

Lecture : Nose 1+2

sources for this lecture is from :

team 429

428 lecture slides

428 lecture notes

anatomy book

Dr.Fatima`s notes during the lecture

pictures from the internet

nose is divided into

1-external part (external nose) pyramidal shape

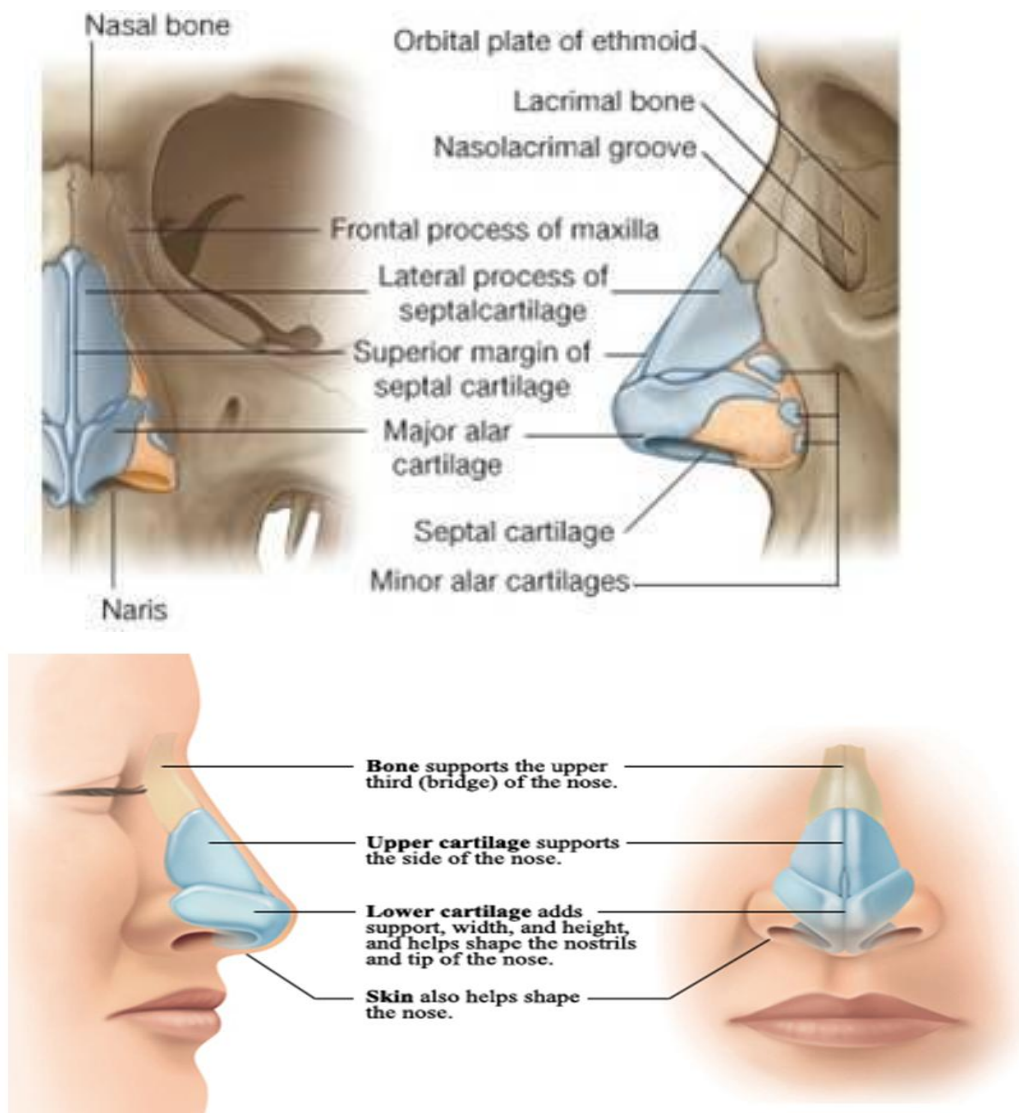
2-internal part (nasal cavity)

both divided by septum to right and left

the external nose include :

1-bony part above : (maxillary bone , ascending process of the maxilla ,nasal process from the frontal bone)

2-cartilagenous part below: (plates of hyaline cartilage upper and lower)



external nose blood supply :

ophthalmic and maxillary arteries branches

ala skin and lower part of the septum by branches from facial artery

external nose nerve supply :

branches of ophthalmic nerve and infra-orbital branch from maxillary nerve , both nerves are from the 5th cranial nerve (trigeminal)

Nasal cavity :

extends from the nostril anteriorly to concha where the nose open in the nasopharynx

