Nose I-II

Objectives:

- Anatomy of the external nose, nose, nasal cavity and paranasal sinuses.
- Physiology of the nose and paranasal sinuses.
- Blood and nerve supply of the external nose, nose, nasal cavity and paranasal sinuses.
- Functions of the nose and paranasal sinuses.
- Congenital anomalies.
- Choanal atresia.
- Acute & chronic rhinitis.
- Allergic & non-allergic rhinitis.
- Vestibular & furunculosis .
- Nasal polyps (allergic & antrochoanal) etc.
- Radiology illustration (e.g. CT scan)

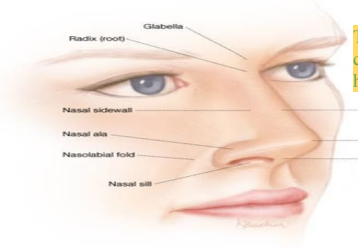
Resources: Doctor slides, 434, 436, 437A
Done by: Tareq Ahmed Alomaim, Alanoud Almansour, Nada Alobaid
Edited by: Abdulhakim Bin Onaiq, Reem Alqarni, Aseel AlMughaiseeb, Ebtesam Almutairi
Revised by: Rotana Khateeb, Sondos Alhawamdeh

[Color index: Important |F1|F2 | Extra]

Anatomy

Anatomy is important

External Nose



The bridge (dorsum) could be depressed or humped

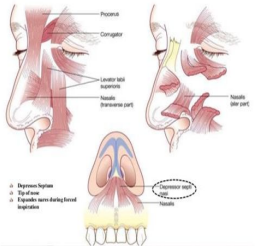
- Pyramidal in shape
- Root is up and base is down
- Consists of:
  1.Skin
  2.Musculature
  3.Osteo-cartilaginous Framework

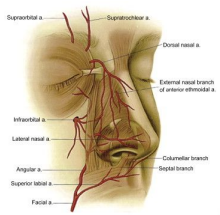
- **Surface Anatomy: Subunits**
  Dorsum (Bridge) - Tip - Columella - Side walls - Ale - Sil

- **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.

- **Skin**
  - 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.

- **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





- Blood Supply of external nose:
  - Dorsal nasal artery
  - Angular artery
  - Superior labial artery

- **Osteo-cartilaginous framework:**
- Bony and cartilaginous parts.
- Upper one third is bony and lower two thirds are cartilaginous.

1. **Bony part:**

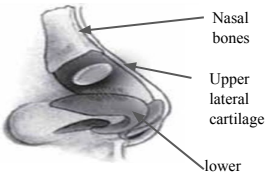
- Consists of two nasal bones that meets in the midline and rest between the frontal bone superiorly, and the frontal process of the maxillary bone infero-laterally.

2. **Cartilaginous part:**

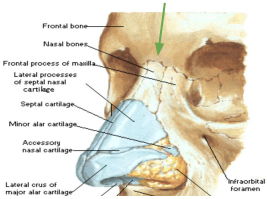
- Upper lateral cartilages
- Lower lateral cartilages (alar cartilages)
- Lesser alar cartilages
- Septal cartilage

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
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.
Lesser alar cartilages: AKA sesamoid cartilages	- Two or more small cartilages - Above and lateral to the alar cartilages - Interconnected by the adjacent perichondrium and periosteum.

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 is composed below of :
1/lateral nasal cartilage
2/ alar cartilages



Nasal part of frontal bone



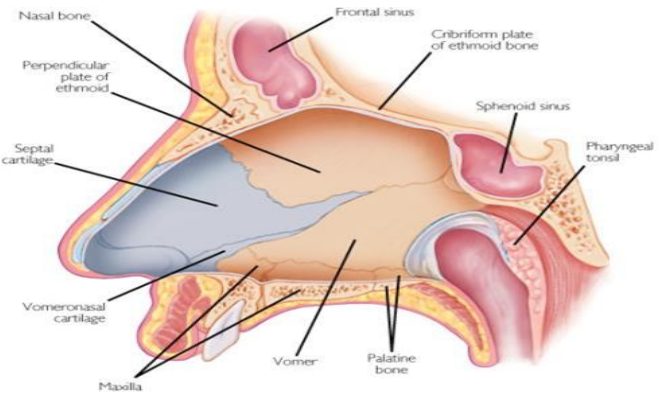
Internal Nose

- **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
    - Large quadrilateral cartilage
    - 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-lines 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.

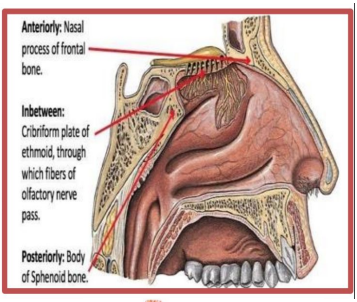


- **Nasal Cavity**
  - The nasal cavity has a floor, a roof, a lateral wall, a medial or septal wall.

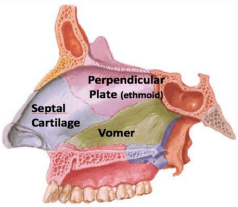
Boundaries of nasal cavity:

-Cribriform plate of ethmoid Why it has lots of holes مخرمة زي المنخل (الغربال)(العظمة الغربالية) ? 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

- **The Roof:** 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

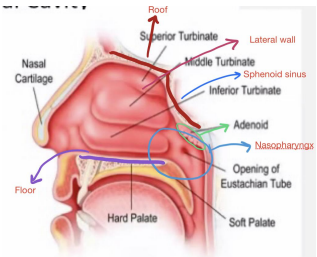


- **The Floor:** Formed by the palatine process of the maxilla (anterior ¾) and the palatine bones (posterior ¼) Hard palate.



