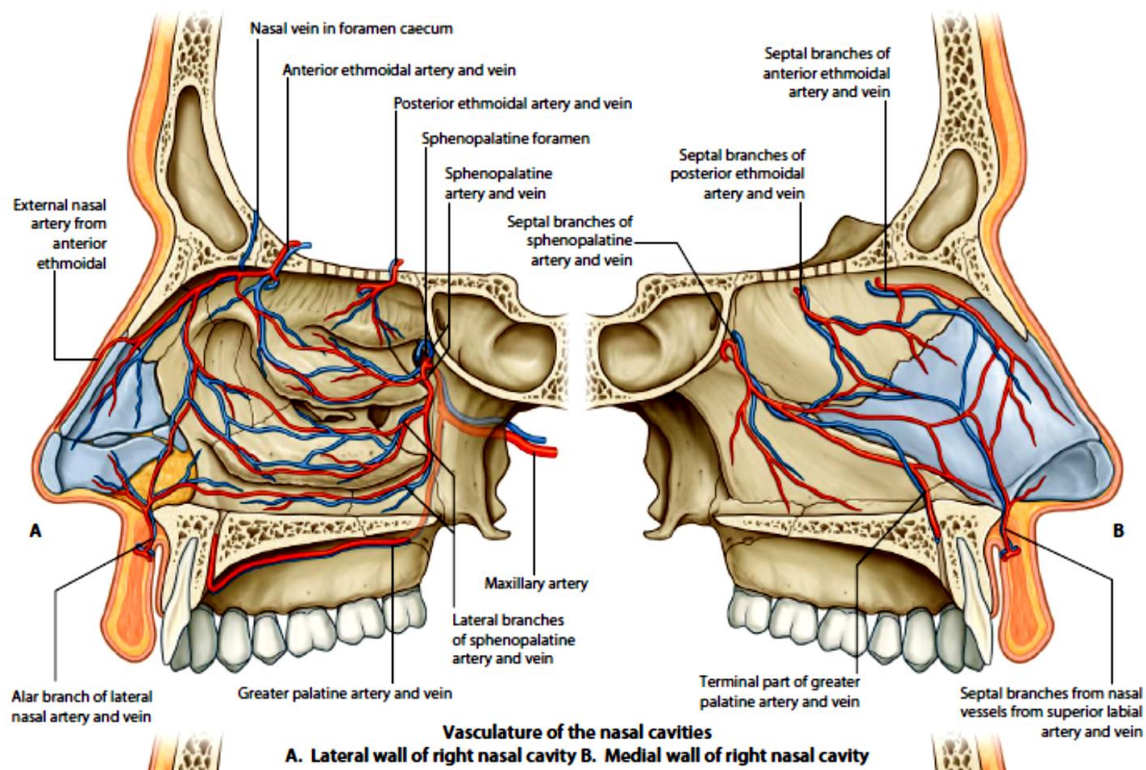
The arterial supply of the medial and lateral walls of the nasal cavity:

1. **Anterior ethmoidal artery** (a branch from the ophthalmic artery).
2. **Posterior ethmoidal artery** (a branch from the ophthalmic artery).
3. **Sphenopalatine artery** (a branch from the maxillary artery).
4. **Greater palatine artery** (a branch from the maxillary artery).
5. **Septal branch of the superior labial artery** (a branch from the facial artery).

The most important branch is the **sphenopalatine artery**. The sphenopalatine artery anastomoses with the **septal branch of the superior labial branch of the facial artery** in the region of the vestibule. The anterior part of the nasal septum is the site (**Kiesselbach area**) of an anastomotic arterial plexus involving all five arteries supplying the septum.

Note:

The submucous venous plexus drains into veins that accompany the arteries.



Nasal Cavity Lymph Drainage

The lymph vessels draining the vestibule end in the **submandibular nodes**. The remainder of the nasal cavity drains by vessels that pass to the **upper deep cervical nodes**.

Paranasal Sinuses

The paranasal sinuses are cavities in the interior of the **maxilla, frontal, sphenoid, and ethmoid bones**. They are lined with mucoperiosteum and filled with air; they communicate with the nasal cavity through relatively small apertures.

The paranasal sinuses function to decrease the weight of the skull (by approximately a 7% to 20% factor) and give resonance to the voice. The quality of the voice is markedly changed when the apertures of the sinuses are blocked or they become filled with fluid.