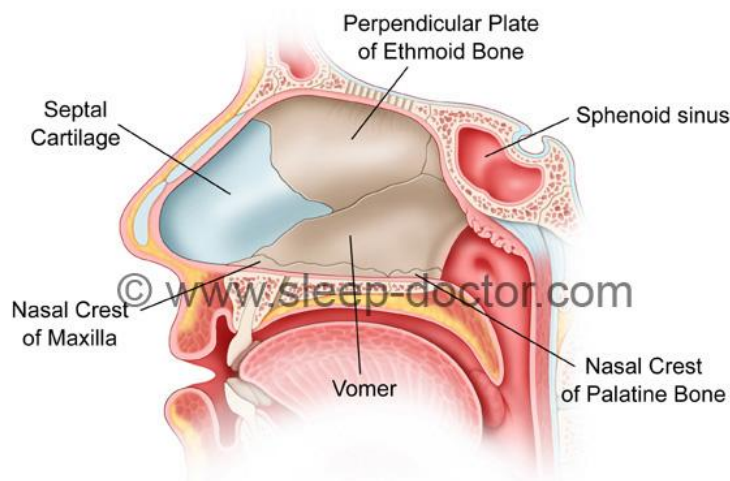
nasal cavity walls :

- 1- floor : palatine process and horizontal plate of palatine
- 2- roof :
 - nasal and frontal bones
 - cribriform (عظمة مخزومة) plate of ethmoid
 - sphenoid
- 3- lateral : conchae (turbinate)
- 4- medial : nasal septum

importance of cribriform plate anatomy is the presence of brain above it and sphenoid sinus is the presence of carotid , be careful during the surgery in both of them.

parts of the nasal septum :

- 1- cartilaginous part → septal cartilage
- 2- bony part → vertical plate of ethmoid bone and vomer

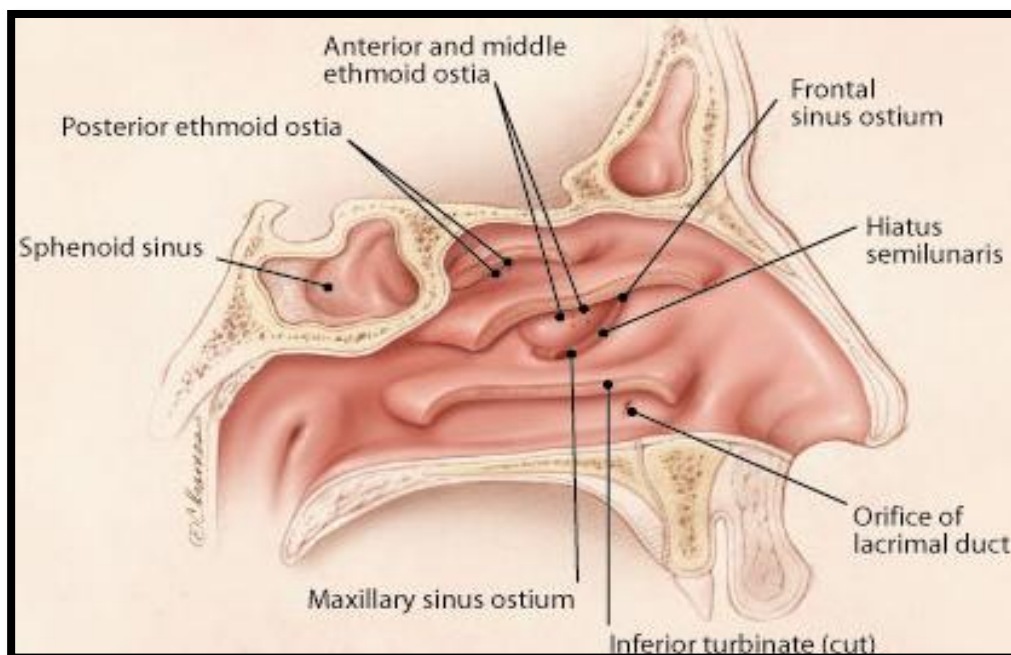
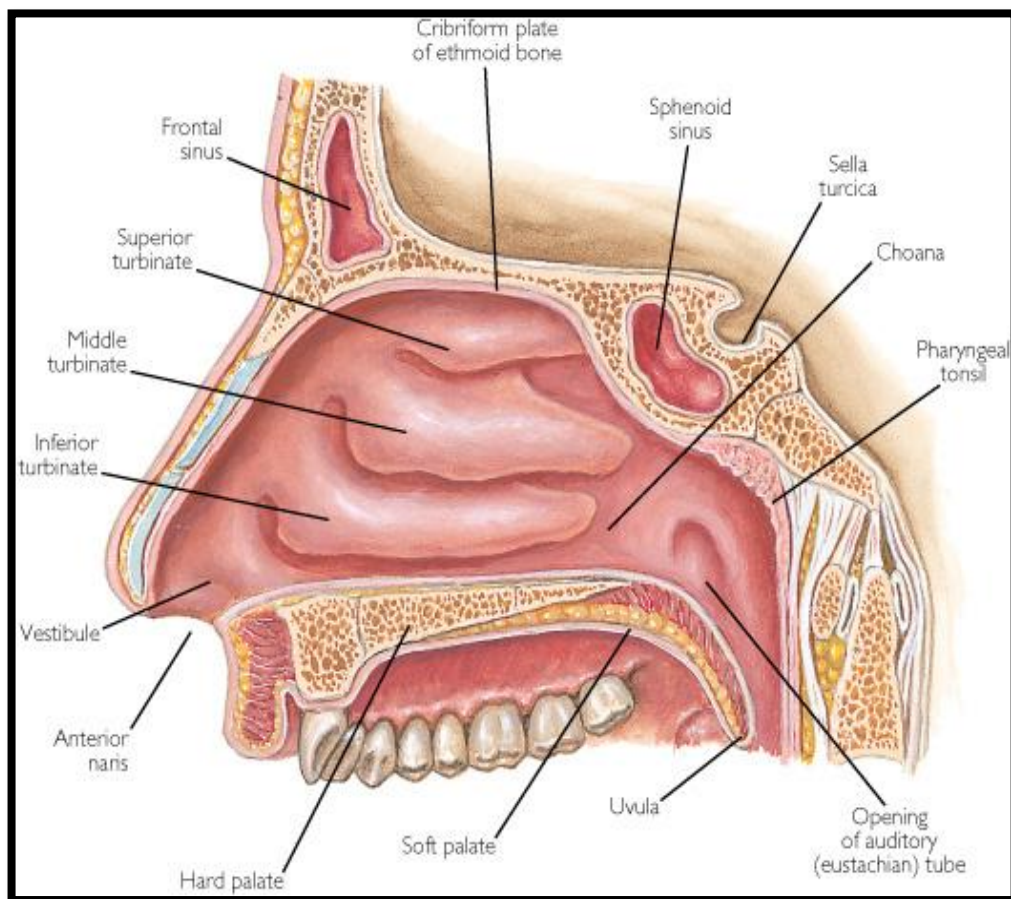