- **The Medial Wall of Nasal Cavity:**
  - 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:

1. Perpendicular (vertical) plate of the ethmoid bone (superior)
2. Vomer (inferior)
3. Septal cartilage (anterior)



- **Lateral wall:** The most important wall of the nose is the lateral wall
  - Marked by 3 bony projections called **turbinates or conchae.** قرنيات
  - 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

- **Lateral wall cont. Very Important know the meatus and what do they receive !!!!!!!!**
- There are spaces(meatus)(فتحات) 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.

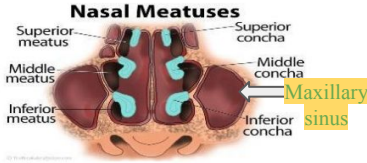
➢ The ostia of maxillary, anterior ethmoidal, and frontal sinuses open/ drain into it.

❖ Superior meatus: Occupies the posterior one third of the lateral wall. The smallest, is the guide in sphenoid sinus surgeries, Receives posterior Ethmmoid air cells.

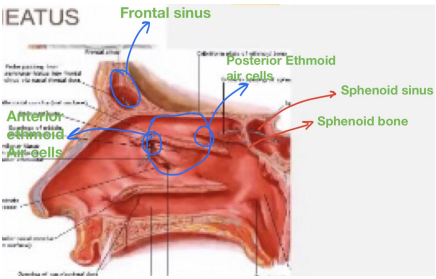
➢ Contains the ostia of posterior ethmoidal sinus.

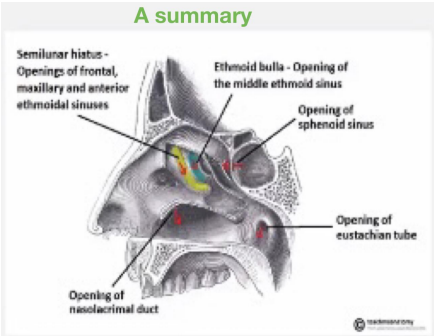
❖ Sphenoethmoidal recess: Lies behind the superior turbinate.

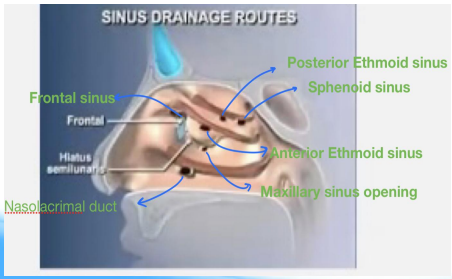
➢ Receives the sphenoid sinus ostium.



This is an anterior view as if someone is in front of you

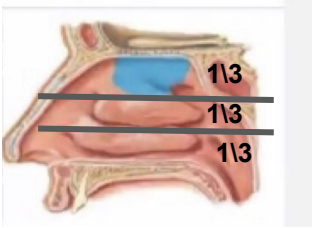






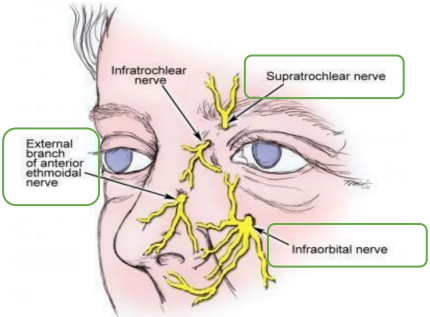
- **Lining of the nasal cavity (Mucous Membrane):**

- **Vestibule:** The Anterior most 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.
- **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.** the blood vessels under the turbinate are not small blood vessels they are sinusoidal (large)) منفخة



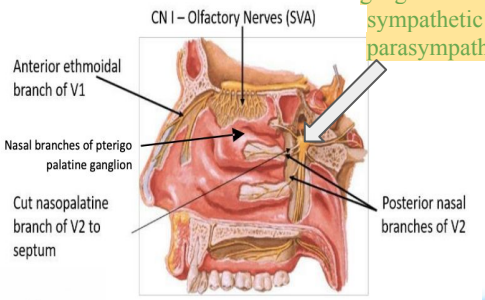
- **Nerve supply to the nasal cavity:**

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



These 3 nerves innervate the skin ; we inject local anesthesia to block those nerves for reduction of nasal fracture

Pterygopalatine ganglion which is sympathetic and parasympathetic

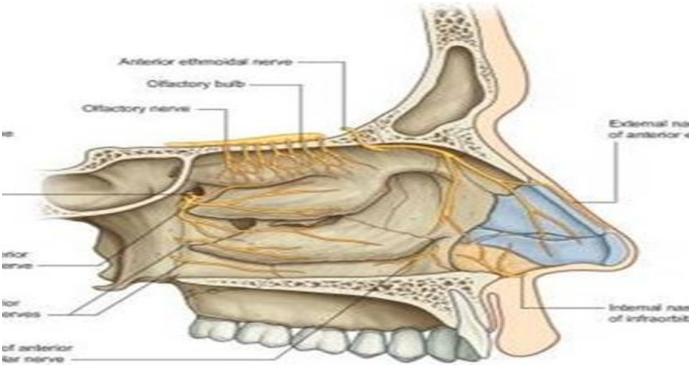


1. **Olfactory nerves**
    a. Arranges in 12-20 nerves, From the olfactory mucous membrane ascend through the cribriform plate of the ethmoid bone and end in the olfactory bulb then goes to the brain.
2. **Common sensation (trigeminal)**
    a. The nerves of ordinary sensation are branches of the **ophthalmic 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.

v2 و v1 تقول كل البرانشز الثلاث كلها جاية من

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

- **Blood supply of the nasal cavity:** imp for epistaxis
  - From branches internal and external carotid arteries.
  - **Internal carotid:** Anterior & posterior ethmoidal arteries.
  - **External carotid:** Facial (superior labial), maxillary (sphenopalatine & greater palatine). Doctor said the external nose (dorsal nasal artery, angular artery, superior labial artery) and the main blood supply of the internal nose (anterior and posterior ethmoidal arteries, sphenopalatine artery). The external supply are branches of the facial artery which is a branch of the maxillary artery
- **Derivatives of external carotid artery:** 2 branches (facial → maxillary)

