Lecture 8,9

Editing File

Nose I-II

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Lecture Objectives:

- ★ Anatomy and physiology of the nose and paranasal sinuses.
- ★ Anatomy of the external nose and nasal cavity, paranasal sinuses (blood supply, {nerve supply} in brief)
- ★ Function of the nose and paranasal sinus.
- ★ Congenital anomalies (in brief) {choanal atresia}
- ★ Acute and chronic rhinitis.
- ★ Allergic and non-allergic rhinitis.
- ★ Vestibular and furunculosis.
- ★ Nasal polyps (allergic and antrochoanal) etc.
- ★ Radiology illustration (e.g. CT scan).

Important Original content Doctor's notes
Golden Notes Extra

Anatomy of External nose :

◄ External nose

- Pyramidal in shape
- Root is up and base is down
- **Surface Anatomy: Subunits**
  - Dorsum (Bridge) - Tip - Columella - Side walls - Ala (formed by the lower lateral cartilage) - Sil

Caudal dislocation of the nasal septum is the deviation of the anterior portion of the nasal septum.

- The external nose has two elliptical orifices called the naris (nostrils) which are separated from each other by nasal septum.
- The nose is 7cm long from inside.
- Consists of :

Skin (varies in thickness)

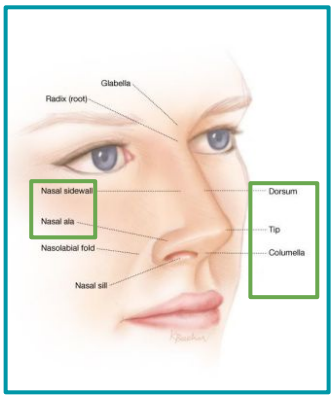
- The skin over the nasal bones and the upper lateral cartilage: is thin and freely mobile
- The skin over the alar cartilages: is thick and adherent and contains many sebaceous glands

Skin thickness is important in assessing patients for rhinoplasty (thick vs thin skin).

Musculature

- Covers the osteo-cartilaginous framework.
- Movement of the tip, ala and the overlying skin,
- Includes:
  - Procerus (common place for botox injection)
  - Nasalis (transverse and alar parts) -
  - Levator labii superioris alaeque nasi
  - Dilator nares (anterior and posterior)
  - Depressor septi

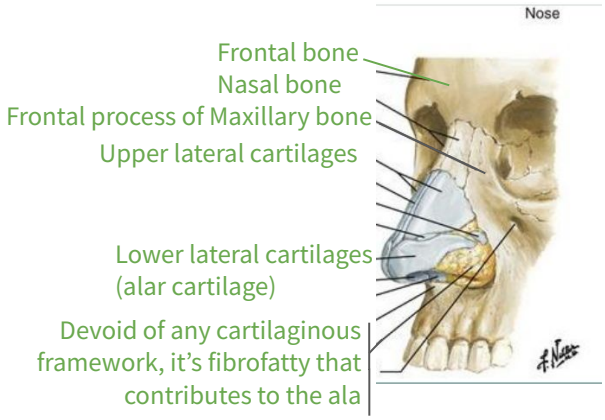
Nasal obstruction from bell's palsy is due to the paralysis of the dilator nares m. leading to increased resistance to inspiration.



Imp to describe lesions in the nose in future

Osteo-cartilaginous framework

- **Bony and cartilaginous parts**
- **Upper one third is bony and lower two thirds are cartilaginous**
  - **Bony part :**
- Consists of two nasal bones that meets in the midline and rest between the frontal bone superiorly, and the frontal process of the maxillary bone infero-laterally.
  - **Cartilaginous part** :
- Upper lateral cartilages
- Lower lateral cartilages (alar cartilages) (between ala and columella)
- Lesser alar cartilages (Sesamoid cartilages) Sesamoid cartilage is lateral to alar cartilage (حبيبات)
- Septal cartilage (Quadrangular cartilage or quadrilateral)



Anatomy of External nose :

01

Upper lateral cartilage:

- Between the nasal bones and the alar cartilages
- Fuses in the midline with the septal cartilage
- Part of the internal nasal valve

Nasal valve:

a)Internal

-Components of the internal nasal valve:

1-Caudal end of the upper lateral cartilage

2-Septum

3-Head of the inferior turbinate

-Hypertrophy of the inferior turbinate or a deviated septum→cause narrowing of the internal nasal valve.

b)External

(columella, floor of the nose & the ala)

-Collapsed external nasal valve is seen in strong breathing (↑suction/breathing power).

02

Alar cartilages 'Lower lateral cartilage':

- U-shaped.
- Medial crus forms the columella, and lateral crus forms the ala.
- Lateral crus overlaps the upper lateral cartilage on each side
- Lower lateral cartilage is composed of 3 crura: medial, intermediate & lateral.
- Columella is formed by:

-Medial crus

-Caudal end of the septum

-Membranous septum (between the cartilaginous septum & columella)

03

Lesser alar cartilages 'sesamoid cartilages' :

- Two or more small cartilages
- Above and lateral to the alar cartilages
- Interconnected by the adjacent perichondrium and periosteum

◄ Blood supply of external nose :

- Dorsal nasal artery
- Angular artery
- Superior labial artery

If you remove the skin that's what you'll see The nose is composed of bone and cartilages . If you try to move the tip of your nose you can ;because it's composed of cartilages. So the external frame of the nose is composed above of 3 bones:

1. nasal bone
2. nasal part of frontal bone
3. frontal process of maxilla

The external frame of the nose below is composed of :

1. Upper lateral nasal cartilage
2. Alar cartilages

Internal nose

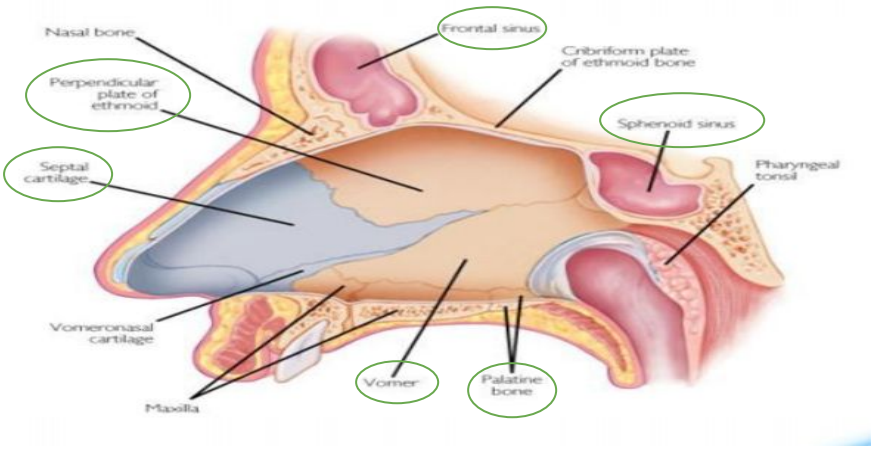
◀ Septum :

- Support the nasal dorsum and the tip of the nose
- Separates the two nasal cavities
- Septum Consists of :
  - Perpendicular plate of ethmoid bone
  - Vomer

  } Bulk of the bony septum
  - Large quadrilateral cartilage (forms the cartilaginous part of the septum)
  - Minor contribution of crests of nasal bones, nasal spine of the frontal bone, anterior nasal spine of maxilla, rostrum of the sphenoid bone, crests of the palatine and maxillary bones
- **Divided into:** two nasal cavities by the nasal septum
- Communicates with the exterior through the nostrils (naris), and with the nasopharynx through the choana (posterior nasal aperture).
- Each cavity consists of a skin-lined portion called the vestibule and a mucosa-lined portion, the nasal cavity proper.

◀ Vestibule of the nose :

- Forms the anterior and inferior part of the nasal cavity.
- Lined by skin.
- Contains sebaceous glands, hair follicles, and hair called vibrissae.



Remember the sinuses to easy remember the bones :

1. Frontal
2. Ethmoid
3. Sphenoid
4. Maxillary

• Nasal cavity :

The nasal cavity has **a floor**, **a roof**, **a lateral wall**, **a medial or septal wall**.

◄ Floor

➢ : Formed by the palatine process of the maxilla (anterior ¾) and the palatine bones (posterior ¼) “Hard palate”.