turbinates(concha) :

- 1- superior turbinate : has opening (superior meatus) for sphenoid sinus and posterior ethmoidal cells
- 2- middle turbinate : has a lot of structures below , opening(middle meatus) for
 - anterior ethmoid cells at bulla ethoidalis
 - maxillary sinus and frontal at hiatus semilunars
 - all of the openings together called (osteomeatal complex)
- 3- inferior turbinate : only the opening(inferior meatus)of the nasolacrimal duct anteriorly

lining of the nose (mucosa):

- anteriorly (skin) : Stratified squamous epithelium
- olfactory mucosa : above superior concha lines the roof
- all other surfaces : – Pseudostratified ciliated columnar with goblet cells (respiratory epithelium) secreting mucus.



Arterial blood supply for the nose : it has dual blood supply from internal carotid artery and external carotid

External carotid artery :

- sphenopalatine artery → from maxillary artery
- greater palatine artery → from maxillary artery
- superior labial artery → from facial artery
- ascending pharyngeal artery

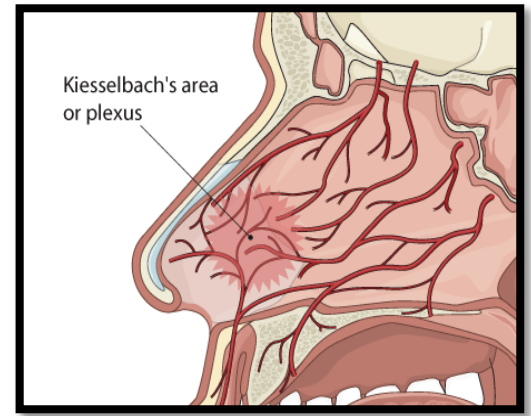
sphenopalatine artery is behind the middle turbinate , when it s injured during surgery(FESS or turbinectomy) it will be retracted to the olfactory fossa and it s difficult to pull it

- posterior nasal artery

Internal carotid artery : the branches of the anterior and posterior ethmoid arteries from the ophthalmic artery.