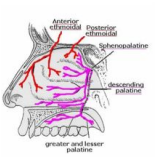
1. Sphenopalatine artery: (the artery of epistaxis): from maxillary artery via the maxillary artery supplies the turbinates and meatus of the nose and most of the septum. It passes through the sphenopalatine foramen. (Important to know the 3 segments of the maxillary artery)
2. Greater palatine artery: 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.
3. 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.
  a. They supply the roof of the nose, anterior parts of the septum and lateral wall of the nose, and the ethmoidal and frontal sinuses.
  b. Bleeding from these vessels is seen above the level of the middle turbinate.
- **Kiesselbach's Plexus (Little's area): commonest area for anterior epistaxis**

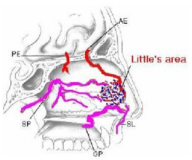
Little's area is a region in the anteroinferior part of the nasal septum, where there is confluence of 4 arteries (Is an area which formed by the terminal ends of 4 arteries) forming this plexus

Mnemonic (LEGS), These vessels are very fragile which can easily bleed

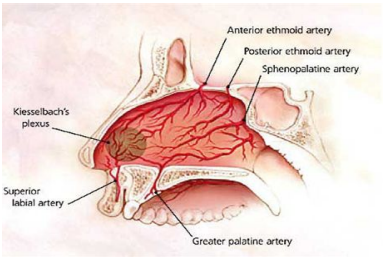
- Anterior ethmoid artery
- Septal branch of superior labial artery.
- Sphenopalatine artery
- Greater palatine artery



Lateral Wall



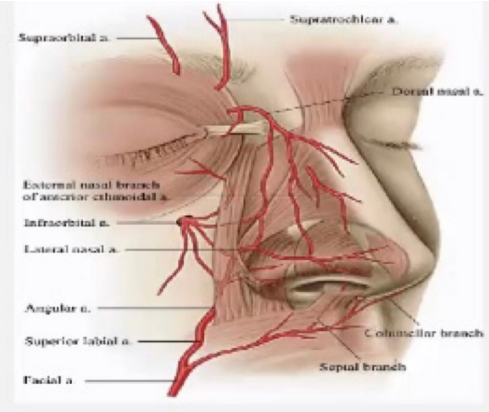
Nasal Septum

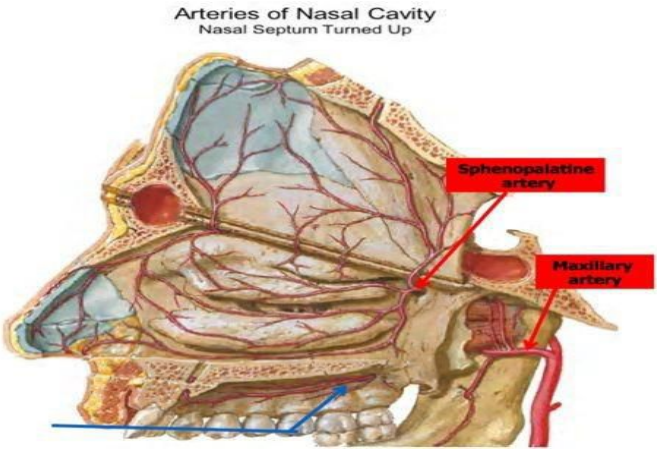


- **Venous Drainage:** The internal jugular and cavernous sinus veins of the face don't have valves so any problem or infection will reach to the brain

- **Lymphatic drainage of the nasal cavity:**

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



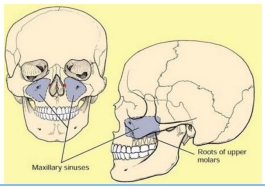


The Paranasal Sinuses

- 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

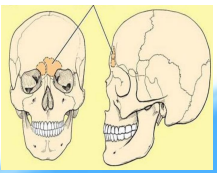
-Antrum of Highmore = Maxillary sinus
- Largest sinus, presents at birth, occupy the body of the maxillary bone.
- Anteriorly related to the cheek. in kids when they have acute sinusitis they will have swelling of cheeks
- Posteriorly related to infratemporal & pterygopalatine fossae
- Medial wall is 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

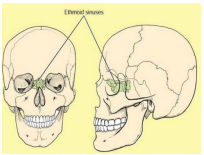
- Between the anterior and posterior tables of the frontal bone in the supraorbital region.
- Varies in size and shape, often loculated and asymmetrical.
- Separated from each other by a bony septum, each sinus is roughly triangular.
- Extending upward above the medial end of the eyebrow and backward 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.

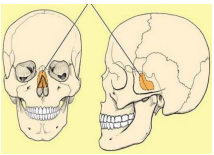


-Since the Orbit is too close to the Ethmoid sinus so any infection of the Ethmoid sinus may spread to the orbit.
-If the Ethmoid sinus affect the eye it pushes it laterally.
-Ethmoidal sinus is a group of cells lined by pseudostratified columnar epithelium mucous membrane, these cells are communicated with each other to eventually drain their secretions to the meatus.

Sphenoid Sinus

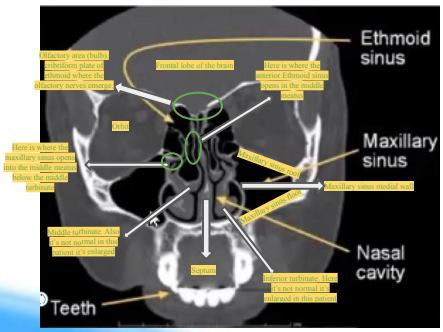
- Occupies the body of the sphenoid bone. Rarely symmetrical.
-Below sella turcica (extends between dorsum sellae and post clinoid processes).
- Relations: **Laterally:** the cavernous sinus containing:
  - Cranial nerves: 3rd, 4th, 6th and 5th (ophthalmic v1 and maxillary v2 divisions)
    imp in case 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.