◄ Roof

-Cribriform plate of ethmoid
Why it has lots of holes (العظمة الغربالية)(الغربال) مخرمة زي المنخل ? So that the olfactory nerves can get out through it to the brain
-Olfactory bulb where the olfactory nerves converge when they get out through the cribriform plate of ethmoid

Narrow, It is formed by :

➢ The nasal and frontal bones. (Anteriorly),
➢ Cribriform plate of the ethmoid (medially) it has holes in it, and sphenoid bones -
➢ For the fibers of olfactory nerve, located beneath the anterior cranial fossa. -
➢ Posteriorly by the downward sloping body of the sphenoid

◄ Medial wall

➢ Formed by the nasal septum.
➢ Divides the nasal cavity into right and left halves.
➢ It has osseous (bone) and cartilaginous parts.
➢ Nasal septum consists of the:
  ○ Perpendicular (vertical) plate of the ethmoid bone (superior).
  ○ Vomer (inferior).
  ○ Septal cartilage (anterior).

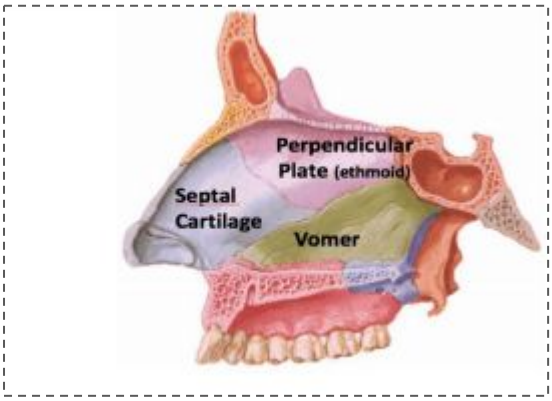
◄ Lateral wall

➢ Marked by 3 bony projections called turbinates or conchae.
➢ Inferior, middle, superior and sometimes supreme turbinates. On clinical examination you may only see 2 of them middle and inferior because the superior is high up;However you can see all of them by endoscope.

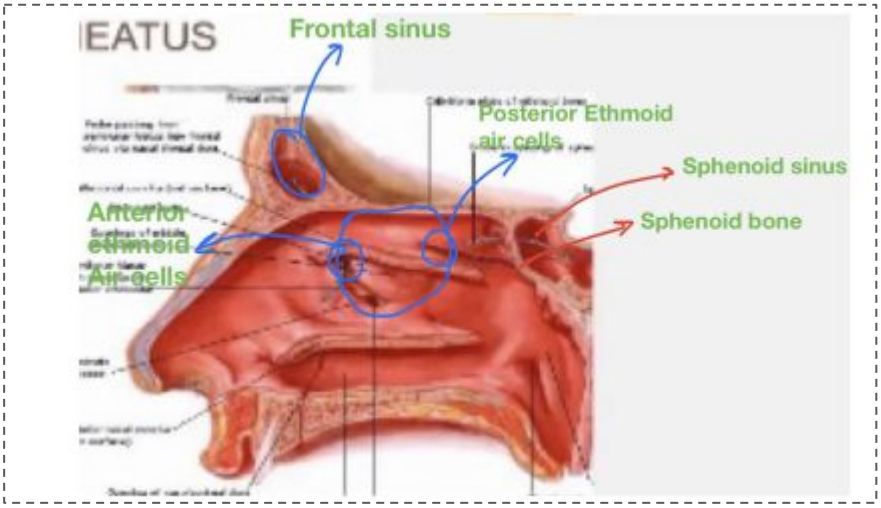
The inferior turbinate is considered as a separate bone, whereas the middle & superior turbinate are part of the ethmoid bone.

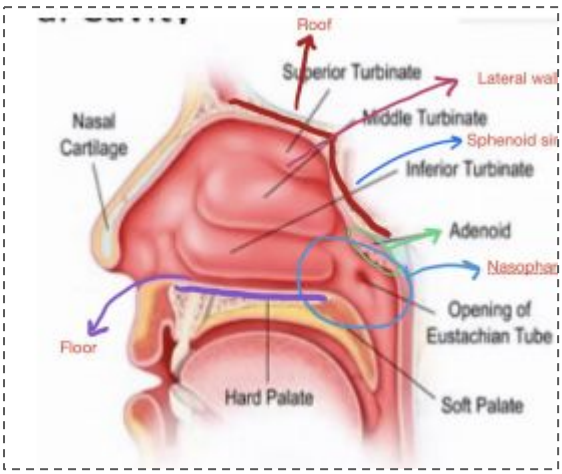
➢ There are spaces(meatus) separating the conchae from the bones. So the conchae are not directly attached to the bones.
➢ Each meatus receives the drainage of the sinuses
➢ Below each turbinates is the corresponding meatus and each meatus receive the opening of a paranasal sinus as follows: **important MCQs**
➢ **Inferior meatus**: The inferior meatus runs the whole length of the lateral wall. (The largest)
  ○ Receives the nasal opening of the nasolacrimal duct in its anterior part
➢ **Middle meatus**: Occupies the posterior half of the lateral wall, it is the most complex and by far the most important.
  ○ The ostia of maxillary, anterior ethmoidal, and frontal sinuses open/ drain into it.
➢ **Superior meatus**: Occupies the posterior one third of the lateral wall. The smallest, is the guide in sphenoid sinus surgeries, receives posterior Ethmoid air cells.
  ○ Contains the ostia of posterior ethmoidal sinus.
➢ Sphenoethmoidal recess: Lies behind the superior turbinate.
  ○ Receives the sphenoid sinus ostium.
  ○ Boundaries: **Medially**→septum. **Laterally**→superior turbinate.

Pictures :



Medial wall





- **Lining of the nasal cavity (mucus membrane) :**
- **Vestibule**:The most Anterior part which is lined by
  - Skin,
  - hair follicles (vibrissae) and sebaceous glands
- contains arteriovenous anastomosis warms the air passing through it. it's 0.5 to 1 cm , since it's lined by skin its protected from trauma , and any disease affecting the skin may affect it as well.
- **Olfactory region: upper ⅓ of the nasal cavity** contains mucous membranes rich in the neuroepithelium
- **Respiratory region: lower ⅔**
  - Mucous membranes which are highly vascular and contain erectile tissue.
  - Lined by pseudostratified ciliated columnar epithelium rich in goblet cells mucoperiosteum. Thick, spongy, highly vascular with Sub-mucosa rich in serous and mucous secreting glands.

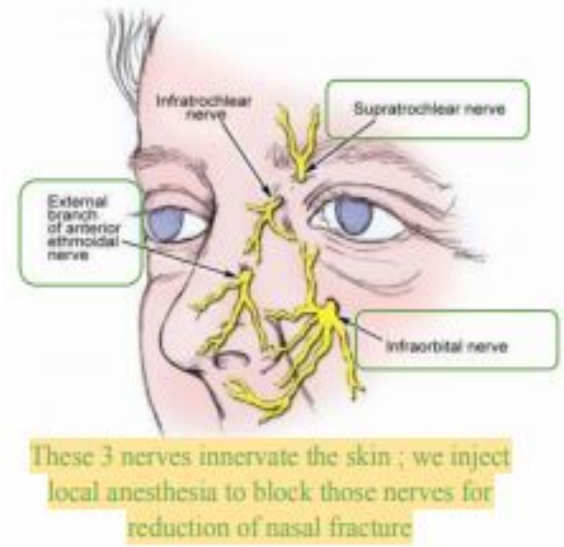
• Nerve supply to the nasal cavity :

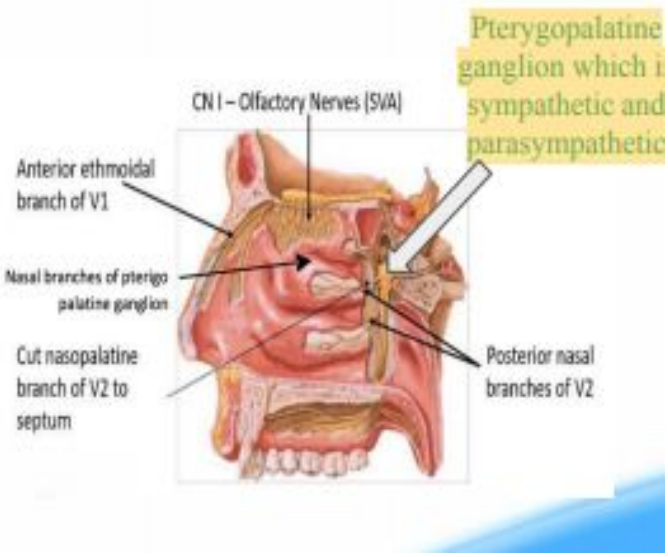
➢ Internal nose: contains the **olfactory nerve**, common sensation **(trigeminal)** and autonomic supply **(sphenopalatine ganglion)**
➢ External nose: **infraorbital nerve**, **infra-trochlear nerve** & **external nasal nerve**

