The Nose and Nasal Sinuses

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Anatomy

- External nose
Fig. 2.2 Important vascular relationships of the face. 1, Site for ligation of the angular vein; 2, facial artery; 3, facial vein; 4, common carotid artery; 5, internal jugular vein; 6, pterygoid plexus; 7, sigmoid sinus; 8, inferior petrosal sinus; 9, superior petrosal sinus; 10, cavernous sinus; 11, superior ophthalmic artery and vein.
Anatomy

- Nasal cavity
Nasal Cavity
Speculum View

- Middle nasal concha
- Bulging septum
- Middle nasal meatus
- Inferior nasal concha (turbinate)
- Inferior nasal meatus
- Airway to nasopharynx
- Floor of nasal cavity
The nasal septum separates the left and right nasal airway. The yellow portion is made of flexible cartilage, the quadrangular cartilage. The blue portion is thin bone, the perpendicular plate of the ethmoid bone. The purple portion is thicker bone, the vomer bone.
Turbinate 2... The inferior turbinate is that structure which can shrink and swell dramatically. If you use Afrin or other decongestants, the inferior turbinate is the structure most affected. When a cold causes severe congestion, this is one of the primary structure that has swollen. ?999 Peter Casano, M.D.
Nerves of Nasal Cavity
Distribution of Olfactory Mucosa

Lateral nasal wall
Nasal septum

Note: Distribution of olfactory mucosa is shaded blue.
Fig. 2.9 Vasculature of the nasal cavity: 1, Kiesselbach’s area; 2, internal maxillary artery; 3, sphenopalatine artery; 4, ophthalmic artery; 5, anterior and posterior ethmoid arteries.

- Kiesselbach’s area
- Area supplied by external carotid artery
- Area supplied by internal carotid artery (schematic)
Anatomy

- Nasal sinuses
  - Maxillary sinus
  - Frontal sinus
  - Ethmoid labyrinth
  - Sphenoid sinus
Fig. 2.6a and b  Nasal sinuses. a. Frontal section. b. Sagittal section. 1, Frontal sinus; 2, ethmoid sinus; 3, maxillary ostium; 4, antral cavity; 5, sphenoid cavity.
The sinuses are air spaces within bone. There are several groups of sinuses. A close up of the main computer model is seen from the side view. The frontal sinus is black check, the maxillary sinus is red, the anterior ethmoid sinuses are green, the posterior ethmoid sinuses are purple, and the sphenoid sinus is yellow. ©999 Peter Casano, M.D.
Sinus 2... Another view of the main computer model as seen from the front. The frontal sinus is black check, the maxillary sinus is red, the anterior ethmoid sinuses are green, the posterior ethmoid sinuses are purple, and the sphenoid sinus is yellow. ©1999 Peter Casano, M.D.
Maxillary Sinus... The maxillary sinus is the largest paranasal sinus. It is intimately related to the upper teeth, tear duct, and the floor of the orbital cavity. Peter Casano, M.D.
Maxillary 2... The maxillary sinus must pump mucous uphill to reach the sinus opening which is at the top. This sinus has a large internal surface area and volume relative to the size of its outflow tract. The flow exits the sinus ostia, then traverses the uncinate process, then drains over the top of the inferior turbinate. ?999 Peter Casano, M.D.
Maxillary 3... During infections and sinus blockage, mucous or pus fills the sinus. Fluid is pulled from the surface of the fluid level and then transported to the exit. The surface area of the sinus cavity that is below the fluid level cannot provide useful mucocilliary flow. It can be a fine balance between the rate that fluid is produced and the speed of the ciliary pumping mechanism. ?999 Peter Casano, M.D.
The frontal sinus has the longest drainage pathway. Surprisingly, the frontal sinus is not as frequently involved as the maxillary or anterior ethmoid sinuses. The frontal sinus outflow is obstructed to a variable degree by the anterior ethmoid cells. 