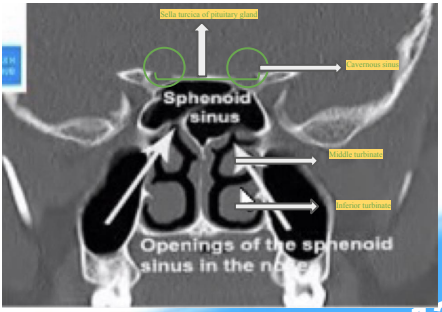
  Above the sinus:
  - Pituitary gland, optic chiasm, frontal lobe of brain, and olfactory tract.
  - The pituitary gland may be approached surgically through the sinus.

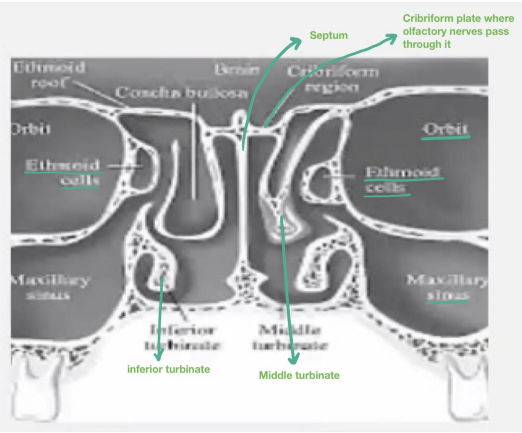


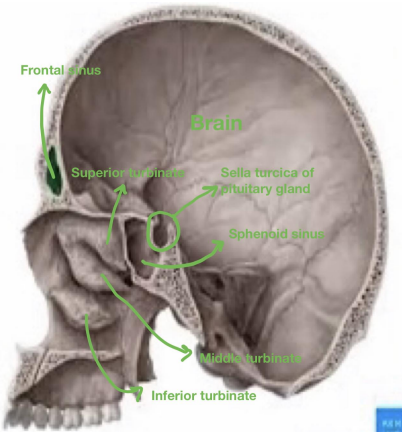
-Sometimes patients with sinusitis of the sphenoid sinus may only present with abducent nerve paralysis (abnormal lateral gaze of the eye) because the abducent nerve is the nearest one to the sphenoid sinus so it's the first nerve to be affected .As it progresses it may reach the other nerves as well .
-So any infection or tumor of sphenoid sinus may reach the cavernous sinus and go to the brain causing meningitis

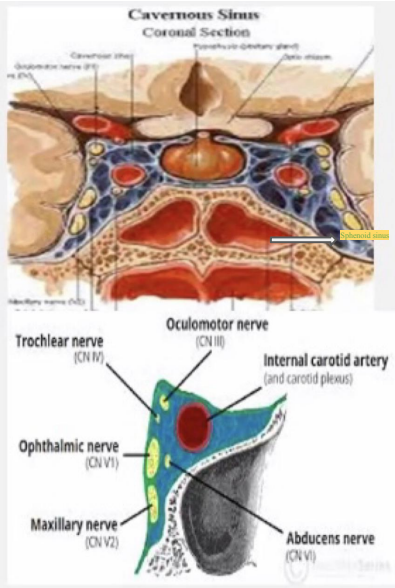
CT

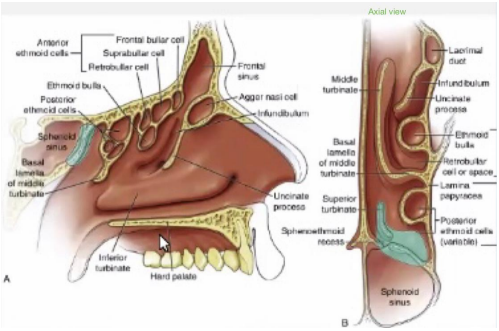





Septum
Cribriform plate where olfactory nerves pass through it
Ethmoid roof
Brain
Cribriform region
Concha bullosa
Orbit
Orbit
Ethmoid cells
Ethmoid cells
Maxillary sinus
Maxillary sinus
Inferior turbinate
Middle turbinate
inferior turbinate
Middle turbinate


Frontal sinus
Brain
Superior turbinate
Sella turcica of pituitary gland
Sphenoid sinus
Middle turbinate
Inferior turbinate


Cavernous Sinus
Coronal Section
Sphenoid sinus
Oculomotor nerve
(CN III)
Trochlear nerve
(CN IV)
Internal carotid artery
(and carotid plexus)
Ophthalmic nerve
(CN V1)
Maxillary nerve
(CN V2)
Abducens nerve
(CN VI)


Axial view
Anterior ethmoid cells
Frontal bullar cell
Suprabullar cell
Retrobullar cell
Frontal sinus
Ethmoid bulla
Agger nasi cell
Posterior ethmoid cells
Infundibulum
Sphenoid sinus
Basal lamella of middle turbinate
Uncinate process
Sphenoethmoid recess
Inferior turbinate
Hard palate
A
Lacrimal duct
Middle turbinate
Infundibulum
Uncinate process
Ethmoid bulla
Basal lamella of middle turbinate
Retrobullar cell or space
Lamina papyracea
Superior turbinate
Posterior ethmoid cells (variable)
Sphenoid sinus
B

Physiology

Respiration

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

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.

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 .