1. **Olfactory nerves**
   a. Arranges in 12-20 nerves, From the olfactory mucous membrane ascend through the cribriform plate of the ethmoid bone and end in the olfactory bulb then goes to the brain.
2. **Common sensation (trigeminal)**
   a. The nerves of ordinary sensation are branches of the **ophthalmic division** (V1) and the **maxillary division** (V2) of the trigeminal nerve.
   b. Anterior ethmoidal nerves: anterior and superior part of the nasal cavity.
   c. Branches of the sphenoid ganglion: posterior ⅔ Of the nasal cavity.
   d. Branches of infraorbital nerve: supply the nasal vestibule.
3. **Autonomic supply**
   a. **Parasympathetic**: come from the greater superficial petrosal nerve and travel through the vidian nerve, causes vasodilatation and increase nasal secretions.
   b. **Sympathetic**: from the sympathetic chain, through superior cervical ganglion, travels in deep petrosal nerve through the vidian nerve

Generally the nerve supply of the nose comes from :
1. olfactory
2. ophthalmic division of trigeminal nerve (v1)
3. maxillary division of trigeminal (v2)

Nerves are also important in:
- referred pain: maxillary division (V2) supply upper teeth, you can differentiate between sinus pain and referred.
- local anesthesia for reduction of nasal fracture





-Pterygopalatine fossa communicates with the nasal cavity through the sphenopalatine foramen, which allows for the passage of the sphenopalatine artery (that's responsible for 80-85% of nasal cavity blood supply).
-Juvenile nasopharyngeal angiofibroma (JNA) is a highly vascular tumor that originates from the sphenopalatine foramen & cause mass effect in the pterygopalatine fossa.

• Blood supply to the nasal cavity :

➢ From branches internal and external carotid arteries.
➢ **Internal carotid**: Anterior & posterior ethmoidal arteries.
➢ **External carotid**: Facial (superior labial), maxillary (sphenopalatine & greater palatine).
➢ **Derivatives of external carotid artery: 2 branches (facial → maxillary)**

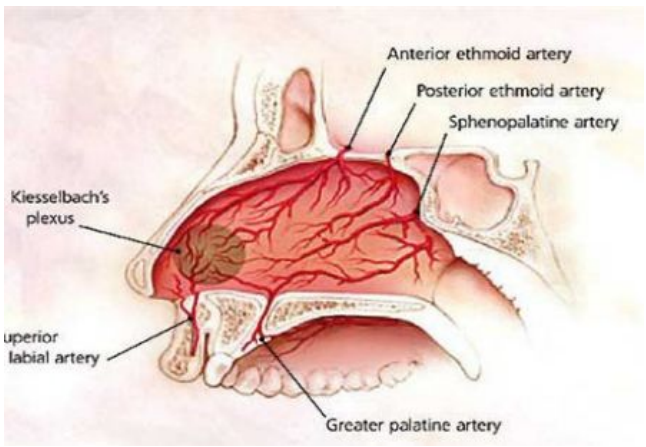
- **Sphenopalatine artery**: (the artery of epistaxis): from maxillary artery via the maxillary artery supplies the turbinates and meatus of the nose and most of the septum. It passes through the sphenopalatine foramen. (Important to know the 3 segments of the maxillary artery)
- **Greater palatine artery**: A branch of the maxillary artery contributes branches to the lateral nasal wall and (via the incisive canal) to the anterior part of the septum.
- **Superior labial artery**: A branch of the facial artery. It sends branches to the tip of the septum and the alae nasi. Its anastomosis with a branch of the sphenopalatine artery and the greater palatine artery forms.

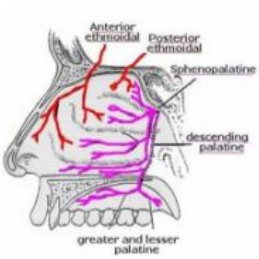
• Branches of internal carotid artery:

- Anterior and posterior ethmoidal arteries: branches of the ophthalmic artery.
- They supply the roof of the nose, anterior parts of the septum and lateral wall of the nose, and the ethmoidal and frontal sinuses.
- Bleeding from these vessels is seen above the level of the middle turbinate.

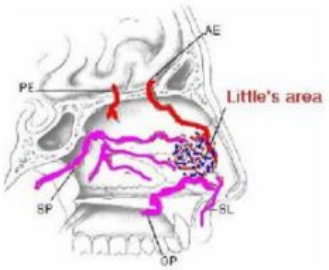
• **Kiesselbach's Plexus (Little's area)**: commonest area for anterior epistaxis
Little's area is a region in **the anteroinferior part** of the nasal septum, where there is confluence of 4 arteries (Is an area which formed by the terminal ends of 4 arteries) forming this plexus
Mnemonic (LEGS), These vessels are very fragile which can easily bleed -

- Septal branch of superior Labial artery.
- Anterior ethmoid artery
- Greater palatine artery
- Sphenopalatine artery





Lateral Wall



Nasal Septum

• Venous drainage of the nasal cavity :

The internal jugular and cavernous sinus (veins of the face don't have valves so any problem or infection will reach to the brain)

• Lymphatic drainage of the nasal cavity :

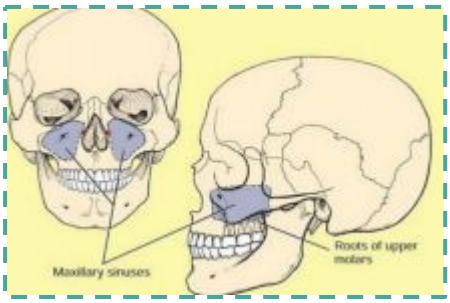
Drains in the submandibular, upper jugular, and retropharyngeal lymph nodes.

The Paranasal Sinuses

- The paranasal sinuses are cavities lined with mucoperiosteum & filled with air.
- Lining: Pseudostratified, columnar epithelium (respiratory epithelium) which is continuous with the nasal epithelium.
- Functions of the PNS: There are 4 pairs of 8 sinuses
    - Resonators of the voice, reduce the skulls weight, help warm and moisten inhaled air, & act as shock absorbers in trauma.
- When the apertures of the sinuses are blocked or they become filled with fluid, the quality of the voice is markedly changed.
- Blood supply: branches from external and internal carotid artery.
- Nerve supply: branches from trigeminal

Maxillary Sinus

- Antrum of Highmore = Maxillary sinus
- **Largest sinus, presents at birth**, occupy the body of the maxillary bone.
- Anteriorly related to the cheek. in kids when they have acute sinusitis they will have swelling of cheeks
- Posteriorly related to infratemporal & pterygopalatine fossae
- Medial wall is related to the nasal cavity. (middle turbinate)
- Floor is related to the palate. + teeth Some people may suffer from severe dental pain which may lead to extraction of all his teeth due to maxillary sinus tumor
- Roof is related to the orbital floor. Since some people have their molar teeth roots inside their maxillary sinus they may experience Oro-antral fistula and sinusitis after tooth extraction
- The maxillary sinus opens into the middle meatus of the nose.



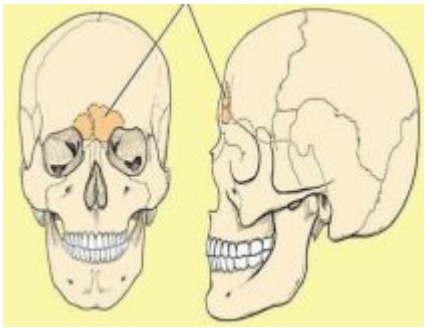
Frontal Sinus

- Between the anterior and posterior tables of the frontal bone in the supraorbital region.
- Varies in size and shape, often loculated and asymmetrical.
- 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.
- Opens into the middle meatus

Any disease in the frontal sinus may penetrate the posterior plate and reach frontal lobe of the brain.