The mucus produced by the mucous membrane is moved into the nose by ciliary action of the columnar cells. Drainage of the mucus is also achieved by the siphon action created during the blowing of the nose.

Rudiments of the sinuses may appear prenatally. However, most sinuses do not develop until postnatal life. The maxillary and sphenoid sinuses are present in a rudimentary form at birth; they enlarge appreciably after the 8th year and achieve full form in adolescence. Expansion of the paranasal sinuses is one of the factors responsible for the significant postnatal growth of the facial skeleton.

Maxillary Sinus

The maxillary sinus is pyramidal in shape and located within the body of the maxilla behind the skin of the cheek. The floor of the orbit forms the roof, and the floor is related to the roots of the premolars and molar teeth.

Frontal Sinuses

The frontal bone contains the two frontal sinuses. They are separated from each other by a bony septum. Each sinus is roughly triangular, extending upward above the medial end of the eyebrow and backward into the medial part of the roof of the orbit.

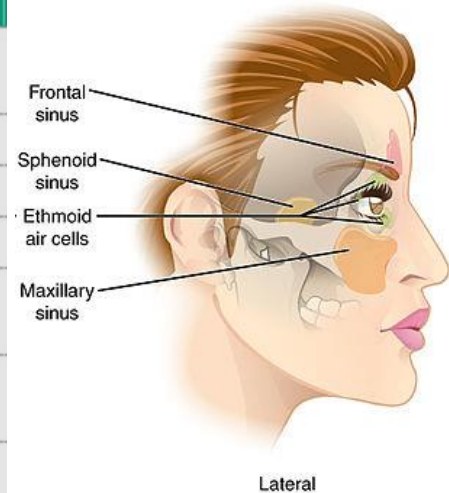
Sphenoid Sinuses

The two sphenoidal sinuses lie within the body of the sphenoid bone. A thin bony septum separates the sinuses.

Ethmoid Sinuses

The ethmoid bone houses three pairs of sinuses (**anterior**, **middle**, and **posterior**) between the nose and the orbit. They are separated from the orbit by an extremely thin plate of bone, and infection can readily spread from the sinuses into the orbit.

SINUS	SITE OF DRAINAGE
Maxillary sinus	Middle meatus through hiatus semilunaris
Frontal sinuses	Middle meatus via infundibulum
Sphenoid sinuses	Sphenoethmoidal recess
Ethmoid sinuses	
Anterior group	Infundibulum and into the middle meatus
Middle group	Middle meatus on or above bulla ethmoidalis
Posterior group	Superior meatus



Clinical Notes

Nose Trauma

Fractures involving the nasal bones are common. Blows directed from the front may cause one or both nasal bones to be displaced downward and inward. Lateral fractures also occur in which one nasal bone is driven inward and the other outward; the nasal septum is usually involved.

Nasal Cavity Infection

Infection of the nasal cavity can spread in a variety of directions. The paranasal sinuses are especially prone to infection. Organisms may spread via the nasopharynx and the auditory tube to the middle ear. It is possible for organisms to ascend to the meninges of the anterior cranial fossa along the sheaths of the olfactory nerves through the cribriform plate and produce meningitis.

Foreign Bodies in the Nose

Foreign bodies in the nose are common in children. The presence of the nasal septum and the existence of the folded, shelflike conchae make impaction and retention of balloons, peas, and small toys relatively easy.

Nose Bleeding

Epistaxis (chronic profuse bleeding from the nose) is a frequent condition. Common causes include nose picking. The bleeding may be arterial or venous. Most episodes occur on the anteroinferior portion of the septum and involve the septal branches of the sphenopalatine and facial vessels.

Sinusitis and the Examination of the Paranasal Sinuses

Infection of the paranasal sinuses is a common complication of nasal infections. Rarely, the cause of maxillary sinusitis is extension from an apical dental abscess. The frontal, ethmoidal, and maxillary sinuses can be *palpated clinically* for areas of tenderness:

- The **frontal** sinus can be examined by pressing the finger upward beneath the medial end of the superior orbital margin. Here, the floor of the frontal sinus is closest to the surface.
- The **ethmoidal** sinuses can be palpated by pressing the finger medially against the medial wall of the orbit.
- The **maxillary sinus** can be examined for tenderness by pressing the finger against the anterior wall of the maxilla below the inferior orbital margin; pressure over the infraorbital nerve may reveal increased sensitivity.