Peter Casano, M.D.
Drainage 1... The posterior ethmoid cells drain into a different location. Their secretions exit above the middle turbinate and behind the portion of the middle turbinate called the basal lamella (red check). ?999 Peter Casano, M.D.
Turbinate 5... One part of the middle turbinate is called the basal lamella. It is shown in red checkers. This portion forms a wall that separates the anterior ethmoid cells from the posterior ethmoid cells. The face of the sphenoid sinus has been removed but the opening is shown. ?999 Peter Casano, M.D.
Sphenoid 1... The sphenoid sinus is the most posterior sinus. An infected sphenoid sinus can cause posterior headaches. The drainage from the sphenoid is almost directly down the throat. Patients often complain of chronic cough and posterior headaches if the sphenoid is involved. The pituitary gland rests on the top of the sphenoid sinus. ?999 Peter Casano, M.D.
Fig. 2.8  Ostiomeatal unit. 1, Frontal sinus; 2, ethmoid sinus; 3, middle turbinate; 4, inferior turbinate; 5, antral cavity; 6, orbit; 7, nasal cavity; 8, nasal centrum; 9, infundibulum under the anterior end of the middle turbinate (black dotted area).
It is thought that many sinus infections begin with swelling in the nasal cavity from viruses or allergies. This swelling may lead to obstruction of the all important ostiomeatal complex (blue glow). The ostiomeatal complex can be thought of as the main intersection for drainage from the anterior sinus cavities. Peter Casano, M.D.
Os. Meatal 2... The ostiomeatal complex describes a functional unit, not a specific anatomic structure. The most critical locations are shown in blue glow. If this area is obstructed, the mucous flow from the maxillary, anterior ethmoids, and frontal can back up. ©999 Peter Casano, M.D.
Physiology
Physiology

- Olfaction
- Respiration
- Protection
- Reflex
- Speech
- Function of the nasal sinuses
Olfaction

- Sensitive
- Influencing appetite
- Important in psychology field
Fig. 2.11  Olfactory organ. 1, Olfactory fibers in the olfactory bulb; 2, olfactory glomeruli; 3, cribiform plate; 4, olfactory epithelium.
Respiration

- The only physiologic respiratory pathway
- The nasal patency can be influenced
- The inspired air is warmed, moistened and purified
Protection

- Defensive system—mucociliary apparatus
图 1-1-29 鼻粘膜的纤毛和粘液毯的运动形式
箭头示运动方向
Specific nasal reflex mechanisms may arise:

- Within the nose and affect the nose itself
- From other parts of the body or organs and affect the nose
- In the nose and affect other parts of the body
Speech

- Influence the sound of speech
Function of the nasal sinuses

- Reduce the skull weight
- Increase the superficial extent of the bones of the skull
Disease
Disease

- Inflammatory diseases localized mainly in the nasal cavity
- Inflammatory diseases of the nasal sinuses
- Neoplasm of the nose and nasal sinuses
Introduction

- A continuous mucosa
- Allergy plays an important role
- Functions as a whole
Inflammatory diseases localized mainly in the nasal cavity

- Acute rhinitis
- Allergic rhinitis
- Chronic rhinitis
Acute Rhinitis

- Symptoms
- Pathogenesis
- Diagnosis
- Treatment
Acute Rhinitis—Symptoms

- Dry prodromal stage
- Catarrhal stage
- Mucous phase
- Secondary bacterial infection
Acute Rhinitis – Pathogenesis

- Rhinovirus
- Spread by droplet infection
The diagnosis often can be made only after a few days.
There is no treatment for the basic cause.
Allergic Rhinitis

- Symptoms
- Pathogenesis
- Examination
- Diagnosis
- Treatment
Allergic Rhinitis - Symptoms

- nasal obstruction
- watery rhinorrhea
- episodic sneezing
Allergic Rhinitis - Pathogenesis

- An inhalation allergy is the cause.
- The commonest allergens: pollens, animal hair, fungi, house dust, feathers
Allergic Rhinitis - Examination

- The mucosa is swollen, pale, and wet.
- The inferior turbanite might completely obstruct the nasal passage.
- There is profuse, clear, watery secretion.
- In the chronic case polypoid changes might occur in the middle meatus.
Allergic Rhinitis - Diagnosis

- History
- Blood tests
  - radioallergosorbent test (RAST)
- Secretion tests
- Skin tests
Allergic Rhinitis - Treatment

- Symptomatic treatment - medication
- Causal treatment - avoidance or elimination of the allergen
Chronic Rhinitis