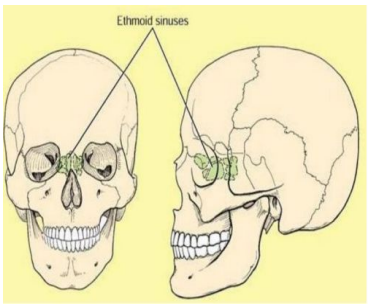
-If Frontal sinus affect the eye it pushes it downward -Orbit is below the frontal sinus ; so any problem in the frontal sinus may reach the eye.

-We usually have two frontal sinuses but they may be asymmetrical in size .However sometimes one of them may go into atresia and disappear



Ethmoid Sinuses

- Thin walled cavities, 3-18 cells. & Present at birth.
- They are contained within the ethmoid bone, between the nose & the orbit.
- Separated from the orbit by a thin plate of bone so that infection can readily spread from the sinuses into the orbit
- Anterior, middle and posterior groups.
  - Anterior & middle: open into the middle meatus.
  - Posterior: open into the superior meatus.
- Bordered by the medial wall of the orbit, the skull base and the middle and superior turbinates.



- ❑ Since the Orbit is too close to the Ethmoid sinus so any infection of the Ethmoid sinus may spread to the orbit.
- ❑ If the Ethmoid sinus affect the eye it pushes it laterally.
- ❑ Ethmoidal sinus is a group of cells lined by pseudostratified columnar epithelium mucous membrane, these cells are communicated with each other to eventually drain their secretions to the meatus.
- ❑ Anterior ethmoid sinus: high in cell number & small in size.
- ❑ Posterior ethmoid sinus: few in number & large in size.

Sphenoid Sinus

- Occupies the body of the sphenoid bone. Rarely symmetrical.
- Below sella turcica (extends between dorsum sellae and post clinoid processes).
- Relations: Laterally: the cavernous sinus containing:
  - Cranial nerves: 3rd, 4th, 6th and 5th (ophthalmic v1 and maxillary v2 divisions) imp in case the pt has a sphenoidal tumor they will present with symptoms of the nerve involved, the 6th it will the first affected nerve.
  - Internal carotid artery
  - Optic nerve.
- Above the sinus:
  - Pituitary gland, optic chiasm, frontal lobe of brain, and olfactory tract.
  - The pituitary gland may be approached surgically through the sinus
    - Sometimes patients with sinusitis of the sphenoid sinus may only present with abducent nerve paralysis (abnormal lateral gaze of the eye) because the abducent nerve is the nearest one to the sphenoid sinus so it's the first nerve to be affected .
    - As it progresses it may reach the other nerves as well.
    - So any infection or tumor of sphenoid sinus may reach the cavernous sinus and go to the brain causing meningitis

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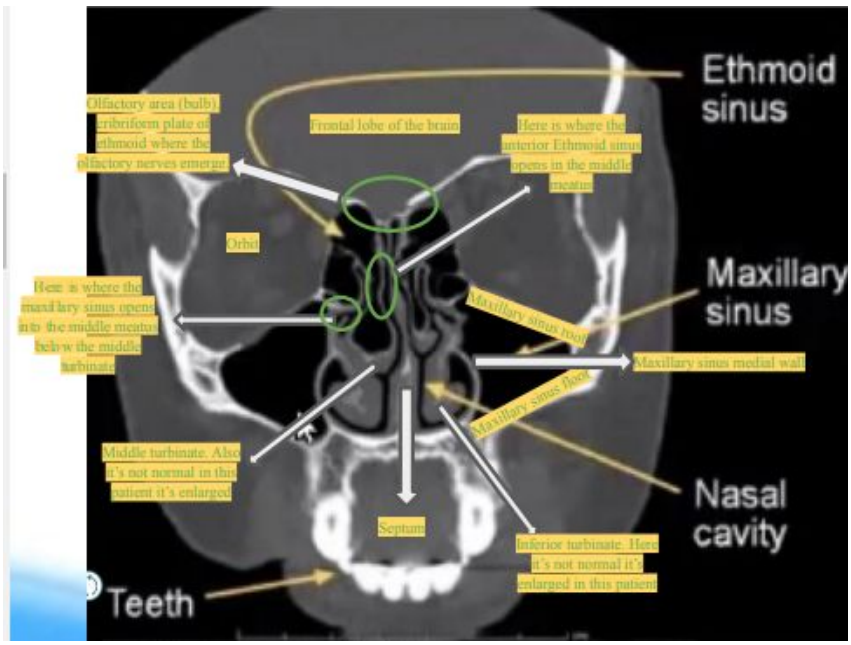
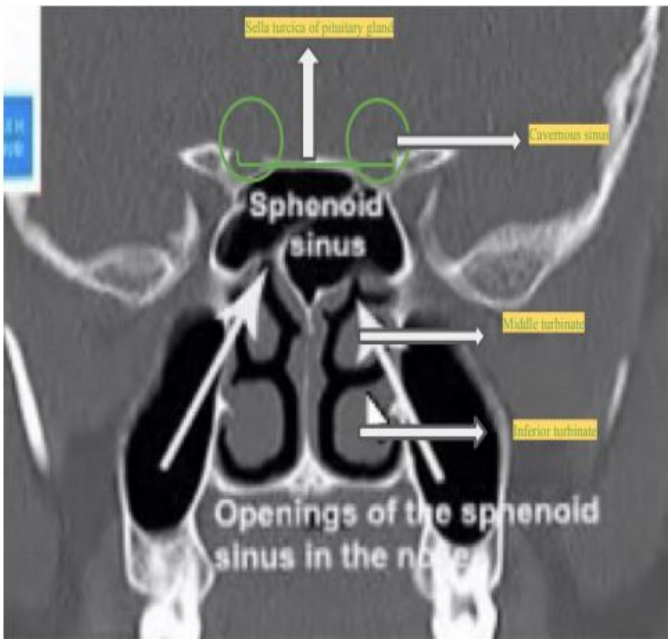




Physiology :

01 Respiration

- Newborns are obligate nasal breathers until age of three months.
- Choanal atresia

02 Air conditioning

- Filtration and purification: Through vibrissae (hair) and mucous secretions Mucous acts as a glue so particles stick on it. Moreover the mucous has lysosomes which kill the bacteria .
- Temperature: Controlled through the large area of the highly vascular mucosa which is full of venous sinusoids.
- Humidification: Controlled through the thickness of the nasal secretions
- Air Reaching the lungs through nose must always be at 37 degrees regardless of the external environment air whether it's cold or hot , this air also must be clean , moisturized , doesn't contain any allergens or microbes all these are the nose functions
- Sinusoidal blood vessels(big blood vessels) below the turbinates ; these vessels swell if the inspired air is cold to warm it , or shrink if the inspired air is hot to make it colder.

03 Protection

- Through the mucociliary mechanisms and the mucous blanket, protect From pollens , pollutions , chemicals and many others.
- Enzymes and immunoglobulins: lysozyme, IgA, and IgE Its function is to react during antibody-antigen reaction and kills microbes and organisms .
- Sneezing: Foreign and irritant materials initiate the sneezing reflex.
- The anterior most part of the nose (vestibule) lined by skin and has hair ; this hair prevents big particles for getting in .
-

04 Vocal resonance

- For phonating the constants M/N/NG

Continued ...

05

Nasal reflex

- Sneezing reflex
- Gustatory reflex: salivation when smelling food
- Noso-pulmonary reflex: increased pulmonary resistance associated with nasal obstruction

06

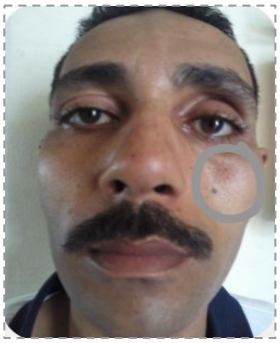
Absorbing shock Extra

- Sinuses act as shock absorbers during trauma since they are bags filled with air making the skull more flexible .