Vocal resonance

- ➔ For phonating the constants M/N/NG

Nasal reflex

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

Absorbing shock

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

Contribute to facial growth

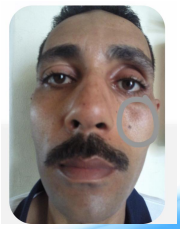
Sinuses are important in facial growth .
Adenoid faces patients has differently shaped nose and sinuses.
Silent sinus syndrome their maxillary sinus has not been fully developed so one cheek will be smaller than the other .

Olfaction

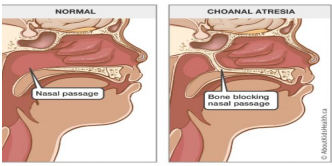
To taste

Lightening the skull Sinus function

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.



Choanal Atresia



Normally during embryological development the nose is not opened it's filled with epithelial plug ,eventually this epithelium will regress and the nose shape will form and the turbinates. Sometimes this regression process is not completed , and the posterior part will be closed while the anterior part is opened . in newly born babies they are obligatory nasal breathers until the age of 3 months,and mouth breathing is a learning process, so if the nose is blocked the baby may become suffocated and die

Atresia of posterior nares

❖ **Types:**

- Bony (most commonly), Membranous(Epithelium), Mixed(Bone and Epithelium).
- Complete unilateral (most commonly), Complete bilateral (surgical emergency), incomplete unilateral, Incomplete bilateral.
- Unilateral Choanal Atresia: Usually diagnosed late in life, presents by unilateral nasal obstruction and unilateral mucoid nasal discharge since birth, treatment is by elective surgical repair.Unilateral is not so dangerous but must be recognized.
- Bilateral Choanal Atresia: maybe linked to CHARGE association (Coloboma, Heart disease, Atresia, Retareded growth, Genital hypoplasia, Ear deformity), usually present at birth by attacks of cyclic cyanosis and respiratory obstruction and nasal discharge. If Bilateral it's so dangerous ,he might die if we didn't open his mouth ,since newborns are obligatory nasal breathers.

❖ **Diagnosis:**

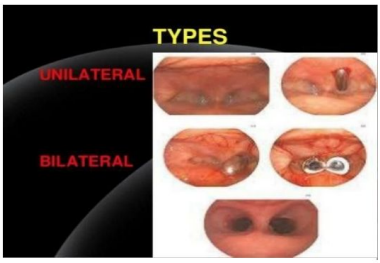
- ➢ Total absence of nasal air flow When putting your hand in front of baby's nose.
- ➢ In bilateral choanal atresia, the baby presents by attacks of respiratory obstruction and cyclic cyanosis
- ➢ Nasal discharge
- ➢ Plastic catheter cannot be passed through the nose, when the baby is delivered the pediatrician puts the catheter and if it passes > there is no atresia
- ➢ Post-rhinoscopy to see directly
- ➢ Radiographs we put a stain and notice that there is no clearance (stuck in the nose and doesn't go to the nasopharynx) not done any more.
- ➢ Clinical examination: mirror test
- ➢ Emergency
- ➢ Transnasal perforation
- ➢ Trans-palatal excision(Removal of the nasal bone by drilling through the posterior part of the palate (not done anymore).

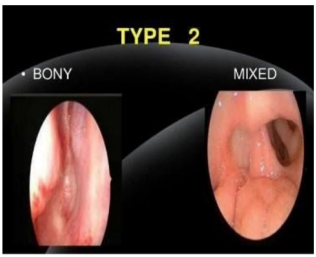
Choanal Atresia

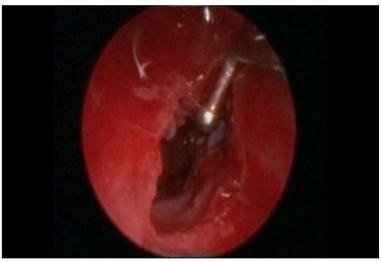
❖ **Management:**

- ➢ Put something to open the mouth (oral airway)
- ➢ Perforate it If membranous (transnasal perforation)
- ➢ Surgery (endoscopic)
- ➢ In bilateral it is an emergency, in unilateral it is not an emergency and we can wait until the child gains weight then we do surgery.

First row :
Left pic:Normal both are opened as you can see the nasopharynx.
Right pic:unilateral Choanal atresia .
2nd row:
Left pic:Bilateral Choanal atresia.
Right pic:Here an operation was performed and stents were placed to keep it opened.
3rd row:Both are opened after the operation.