- Symptoms
- Pathogenesis
- Diagnosis
- Treatment
Chronic Rhinitis - Symptoms

- Nasal obstruction
- Nasal discharge
- Secondary pharyngitis
Chronic Rhinitis - Pathogenesis

- Recurrent acute rhinitis
- Infection in the sinuses
- Vasomotor diseases of the mucosa
- Chronic inflammation due to tobacco smoke and dust
C**hronic Rhinitis—Diagnosis**

- Simple chronic rhinitis
- Chronic hyperplastic rhinitis
Chronic Rhinitis - Treatment

- Conservative
- Surgical
Inflammatory diseases of the nasal sinuses

- *Acute sinusitis*
- *Chronic sinusitis*
Acute Sinusitis

- Pathogenesis
- Symptoms
- Examination
- Treatment
Acute Sinusitis - Pathogenesis

- Follow the common cold
- Occur from a specific organism
- Occur by infected water
Acute Sinusitis—Symptoms

- Pains
- Discharge
- Nasal obstruction
- Abnormal smell
Acute Sinusitis - Examination

- The mucosa is reddened, edematous, and moist.
- Mucopurulent material is present in the middle meatus.
- Radiographs show the involved sinus to be clouded.
Fig. 11.1.  
A. Suppurative sinusitis of the left maxillary sinus caused by an infected tooth. The sinus is opaque with an air-fluid level that is seen just superiorly. The other sinuses are clear. 
B. Acute right frontal sinusitis in a different patient. An air-fluid level is present in the frontal sinus, and the ethmoid sinus is opaque.
Acute Sinusitis - Treatment

- Draining the sinuses
- Antibiotics
Chronic Sinusitis

- Symptoms
- Examination
- Treatment
Chronic Sinusitis—Symptoms

- Purulent nasal discharge
- Nasal obstruction
- Disorders of smell
- Postnasal drip
- Fatigue
**Chronic Sinusitis-Examination**

- The mucosa is red, and has a velvety appearance
- Dried secretions and purulent develop in the middle meatus
- Strands of mucopurulent secretions are present on the posterior walls of the nasopharynx
- Radiographs show opacification from mucoperiosteal thickening of the involved sinuses
Chronic Sinusitis - Treatment

- Sinus lavages
- Surgery
图 1-12-3 上颌窦穿刺冲洗法
Neoplasm of the Nose and Nasal Sinuses

- Benign neoplasm
- Malignant neoplasm
Benign Neoplasm

- Symptoms
- Diagnosis
- Treatment
Benign Neoplasm - Symptoms

- Unilateral nasal obstruction
- Secondary sinusitis
- Cosmetic deformity
Benign Neoplasm—Diagnosis

- Physical examination
- Endoscopy
- Radiography
- Biopsy
Fig. 11.6 - Injected muscles of the eyelid, in a patient who has a pseudocystic nasolacrimal duct obstruction.
Benign Neoplasm - Treatment

- Surgery
Malignant Neoplasm

- Symptoms
- Diagnosis
- Treatment
- Prognosis
Malignant Neoplasm-Site and Extension

- Sebileau's levels
- Oehngren's plane
Fig. 2.69a and b  Tumor site. (a) Sébileau’s levels; (b) Oehngren’s plane.
Malignant Neoplasm—Symptoms

- Unilateral nasal obstruction
- Unilateral nasal discharge
- Hemorrhagic nasal secretion
- Headache
- Restriction of eye movement
- Loosening of the teeth
- Cranial nerve palsies
- Regional lymphadenopathy
Malignant Neoplasm - Diagnosis

- Physical examination
- Endoscopy
- x-ray
- Computed tomography
- Biopsy
Fig. 11.7. Advanced carcinoma of the left maxilla. The left cheek is substantially swollen, and the left eye is displaced superiorly. The tumor has metastasized to the preauricular lymph node.
Fig. 11.8. Water's position roentgenogram of a patient with advanced carcinoma of the left maxilla. There is opacification of the maxillary sinus and erosion of the roof and lateral and medial walls.
Malignant Neoplasm - Treatment

- Surgery
- Radiotherapy
- Chemotherapy
Malignant Neoplasm—Prognosis

- 5 year survival rates:
  - from 30% to 40%