07

Contribute to facial growth Extra

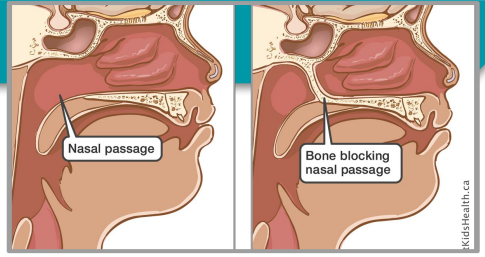
- Sinuses are important in facial growth . Adenoid faces patients has differently shaped nose and sinuses.
- Silent sinus syndrome their maxillary sinus has not been fully developed so one cheek will be smaller than the other .
- Silent sinus syndrome is a spontaneous, asymptomatic collapse of the maxillary sinus and orbital floor associated with negative sinus pressures. It can cause painless facial asymmetry, diplopia and enophthalmos.



08

- **Olfaction**
- **To taste**
- **Lightening the skull**

Choanal atresia



- **Definition:**
  - It is a congenital disorder where the posterior nasal apertures (choana) are blocked either by bone (most commonly) or soft tissue (membranous)
  - It leads to the absence of of communication b/w the posterior nasal cavity and the nasopharynx
  - Also known as atresia choanae
- **Embryology:**
  - Normally during embryological development, the nose is not open, it is filled with epithelial plug and later on this epithelium will regress.
  - If this regression of the epithelial plug is not completed → the posterior part will remain closed while the anterior part of the nose will open up leading to this disorder.
  - Newly born babies are obligatory nasal breathers until the age of 3 months, mouth breathing is a learning process so if the nose is blocked the baby might suffocate & die
- **Different classifications of choanal atresia:**

Type of tissue

- **Bony**
- **Membranous (**epithelium)
- **Mixed** (bone & epithelium) (most common)

Complete/incomplete

- **Complete unilateral** (most common)
- **Complete bilateral** (surgical emergency)
- **Incomplete unilateral**
- **Incomplete bilateral**

Unilateral/bilateral

Unilateral choanal atresia:

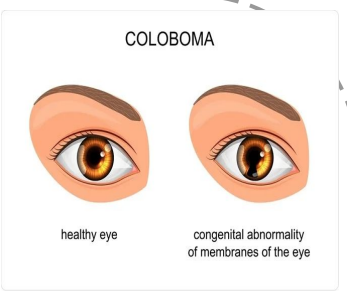
- Usually diagnosed late in life
- Unilateral is not so dangerous but must be recognized
- **Presentation:**
  - Unilateral nasal obstruction
  - Unilateral mucoid nasal discharge since birth
- **Treatment:**
  - Elective surgical repair

Bilateral choanal atresia:

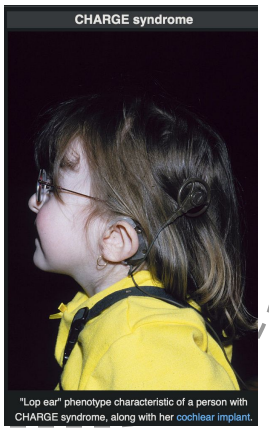
- Associated with CHARGE syndrome (explained in the next page)
- Bilateral is so dangerous the pt might die if we don't open his mouth (since newborns are obligatory nasal breathers)
- **Presentation:**
  - Presents at birth
  - Attacks of :
    - cyclic cyanosis
    - respiratory obstruction (relieved by crying)
    - nasal discharge

Choanal atresia (cont.)

CHARGE syndrome



- CHARGE syndrome was formerly known as CHARGE association
- It is a rare syndrome caused by a genetic disorder
- Associated with bilateral choanal atresia
- **CHARGE is an acronym that stands for:**
  - **C** → coloboma[1] of the eye
  - **H** → heart defects
  - **A** → atresia choanae (choanal atresia)
  - **R** → retardation of growth
  - **G** → genital and/or urinary abnormalities (genital hypoplasia)
  - **E** → ear abnormalities & deafness



1. Coloboma is used to describe conditions where normal tissue in or around the eye is missing from birth

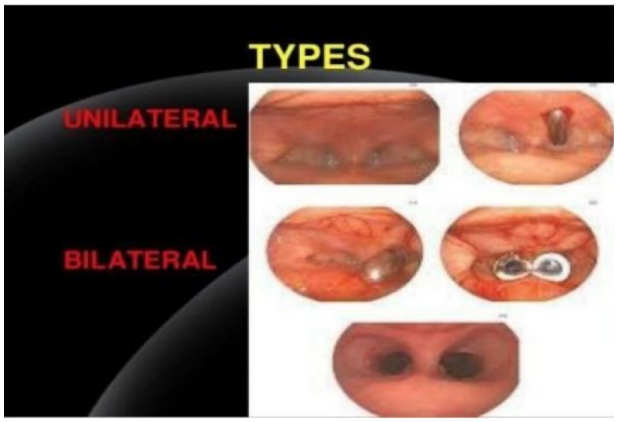
- **Diagnosis of choanal atresia:**
  - **Plastic catheter can't be passed through the nose (when the baby is delivered the pediatrician puts the catheter and if it passes → no choanal atresia)**
  - Posterior rhinoscopy (to see directly)
  - Total absence of nasal air flow (when putting your hand in front of the baby's nose)
  - Radiographs → we put a stain and notice that the stain is stuck in the nose and doesn't go to the nasopharynx (no clearance) (not done anymore)
  - Clinical examination → mirror test (hold a dental mirror at each naris to see if fogging occurs)
  - Inability to pass a catheter into the nasopharynx
  - CT scanning shows the atresia clearly

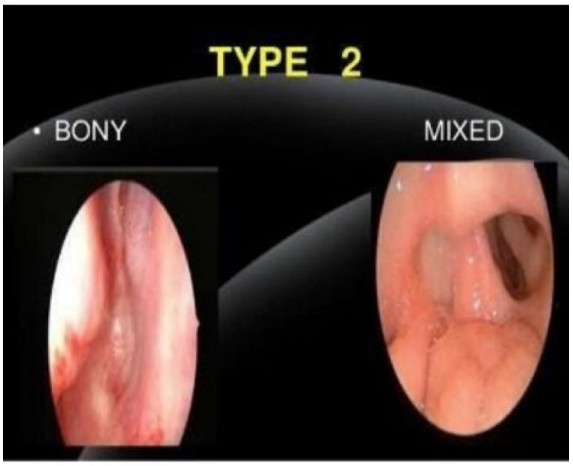
- **Management of choanal atresia: (EXTRA)**
  - Emergency immediate oral airway) put something to open the mouth (oral airway)
  - Transnasal perforation (if membranous choanal atresia)
  - Trans-palatal excision → removal of the nasal bone by drilling through the posterior part of the palate (not done anymore)
  - Surgery (endoscopic)
  - In bilateral it is an emergency, but unilateral is not an emergency and we can wait until the child gains weight then we do surgery
  - Definitive surgery – Done mostly endoscopicaly

Choanal atresia (cont.)

