NASAL CAVITY

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I. **NASAL CAVITY** - openings - anteriorly opens to Anterior Nares, posteriorly at Choanae (Posterior Nares); cavity lined by mucoperiosteum.

A. Nasal Cartilages - Septal Cartilage with fused Lateral Nasal Cartilages; Alar Cartilages - surround medial side of nostrils; function - direct inhalation toward mouth (smell what you eat).

B. Nasal Cavity Boundaries; Floor = palate - Maxillary bone (palatine process) and Palatine (horizontal plate) bones; Roof - Nasal, Frontal, Ethmoid and Sphenoid bones; Medial wall = nasal septum: Septal cartilage, Ethmoid bone and Vomer; Lateral Wall - Nasal, Maxillary, Ethmoid, Palatine and Sphenoid bones and Inferior Nasal Concha.

Clinical Note: **Fractures of nose are common**; **fractures of cribriform plate** of Ethmoid (which forms roof of nasal cavity and floor of anterior cranial fossa) can lead to meningitis or **cerebrospinal fluid leakage** into nasal cavity if the dura is torn.

C. Nasal Conchae (L. shell) - also called Turbinates - projections from lateral wall increase surface area of mucosa to warm, humidify, and clean air; Superior and Middle conchae are part of Ethmoid bone; Inferior concha is a separate bone.

Note: Opening of auditory tube is in nasopharynx, posterior to inferior concha.

1. Four Spaces of Nasal Cavity associated with conchae, each space (Meatus, L. passage) has its own openings for nerves, air sinuses or nasolacrimal duct.

Space	**Location**	**Openings/Sinuses**
Sphenoethmoidal Recess	**Above Superior Concha**	1) Olfactory foramina of cribriform plate and 2) Sphenoidal air sinus (opening)
Superior Meatus	**Below Superior Concha**	1) Posterior Ethmoidal Air sinus (opening)
Middle Meatus	**Below Middle Concha - parts** **Ethmoidal Bulla -** rounded elevation in wall **Hiatus Semilunaris -** slit below Ethmoid Bulla **Infundibulum -** anterior part of Hiatus	1) Middle Ethmoidal sinuses open onto Ethmoidal bulla 2) Anterior Ethmoidal sinus - open to Hiatus 3) Maxillary sinus opens to Hiatus Semilunaris; 4) Frontal sinus drains to Infundibulum
Inferior Meatus	**Below Inferior Concha**	1) Nasolacrimal duct (opening)

Clinical Note: **Opening of Maxillary sinus is high up (superior)** on wall of sinus, can lead to **poor drainage** of sinus when infected.

C. Divisions - Respiratory area - lower part of mucosa, lined with respiratory epithelium; Olfactory area - upper part of mucosa, lined with olfactory epithelium

D. Nerves

1. **Olfactory** area - Olfactory nerve (CN I, sense of smell)
2. **General sensation** (touch, temperature, etc.) **Somatic Sensory branches from <u>V1 and V2</u>** - Anterior Ethmoidal nerve (from V1) and Nasopalatine nerve and Nasal branches (from V2)
3. **Parasympathetic Innervation to nasal mucous glands** - **Facial nerve (CN VII)** - Visceral Motor (Parasympathetic) from Pterygopalatine ganglion; branches of Facial nerve (VII) travel with Trigeminal nerve (V)

E. Blood supply

1. Arteries - Mostly from Sphenopalatine artery (branch of Maxillary artery); also from Anterior and Posterior Ethmoidal arteries (branches of Ophthalmic artery) and branches of Facial artery (anteriorly).

2. Veins - Ethmoidal veins drain to Ophthalmic vein; other branches to Pterygoid venous plexus and Facial vein.

Clinical Note: **Epistaxis (Nosebleed)** - Rich anastomoses in nose results in epistaxis (nosebleed) often due to tearing of veins; spurting of blood occurs from tears of arteries.

F. Lymphatics - drain to Retropharyngeal nodes.

<u>II. **PARANASAL AIR SINUSES**</u> - air filled extensions of nasal cavities; all are paired; develop after birth; lined by mucous membrane; serve to lighten growing bones; possibly a mistake of evolution as could have filled growing bones with spongy (cancellous) bone and would not get infected.

A. Frontal sinus - two sinuses separated by a median septum; variable in size.
B. Sphenoid sinus - paired sinuses located in body of sphenoid bone
C. Ethmoidal sinus (also call air cells) - Anterior, Middle, and Posterior groups
D. Maxillary sinus - largest, occupies entire body of maxilla; Roof - floor of orbit; Medial wall - related to lower part nasal cavity.

Clinical Note: **Blocked Ethmoidal sinuses** may cause **infection** to pass laterally through thin medial wall of **Orbit** to infect eye.

Clinical Note: **Tooth Extraction Fractures Maxillary Bone** - Roots of teeth closely related to floor of sinus; Extraction of molar teeth can result in fracture of floor of sinus.

Clinical Note: **Maxillary Sinus Infections are sensed as Toothache** - Anterior and Posterior Superior alveolar branches of CN V2 supplies mucous membrane of maxillary sinus and teeth; infected sinus can result in sensation of **tooth ache**.

III. **PALATE DEVELOPMENT**

A. Development - occurs during 5-12th week

1. Two parts form palate: primary and secondary palates.

a. Primary palate (Median palatine process) - formed by union of Medial Nasal Processes, become part of palate anterior to incisive foramen, bearing incisor teeth

b. Secondary palate (posterior to incisive foramen) - formed of Maxillary processes of Arch I; Maxillary processes fuse with the Median Palatine processes anteriorly; posteriorly, Maxillary processes fuse with each other at midline; fusion proceeds anteriorly to posteriorly.

2. Malformations

a. **Anterior Cleft palate** - improper fusion of primary and secondary palates (**Medial Nasal processes and Maxillary processes fail to fuse**); cleft is anterior to incisive foramen; 1:1000 births

b. **Posterior Cleft palate** - improper fusion of parts of secondary palate (**Maxillary processes from each side fail to fuse with each other**); cleft is posterior to incisive foramen; 1:2500 births

IV. **PALATINE TONSILS** - located between palatoglossal and palatopharyngeal folds on lateral side of oropharynx; tonsils are a collection of lymphoid tissue covered by mucous membrane; lateral to tonsil is the tonsillar bed (lateral wall of pharynx)

A. Arteries - mainly from Tonsillar branch of Facial artery.

B. Veins - join pharyngeal plexus of veins which drain to Facial, Lingual or Internal Jugular veins.

Clinical Note: Bleeding after tonsillectomy - Tonsillar branch of Facial artery can bleed extensively after tonsillectomy.

Clinical Note: Damage Glossopharyngeal nerve in tonsillectomy - Glossopharyngeal n. - passes forward with Tonsillar artery in lateral wall of pharynx; only mucosa and fascia cover nerve; can be damaged in removal of tonsil.

C. Lymphatics - Drain to Jugulodigastric node (one of the Deep Cervical nodes, becomes enlarged during tonsillitis); located near angle of mandible and inferior to posterior belly of Digastric muscle.