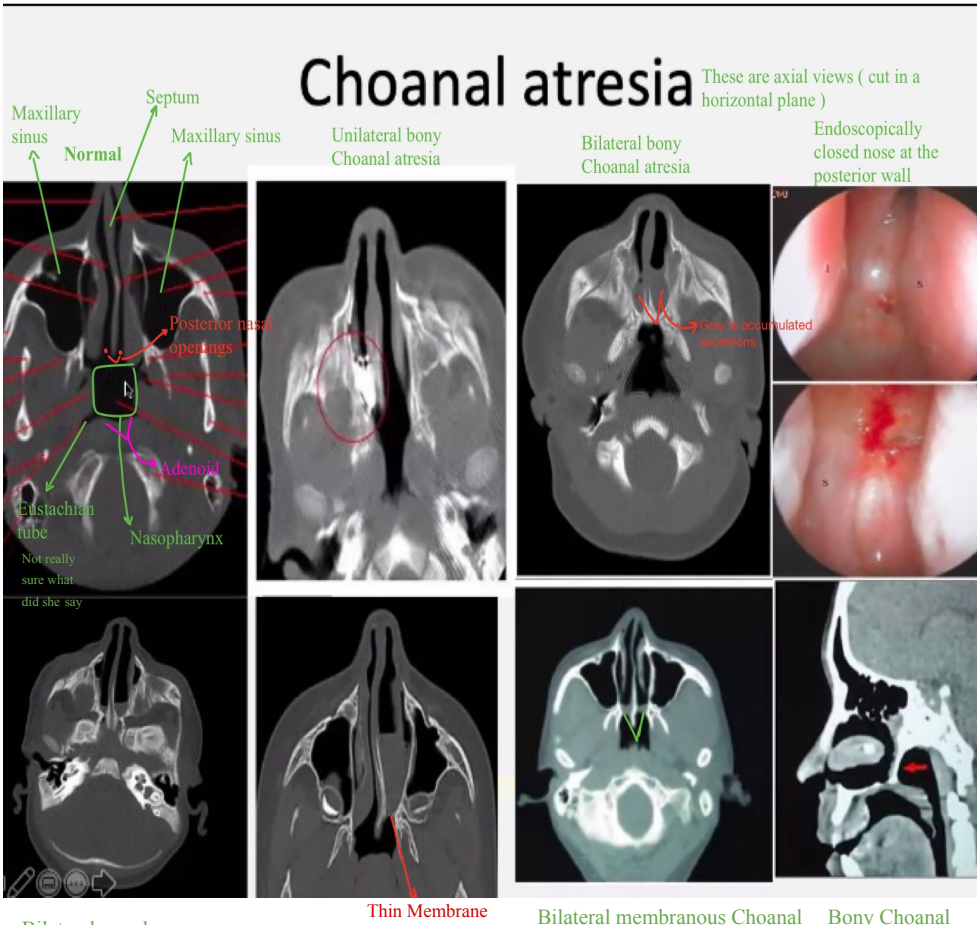


Left pic:This is the end of the nose by endoscope (it's closed)
Right pic:
Left nostril is closed it could be bone and membranous
Right nostril: is opened.

This is during the surgery we're opening it

Choanal Atresia

In Doctor's slides F1



Bilateral membranous Choanal Atresia(not sure what did she say)

Unilateral membranous Choanal Atresia

Bilateral membranous Choanal Atresia

Bony Choanal Atresia (Lateral View)

Acute Rhinitis

Rhinitis is very important

- Rhinitis is the inflammation of the inner lining of the nose
- Acute Rhinitis: Lasting less than 4 weeks.
- Etiology: Viral, bacterial and fungal.
- most commonly viral and the treatment is supportive(like analgesics and decongestant)no need for antibiotic, definitive diagnosis is by culture(whether it's viral or bacterial)But practically we don't do it always because it's costly and takes 2-3 days .
- but clinically most viruses will go in 3-10 days, but bacterial: persists for more than 10 days or the symptoms gets worse, e.g. headache, discharge change from watery to thick yellow\greenish
- The common cold (not Influenza)is the result of viral infection, but secondary bacterial infection may supervene.
- It's the most common viral infection in humans caused by (Rhinovirus/Coronavirus)
- It is self-limiting and no treatment is required other than an antipyretic, such as paracetamol.
- Clinical presentation: Acute symptoms
    - Burning sensation in the nose, nasal congestion, mucopurulent rhinorrhea Phlegm, fever, headache, fatigue, dryness of the nose, nasal obstruction, sneezing, hyposmia or even anosmia and watery rhinorrhea. (Runny nose) +post nasal drip + secretions
- Can be secondarily infected by bacteria (Strep pneum, Staph a., H.Inf, Kleb. Pneum, M.Catarrhalis)
- Can progress into acute bacterial rhinosinusitis.

Acute Rhinitis

- Treatment:
  - Prophylactic: Avoid contact with patients & vaccination.
  - Therapeutic: Rest, analgesics, and decongestants.+Vitamin C + Antipyretics
  - Antibiotics are rarely given because in 95% of the cases it's viral.
  - So must of the times if the infection is : Acute(less than 3 weeks),Non toxic patient (his fever is less than 39) , Patient is not sick (young , healthy , fit , not immunocompromised,non diabetic), Short period infection , Symptoms didn't get worse, No Complications . Don't Give Antibiotic!!
  - So don't give antibiotics unless(antibiotics indications):
  - 1/ Symptoms got worse
  - 2/Complications (infections spread to the eye or to sinuses , discharge change from watery to thick yellow\greenish,headache) .
  - 3/ A patient with medical issues

- Influenza rhinitis:

- Influenza A, B, C viruses
- Similar symptoms of common cold but with more constitutional symptoms.
- Same management
- Role of influenza vaccine.

Chronic Rhinitis

- ❖ Rhinitis is the inflammation of the inner lining of the nose
- ❖ Chronic Rhinitis: more than 4 consecutive weeks.
- ❖ Etiology: Allergic & non-allergic

Broadly Rhinitis is divided into Allergic and non Allergic Rhinitis.
-Allergic Rhinitis :is Antigen-Antibody Reaction (Immunological Reaction) (you must have antibody to a specific antigen).
-Non Allergic Rhinitis : non immunological mediated reaction.

Allergic Rhinitis

Allergic Rhinitis is an immunological reaction (Antigen-Antibody Reaction) . If someone's immune system doesn't like a specific type of allergen, once he's is exposed to that allergen initially nasal defense mechanism (such as hair which prevents big particles from getting inside ,mucosa cells will produce lysosomes)will start to fight but will fail so that allergen will get inside and be in contact with nasal mucosa ,mast cells are the guardian immune cells present under the mucous membrane . The first time you'll not experience any symptom ; because these mast cells took part of that allergen and will introduce it to memory cells. During the Second exposure the cells will recognize this antigen and start to fight it with the antibodies that was formed during the first exposure, and you'll start experiencing symptoms like sneezing trying to expel this foreign body , Secretion also has lysosomes which will fight and expel it out ,Sinusoidal blood vessels will swell to prevent this allergen from entering the lungs .(75% of people with allergic rhinitis may develop asthma)

- In allergic rhinitis, allergens present in the air bind with immunoglobulin E (IgE) in the nose. The body releases histamine resulting in allergic rhinitis symptoms.
- Could be seasonal or perennial.