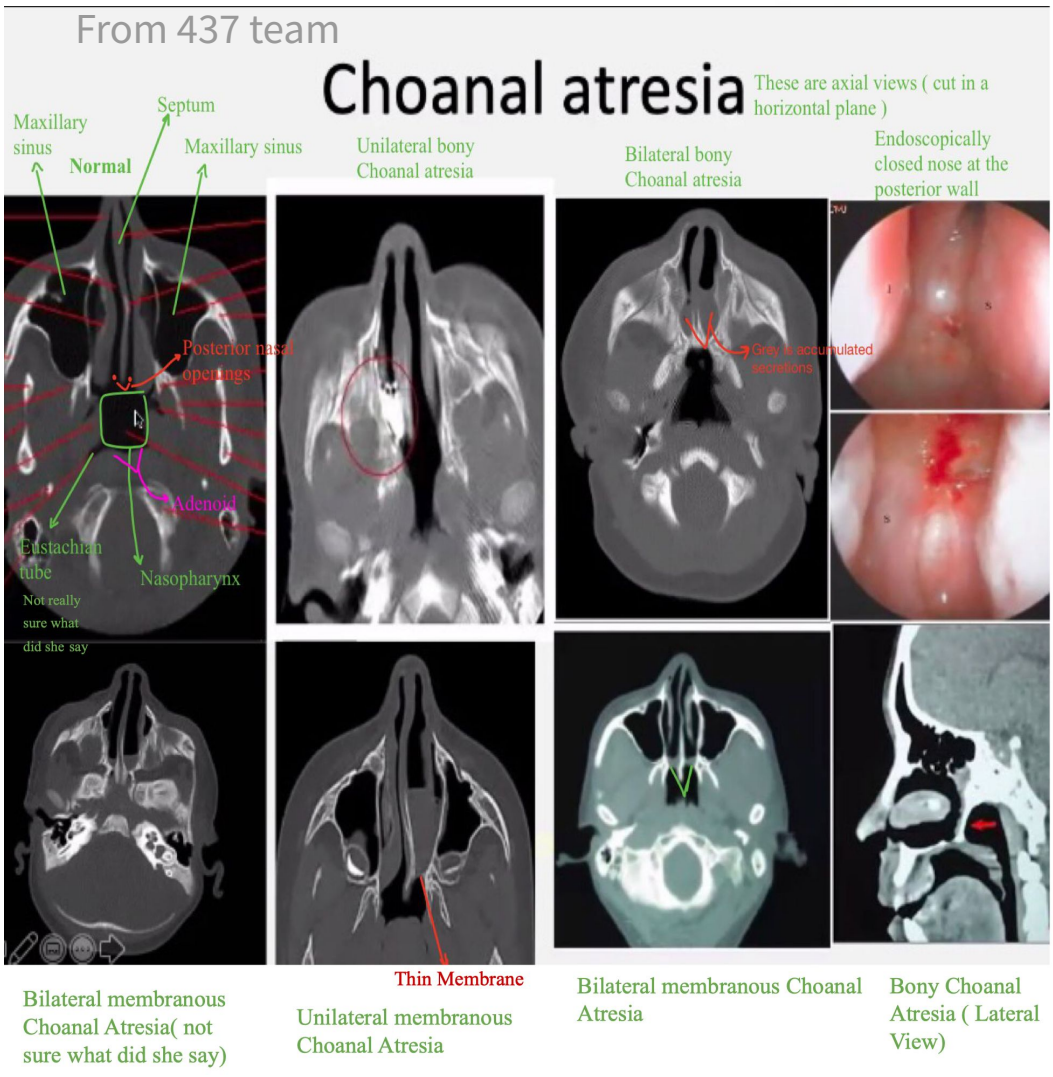
EXTRA page from team 437

- First row:
  - Left pic → normal, both are opened as you can see the nasopharynx
  - Right pic → unilateral choanal atresia
- Second row:
  - Left pic → bilateral choanal atresia
  - Right pic → here an operation was performed and stents were placed to keep it open
- Third row:
  - Both are open after the operation





- Left pic → this is the end of the nose by endoscope (it's closed)
- Right pic → left nostril is closed, it could be bone and membranous (right nostril is open)



Acute rhinitis

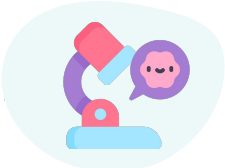
- **Definition :**
  - Rhinitis is inflammation of the inner lining of the nose
  - Acute rhinitis → lasting less than 4 weeks

- **Etiology:**
  - Viral (most common) → recovery in 3-10 days
  - Bacterial → double sickening, persists for more than 10 days or the symptoms get worse (e.g. headache, discharge changes from watery to thick yellow/greenish)
  - Fungal
  - The common cold (NOT INFLUENZA) is the result of viral infection most commonly caused by rhinovirus/coronavirus/adenovirus
  - Can be secondarily infected by bacteria (strep. Pneumo, s.aureus, H.influenzae, klebsiella pneumoniae, moraxella catarrhalis)
  - Can progress into acute bacterial rhinosinusitis
  - Influenza rhinitis is similar to common cold but with more constitutional symptoms

Symptoms

- Acute symptoms
- Burning sensation in the nose
- Nasal congestion
- Mucopurulent rhinorrhea
- Phlegm
- Fever
- Headache
- Fatigue
- Dryness of the nose
- Nasal obstruction
- Sneezing
- Hyposmia / anosmia
- Watery rhinorrhea
- Post nasal drip

Diagnosis



- Definitive diagnosis is by culture (whether it's viral or bacterial) but practically we don't do it always because it is costly & takes 2-3 days

Treatment

Supportive management

- Bed rest
- Analgesics
- Rehydration
- Decongestant
- Antipyretics (e.g. paracetamol)
- Vitamin C
- NO NEED FOR ANTIBIOTICS (because 95% of cases are viral)
- **Prophylaxis:**
  - Avoid contact with patients
  - Vaccination (in influenza rhinitis)

When are antibiotics indicated?

EXTRA

- Most of the times if the infection is acute (less than 4 weeks), non toxic pt (fever is less than 39), pt is not sick (young, healthy, fit, not immunocompromised, non diabetic etc), short period of infection, symptoms didn't get worse, no complications → DONT GIVE ANTIBIOTICS)
- **ANTIBIOTICS indications:**
  - Symptoms got worse
  - Complications → infxn spread to the eyes or to sinuses, discharge changed from watery to thick & yellow/greenish, headache)
  - A patient with medical issues)

Chronic rhinitis

- **Definition** EXTRA
  - Rhinitis is inflammation of the inner lining of the nose
  - Chronic rhinitis → rhinitis lasting more than 4 consecutive weeks

- **Etiology:** EXTRA
  - **Allergic** → antigen-antibody reaction (you must have IgE antibodies to a specific antigen)
  - **Non-allergic** → non immunological mediated reaction

Allergic rhinitis

- **Pathophysiology:**
  - Exposure to a particular allergen → susceptible individual produces reaginic antibody (IgE) → IgE binds to the surface of a mast cell (when mast cells are abound in nasal mucosa & when fixed to IgE molecules they are said to be sensitized) → further exposure to that specific allergen causes its binding to the IgE of the sensitized mast cell → leading to degranulation of the cell & release of histamine, slow-reacting substance, and vasoactive peptides → these substances cause vasodilation, increased capillary permeability and smooth muscle contraction, itching - the features of allergic airway disease
  - First time exposure to the allergen will not produce any symptoms, it will only sensitize mast cells so the second exposure will produce symptoms

- **Allergens:** EXTRA
  - **Seasonal allergens:**
    - Mold spores in autumn
    - Tree & grass pollen in spring
  - **Perennial allergens:**
    - Animal dander (especially cats) (some people have allergy from the saliva on their fur because they lick it all the time)
    - House dust mites (found on beds, lives on the skin of dead people. Some people have allergy not from the mite itself but from its feces)

Allergic rhinitis (cont.)

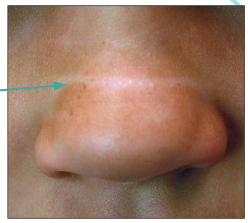
Signs & Symptoms

symptoms

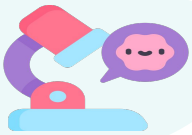
- Paroxysmal sneezing
- Nasal obstruction
- Watery rhinorrhea
- Itchiness of the nose, eyes, palate &/or throat

Signs

- Transverse nasal crease (due to rubbing the nose)
- Pale & bluish mucosa
- Swollen turbinates
- Allergic shiners (dark circles around the eyes)



Investigations



EXTRA

- **History** of symptoms related to allergen exposure
- **Skin testing** → forearm is pricked with the relevant allergen, a +ve response is a central weal with surrounding erythema
- **RAST** (radio-allergo sorbent test) → measures allergen-specific IgE & has the advantage of being performed on a blood sample (useful in children whom skin tests are unsuitable)
- **High total IgE** → indication of the presence of atopy

Treatment

- **Avoidance** of the allergen (main treatment)
- Intranasal **corticosteroids** (e.g. beclomethasone, flunisolide) → the most effective tx of nasal allergy (not advisable in young children) (used in both allergic & non-allergic rhinitis)
- **Anti-histamines** → useful in acute episodes but tolerance develops
- **Na cromoglycate**[1] → as prophylaxis, particularly suitable for children
- **Anti-cholinergics**
- **Vasoconstrictor nasal drops** → provide temporary relief, prolonged use leads to chronic rhinitis medicamentosa
- **Turbinate reduction** → if gross hypertrophy of the nasal mucosa has occurred
- **Sublingual immunotherapy** → if someone is allergic to cats & he wants to keep his cat, we inject him with pet dander or sublingual (like a vaccine). Its disadvantage (the allergy shot) takes a long time (5 yrs minimum). Only used in specific situations
- **Saline nasal spray**

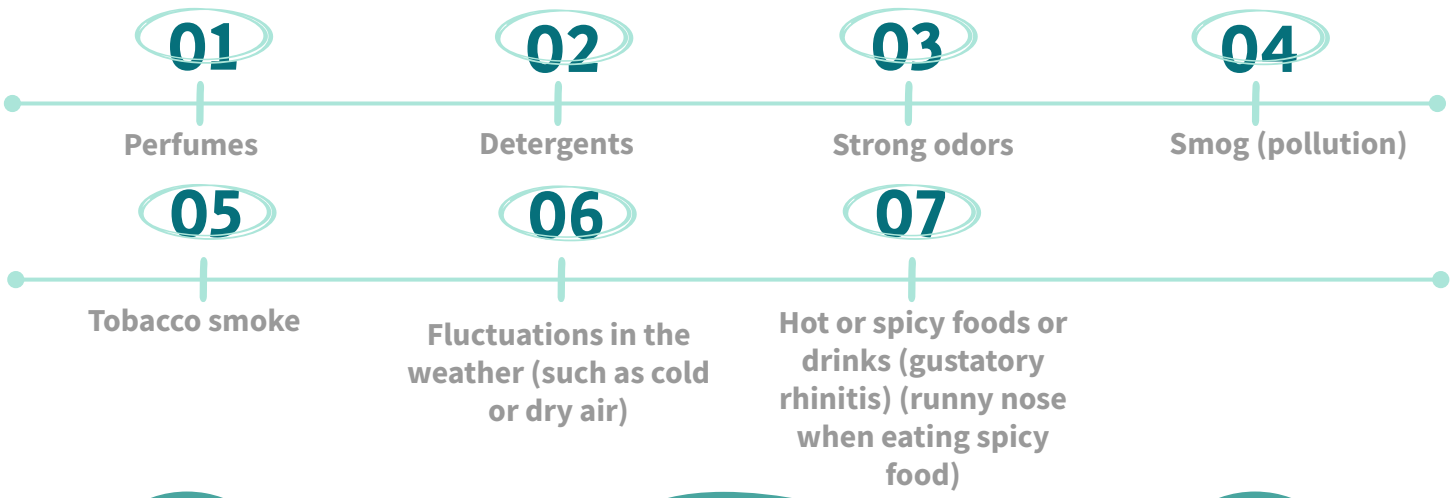
1. MOA → mast cell stabilizer (inhibits degranulation of mast cells preventing the release of histamine)

Non-allergic chronic rhinitis

- **Pathophysiology:**
  - less itching, reaction by triggered nerves / irritation to nerve endings
  - It is thought to occur when the blood vessels inside the nose expand → leading to swelling and congestion

- **Presentation:**
  - Similar symptoms to allergic rhinitis but in the absence of identifiable allergies with less itching & sneezing (itching is the hallmark of allergy)

- **Triggers:** → these triggers are irritants (could be occupation related)



Subtypes

- Idiopathic rhinitis
- Occupational rhinitis
- Drug-induced rhinitis
- Hormone-induced rhinitis. More in female
- Autonomic rhinitis (vasomotor)
- Atrophic rhinitis
- Systemic disease causing rhinitis

Medications causing non-allergic rhinitis

- Aspirin
- Ibuprofen
- Beta blockers
- Antidepressants
- Oral contraceptives (some women may have nasal congestion & obstruction when ingesting OCPs due to hormonal changes)
- Overuse of nasal decongestant spray (rhinitis medicamentosa)

Treatment:

- Avoid irritants
- Nasal wash
- INCS, antihististamines, oral decongenstants, topical anticholinergics, mast cell stabilizers, turbinate reduction can be considered

EXTRA page

Non-allergic rhinitis (cont.)

- **Rhinitis medicamentosa :**
  - Reversible or irreversible damaged mucosa caused by topically or systemically applied drugs is a condition caused by excessive use of nasal decongestants which causes rebound nasal congestion
  - NEVER EVER USE NASAL DECONGESTANT FOR MORE THAN 5 CONSECUTIVE DAYS!!!!
  - We usually tell pts to use them every 8 hrs for 3 days only
  - If used often, the nose (turbinate) becomes dependent on the decongestant
  - Muscles of the sinusoidal blood vessels will not contract on their own (only with decongestant)
  - Xylometazoline (brand name → otrivin) → is a nasal decongestant

- **Other causes of non-allergic rhinitis:**

1. Hormonal changes associated with pregnancy, menstruation, or thyroid conditions (hypothyroidism might cause rhinitis in a form of nasal congestion)
2. Stress → extensive sinus surgery (rhinitis due to excessive removal of tissue) (some people might experience nasal obstruction with stress)
3. Structural problems that affect the nasal passages, including:
   1- deviated septum
   2-enlarged turbinates
   3-enlarged adenoids
4. Gastroesophageal reflux (GERD) → sometimes GERD may cause irritation of the throat & might cause sinusitis
5. smoking
6. Spicy food

- If someone has enlarged turbinate (due to chronic sinusitis or allergy) and the doctor performed complete turbinectomy instead of partial turbinectomy he will develop **empty nose syndrome** & they will lose the defense mechanism
- **Empty nose syndrome:**
  - It is a form of secondary atrophic rhinitis
  - Syndrome where patients with clear nasal passages experience a range of symptoms:
    - Feeling of nasal obstruction
    - Nasal dryness
    - Crusting
    - Sensation of being unable to breathe

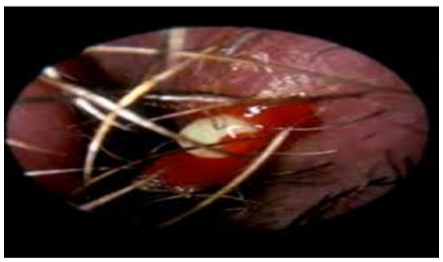
EXTRA

Allergic vs non-allergic rhinitis

symptoms	Allergic rhinitis	Non-allergic rhinitis
Runny nose	✔	✔
Nasal congestion	✔	✔
Itchy eyes, nose & throat[1]	✔	✖
sneezing	✔	✔
Post-nasal drip[2]	✔	✔
Cough (post-nasal drip causes cough)	✔	✔
headache	✔	✔
Bluish discoloration under the lower eyelids (allergic shiners)	✔	✖
Seasonal symptoms	✔	✖
Year-round symptoms	✖	✔

1. Symptoms of histamine release (itching is very important in differentiating allergic with itching from non allergic without itching) (histamine irritates nerves leading to itching)
2. The feeling of mucous moving down the back of the throat, 0.5L of nasal drip daily is normal, usually not felt unless it's large amount (during infections) or if it's thick not moist (during weather changes)

Furunculosis



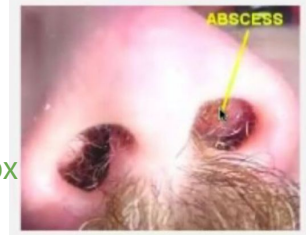
- **Definition :**
  - Acute infection of hair follicle of the nasal vestibule leading to abscess formation (vestibule is lined by skin, so any skin disease may affect it)
  - Causative organism → staph aureus
  - Small but very painful
  - Can lead to cavernous sinus thrombosis & blindness

- **Due to:**
  - Plucking nasal hair (vibrissae)
  - Excessive nose blowing
  - Picking the nose & nose piercing (trauma to the nose)
  - Viral infections (such as HSV or shingles)
  - Constant runny nose (e.g. allergens or viral infection)
- **symptoms:**
  - The tip of the nose becomes red, tense & painful
  - Very localized & painful
- **Complications:**
  - Local abscess
  - Spreading cellulitis
  - Cavernous sinus thrombophlebitis (risk of cavernous sinus thrombosis after squeezing the furuncle due to retrograde venous spread)
- **treatment:**
  - Give systemic abx without delay (preferably by injection)
  - Drainage may be necessary but should be deferred until the pt has had adequate abx treatment for 24 hours.
  - Avoid squeezing
  - Local application of heat Warm compressors
  - Topical abx (like fusidic acid 'fucidin®') + systemic abx
  - cleaning

Dangerous zone (triangle): upper lip, nose. Veins in this zone are valveless; so any infxn in that area may reach the brain

EXTRA 1

- Furunculosis complicates into abscess
- Treatment → incision & drainage + local & systemic abx



EXTRA 2

Here the infection spread into the cavernous sinus (bulging & frozen eyes, he can't move his eye) . has a very very high mortality