Chronic Rhinitis

Allergic Rhinitis

Pathophysiology: if the particles gets to the mucosa, the body produces antibody to prevent to from going to the lungs, the complex causes histamine release, causing vasodilation, increase secretions(rhinorrhea), itching
The main function of the nose is to prevent any harm from reaching the lungs.

- Common **allergens** that can lead to chronic rhinitis include:
  - ➢ Ragweed (type of a tree), pollen, mold, & dust mites (العث Found on beds, live on skin of dead people. Some people have allergy not from the mite itself but from its feces)
  - ➢ Pet dander (dogs & cats) (Some people have allergy from saliva on their fur because they always lick it)& cockroach residue
- **Clinical presentation:** paroxysmal sneezing, nasal obstruction, watery rhinorrhea, itchiness of the nose, eyes, palate and/or throat.
- **Signs**: transverse nasal crease, pale and bluish mucosa, swollen turbinates and allergic shiners (dark circles around the eye).
- **Treatment:**
  - ➢ Avoidance of the allergen (if known)(is the main treatment)
  - ➢ Medications (Intranasal corticosteroids, antihistamines "local and systemic", Anticholinergics, Na cromoglycate), turbinate reduction and immunotherapy

Chronic Rhinitis

- Chronic Rhinitis: more than 4 consecutive weeks.
- Etiology: Allergic & non-allergic

Non-Allergic Rhinitis **No itching reaction by triggered nerves \ irritation to nerve endings**

-Its thought to occur when the blood vessels inside the nose expand. This leads to swelling and congestion. Similar symptoms of allergic rhinitis, but in the absence of identifiable allergies with less itchiness and sneezing. (doesn't involve the immune system) (itching is the Hallmark of Allergy).

- The reaction may be **triggered** (these triggers are irritants): Perfumes, Detergents, Strong odor, Smog(pollution), Tobacco smoke, Fluctuations in the weather such as cold or dry air, Hot or spicy foods or drinks (gustatory rhinitis)(Runny nose when eating spicy food.)

- Subtypes: Idiopathic Rhinitis, Occupational Rhinitis, Drug-induced Rhinitis, Hormone-Induced Rhinitis, Autonomic Rhinitis (Vasomotor), Atrophic Rhinitis, Systemic diseases causing rhinitis.

- **Medications** include:
  - Aspirin, ibuprofen, Beta-blockers, Antidepressants & Oral contraceptives(These medications may cause Rhinitis)Some women may have nasal congestion and obstruction when ingesting oral contraceptives due to hormonal changes.
  - Overuse of nasal decongestant spray **(rhinitis medicamentosa):very important**
    - Reversible or irreversible damaged mucosa caused by topically or systemically applied drugs is a condition **caused by excessive use of nasal decongestants causes rebound nasal congestion. Never ever use Nasal decongestant for more than 5 days . We usually tell patients to use them every 8 hours for 3 days only .The nose (turbinate) becomes dependant on the decongestant**, صارت ماتفتح بدون الدوا Otrivin is a nasal decongestant. Muscles of sinusoidal blood vessels will not contract on their own (only with the decongestant).
    - Mucosal swelling:(Acetylsalicylic Acid/OCP/beta-blocking drugs)
    - Dryness of the nasal mucosa (**Atropine**/belladonna preparations/steroids/imidazoline/catecholamine derivatives)
  - Hormonal changes associated with pregnancy, menstruation, or thyroid conditions(Hypothyroidism might cause Rhinitis in a form of nasal congestion).

Chronic Rhinitis

Non-Allergic Rhinitis

- Stress Extensive sinus surgery (Rhinitis due to excessive removal of tissue) .Some people may experience nasal obstruction with stress
- Structural problems that affect the nasal passages, including a deviated septum, enlarged turbinates, and enlarged adenoids.
- Gastrointestinal reflux (GERD)(Sometimes GERD may cause irritation of throat and some studies showed that it may cause sinusitis), asthma, or chronic sinusitis.
- smoking
- 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 and they will lose the defense mechanism.Empty nose syndrome (ENS), one form of secondary atrophic rhinitis, is a clinical syndrome in which people who have clear nasal passages experience a range of symptoms, most commonly feelings of nasal obstruction, nasal dryness and crusting, and a sensation of being unable to breathe.

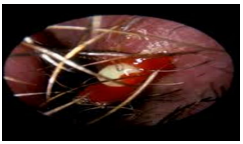
Treatments: Addressing the cause of possible. Involve a combination of medication, lifestyle changes & surgery: (Chronic Rhinitis may lead to swelling of the turbinates where surgery is indicated. Surgery also indicated if there is nasal polyp.)

- Saline nasal sprays, decongestants(for not more than 3 days), antihistamines , corticosteroid nasal sprays (Corticosteroids nasal sprays Locally working on nasal mucosa used in allergic and non allergic rhinitis because they are anti inflammatory) and mast cell stabilizers ,sublingual immunotherapy for allergies(If someone is allergic to cats and he wants to keep his cat we inject him with pet dander or sublingual (like a vaccine). Its disadvantage (the allergy shot) takes long time(5 years minimum). Only used is specific situations)and turbinate reduction

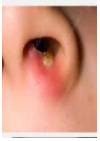
To confirm that someone has an allergy we perform skin test اختبار الجلد
(we inject small amount of the allergen under the skin and we see how the body reacts to it ;if he developed a wheel in a specific size then he is allergic).