Figure 1: Picture of patient's eyes A. Before intervention after

EXTRA 3

- This pt progressed from A-D. he ends up with facial cellulitis (pic C) (very dangerous eye involvement)
- Tx → admit pt + IV abx + close observation.
- If this pt is not treated well, the infxn might reach the cavernous sinus

Vestibulitis

- **definition :**
  - Diffuse dermatitis of the nasal vestibule
  - Associated with runny nose
  - Usual causative organism ⟶ staph aureus
  - Always take a swab for culture & sensitivity

- **Clinical presentation :**
  - Habitual rubbing of the nose
  - Allergy
  - Rhinorrhea

- **Clinical presentation :**
  - Pain
  - Red, swollen, eroded & tender skin
  - Crusting & scaling of the skin
  - Sore & fissured skin

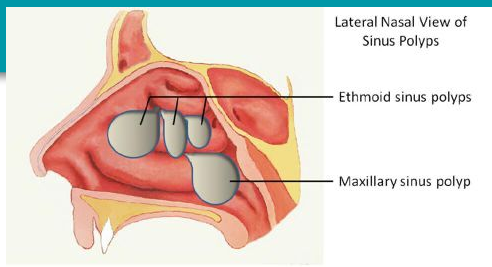
- **Treatment:**
  - Local cleaning
  - Local antibiotic-steroid ointments
  - Systemic flucloxacillin
  - Treatment needs to be prolonged

A case of a pediatric patient with no hx of infection or vestibulitis, foreign bodies have to be ruled out (pediatric, unilateral & foul smelling).
Foreign bodies can induce vestibulitis.

Furuncle	Vestibulitis
- حبة بالأنف صغيرة و تنرفز مرة - Very localized (around hair follicles) and painful - **Treatment**:Don't squeeze, Don't manipulate - Avoid nose picking (causes cross contamination) - Apply antibiotic like Fucidin, why? *imp this area is from the dangerous zone, so complications might happen like cavernous sinus thrombosis and blindness.	- Broader than furuncle - Like cellulitis but in the nose - **Treatment** is the same as furuncle + maybe you'll need oral antibiotics or IV antibiotics and admission (depends on the case)

Part of obj

Nasal polyps



- **Definition :**
  - Benign (non cancerous) growth of the mucosa of the nose
  - Nasal polyps are multiple unlike antrochoanal polyps (next page)
  - Nasal polyps have high recurrence rate

- **Etiology :**
  - Exact etiology is unknown
  - Allergy, usually bilateral & multiple, eosinophils & plasma cells in large amounts
  - Inflammation (i.e. infections)
  - Neoplastic (benign) (bleeding polyps of nasal septum/malignant)

- **classification :**
  - Simple nasal polyp (allergy, vasomotor, inflammatory, mixed (allergic-infective)
  - Fungal polyp
  - Malignant polyp

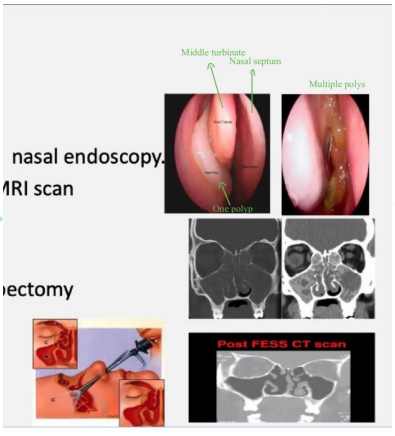
- **Site of origin :**
  - Ethmoidal polyp (most common site, mostly bilateral)
  - Maxillary sinus polyp is the 2nd most common site
  - Unilateral non antrochoanal polyp is a Red flag! It might be a tumor.

Symptoms

- Blocked nose
- Runny nose
- Postnasal drip
- Nasal congestion
- ↓ sense of smell
- Breathing through the mouth
- Sleep apnea
- Snoring
- Pain / headache (because there is no air in the sinus) → headache may also occur if there's sinus infection in addition to the polyp

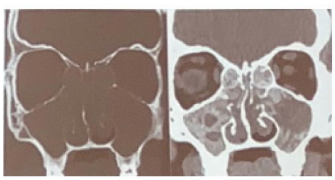
Diagnosis

- History of nasal obstruction
- Physical examination of the nose
- CT scan (to see where it extends)
- MRI
- Nasal endoscopy



Treatment

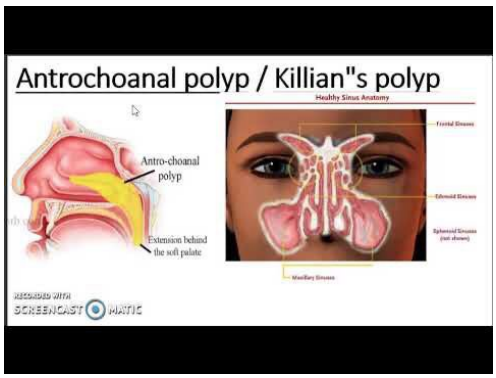
- Functional endoscopic sinus surgery (FESS)
- Surgery-polypectomy (done only in special situations)
- Medication (topical steroid therapy but will not usually disappear)



Part of obj

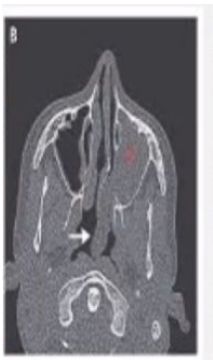
Antrochoanal polyps

- **Definition:**
  - Antro=maxillary sinus
  - Choana = posterior nasal apertures
  - Also known as killian's polyps
  - Antochoanal polyp (present from the nose going to the nasopharynx), when single called Antrochoanal polyp (Antral when multiple), but it's mostly single.
  - In general the ethmoidal and antrochoanal polyp are almost the same and have same management.
  - Antrochoanal polyps are benign polypoid lesions arising from the maxillary antrum & they extend into the choana (and to the oral cavity)
  - They occur more commonly in children & young adults
  - ALMOST ALWAYS UNILATERAL (important)
  - Unknown cause
  - Male more than female
- **Diagnosis:**
  - Nasal endoscopy
  - CT scan
  - How is it diagnosed? By examining the nose you'll see it at the posterior end of the nose unlike other polyps which are seen in the anterior nose or you can see it through the oral cavity
- **Treatment:**
  - Always surgical treatment
  - FESS (functional endoscopic sinus surgery) → we go inside the nose by an endoscope then we open the middle meatus of the middle turbinate and we reach the maxillary sinus and we remove it
  - NOT MEDICAL TREATMENT!!!!!!



X-ray of an antrochoanal polyp

Unilateral antrochoanal polyp during throat examination

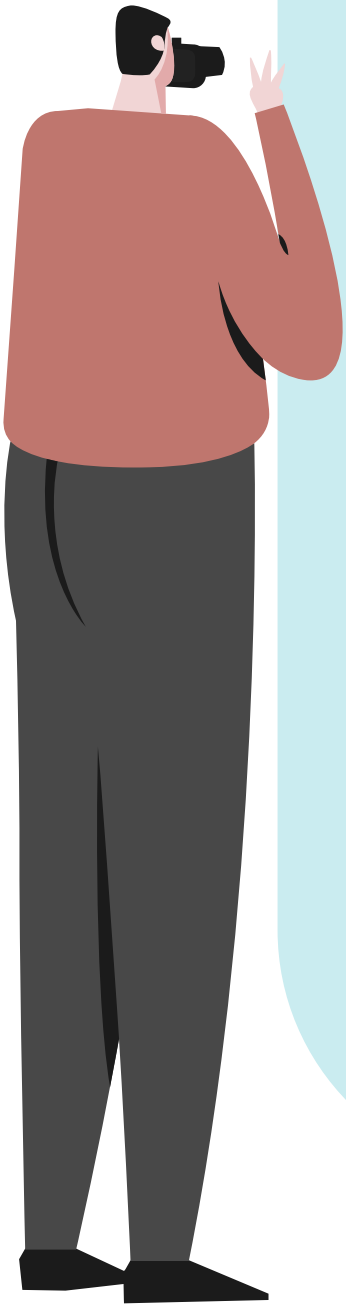


Axial view of antrochoanal polyp

Coronal view of antrochoanal polyp

A huge antrochoanal polyp

THANK YOU!



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