Symptoms	Allergic Rhinitis	Non-Allergic Rhinitis
Runny Nose	✓	✓
Nasal Congestion	✓	✓
Itchy eyes, nose & throat (histamine) Itching is very important in differentiating allergic with itching from non allergic without itching	Why itching because Histamine released during allergy irritates the nerves ✓	Non allergic No itching (No Histamine Release)
Sneezing	✓	✓
Post-Nasal Drip (The feeling of mucous secretions moving down the back of the throat) 0.5 liter of nasal drip daily (normal) usually is not felt unless it's large amount (during infections) or if it's thick not moist (during weather changes	✓	✓
Cough(Post nasal drip causes cough)	✓	✓
Headaches	✓	✓
Bluish discoloration under the lower eyelids (allergic shiners)	✓	
Symptoms tend to be seasonal	✓	
Symptoms tend to be year-round		✓ Always present

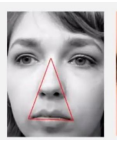
Furunculosis



- **Acute infection of hair follicle of the nasal vestibule**(Vestibule is lined by skin ; so any skin disease may affect it)**by Staph a.**
- Small but very painful.
- **Due to:**
  - Plucking nasal hair نتف الشعر) (virissae), excessive nose blowing, picking nose and nose piercing. (Trauma to the nose)
  - Viral infections, such as herpes simplex or shingles
  - Constant runny nose, eg; allergens or viral infection

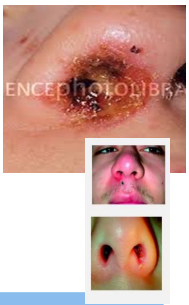


Localized furunculosis



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

Vestibulitis



- Diffuse dermatitis of the nasal vestibule, usually **by Staph a.**
- **Clinical presentation:** Red, swollen, eroded and tender skin with crustations and scales.
- **Treatment**: Local cleaning, local antibiotic-steroid ointments

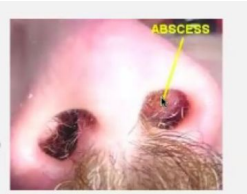
Furuncle	Vestibulitis
- حبة بالأنف صغيرة و تنرفز مرة - Very localized (around hair follicles) and painful - **Treatment**:Don't squeeze, Don't manipulate - Avoid nose picking (causes cross contamination) - Apply antibiotic like Fucidin, why? *imp this area is from the dangerous zone, so complications 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)

Treatment: include analgesia, warm compressors, topical +/-systemic antibiotics, +/-I&D

- Complications: facial veins are valveless so if there is infection it's easily transported

Facial Cellulitis & cavernous sinus thrombosis. And abscess

- Risk of cavernous sinus thrombosis after squeezing the furuncle due to retrograde venous spread.



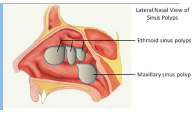
Furunculosis complicates into abscess .
Treatment: incision and drainage + local and systemic antibiotics.

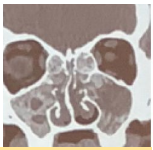
This patient progresses from A-D .He ends up with Facial cellulitis pic C (very dangerous, eye involvement)
Treatment : admit the patient +Iv antibiotics + close observation. If this patient is not treated well the infection might reach the cavernous sinus.


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

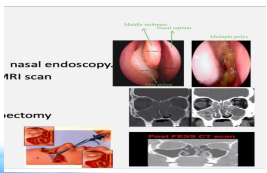
Here the infection spread into the cavernous sinus (Bulging and Frozen eyes he cannot move his eye with very very high mortality.

Nasal Polyps



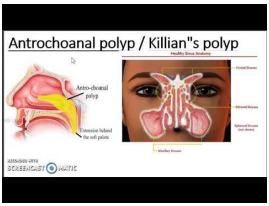


- **Nasal polyps:** benign (non cancerous) growths of the mucosa, of the nose. Nasal polyps are multiple unlike Antrochoanal polyps. Nasal polyps have high recurrence rate.
- **Etiology**: The exact etiology is unknown
  - Allergy, usually bilateral and multiple,eosinophils and plasma cells in large amounts
  - Inflammation "i.e. Infections" Unilateral non Antrochoanal polyp is a Red Flag!! It might be a tumor.
  - Neoplastic(benign(bleeding polypus of nasal septum/malignant)
- **Classification:**
  - Simple nasal polyp (Allergy, vasomotor, inflammatory, mixed (allergic-infective)
  - Fungal polyp & Malignant polyp
- **Site of origin:**
  - Ethmoidal polyp (commonest site, mostly bilateral), middle meatus second in frequency Maxillary sinus polyp is the 2nd most common. Important Mcqs
  - Antrochoanal 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 the same management
- **Symptoms** can include: nose blocked, runny nose, postnasal drip, nasal congestion, reduced sense of smell, breathing through the mouth, sleep apnea, snoring, pain or headache(because no air in the sinus)(headache: may also occur if there's a sinus infection in addition to the polyp)
- **Diagnosis:** clinical exam, nasal endoscopy, C.T. scan or MRI scan. Diagnoses is by history of nasal obstruction...etc then examination then we order CT scan to see where it extends
- **Treatments:** Medications, surgery-polypectomy(Done only in special situations), Functional Endoscopic Sinus Surgery (FESS).



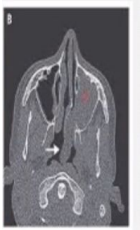
Antrochoanal polyp Antro= Maxillary sinus important Mcqs
Low Recurrence Rate

- Benign polypoid lesions arising from the maxillary antrum and they extend into the choana. And to the oral cavity
- They occur more commonly in children and young adults.very important Mcqs
- They are almost always unilateral.very important Mcqs
- The cause of ACPs is not clear
- Treatment: of ACPs is always surgical (FESS) functional endoscopic sinus surgery (not medical treatment) very important Mcqs FESS(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)
- Diagnosis:Nasal endoscopy and computed tomography scans. How is it diagnosed? By examining the nose you'll see it at the posterior end of the nose unlike the other polyps which are seen in the anterior nose or you can see it through the oral cavity.



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