The Kiesselbach plexus or little area is located on the antero-inferior part of the cartilaginous septum, where four **arteries anastomose to form a vascular plexus:**

- Anterior ethmoidal artery (from the ophthalmic artery)
- Sphenopalatine artery (from the maxillary artery)
- Greater palatine artery (from the maxillary artery)
- Septal branch of the superior labial artery (from the facial
- (except the posterior ethmoidal artery) don't participate in anastomosis



It is the location of the **most anterior epistaxis** in young people and children

in old people with hypertension the epistaxis is posterior due to bleeding from Woodruff's plexus, a venous plexus situated in the posterior part of inferior meatus.

Venous drainage : to Cavernous sinus

Bermuda triangle → angular vein in eye is valvless will transmit the infection from nose to brain (it's the dangerous zone)

Nerve supply :

- 1- Autonomic vidian
 - vascular tone
 - turbinate congestion
 - Nasal secretions
- 2- Smell olfactory
- 3- Sensory components. Trigeminal (ophthalmic and maxillary)
 - Pain
 - Temperature
 - Touch.

- **Ophthalmic division:**

The ophthalmic division includes the following:

1- Lacrimal - Skin of lateral orbital area except lacrimal gland.

2- Frontal - Skin of forehead and scalp, including the supraorbital (eyelid skin, forehead, scalp) and supratrochlear (medial eyelid, medial forehead) skin

3- Nasociliary - Skin of the nose and mucous membrane of anterior nasal cavity (Anterior ethmoid, Posterior ethmoid, Infratrochlear) these are branches of nasocilliary nerve

○ **Maxillary division:**

The maxillary division includes the following:

- 1- Maxillary.
- 2- Infraorbital.
- 3- Zygomatic
- 4- Superior posterior dental.
- 5- Superior anterior dental - Mediates sneeze reflex.
- 6- Sphenopalatine is the most important.

functions of the nose :

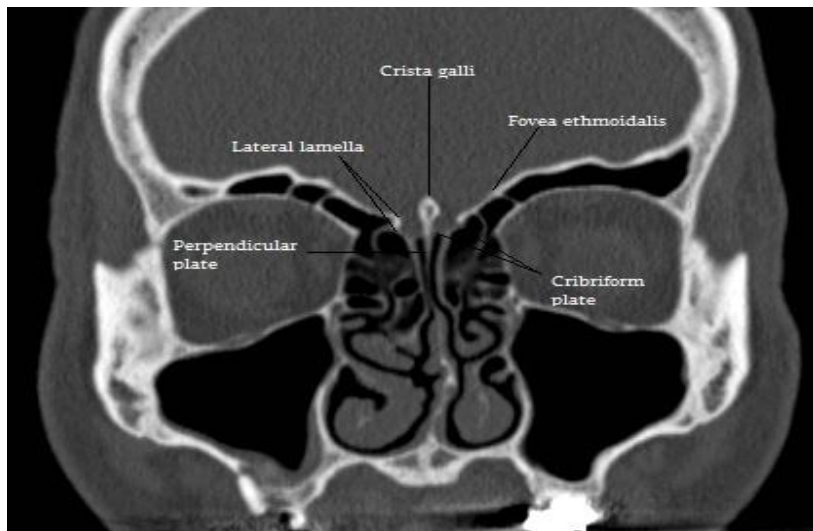
- Nasal respiration.
- protective functions of the nose
- Purification (vibrissae, cilia, lysozymes (anti bacterial, reflex sneezing, warming 37degree,smell)).
- Moistening.
- Transudation of fluid through the epithelium.
- Secretion from the mucosal gland.

Anatomy of paranasal sinus:

- There are 4 paired of paranasal sinus (maxillary, ethmoid , frontal , sphenoid)
- lined by pseudostratified columnar epithelium (respiratory epithelium) which is continuous with the nasal epithelium.
- The mucosa secretes the mucous which traps bacteria, it is naturally extruded through sinus ostia to be expectorated or swallowed.
- The damage of the maxillary and frontal sinuses follows a circular pattern through the natural ostia.
- Mucosa has a specific pattern of secretions if it's disturbed it leads to sinusitis
- Some sinuses develops after birth.

The Ethmoid sinus: anterior - posterior

- Are present at birth small , adult size at age 12.
- Are separated by the ground (base) lamella into anterior and posteriorethmoidal
- which drains into the middle and superior meatus, respectively.
- Consist of the vertical and horizontal plates.
- The vertical plate is divided into two portions, the perpendicular plate of the ethmoid and the crista galli.
- The horizontal plate is known laterally as the fovea ethmoidalis and medially as the cribriform plate.



- **Lamina papyracea (very thin)** what divides the orbit from the nose medial to the ethmoid so you need to be careful when performing a surgery on a child

- Injury in medial lamina papyracea perforates the eye

- Injury in fovea ethmoidalis perforates the brain.

-infection can spread easily from ethmoidal sinuses to orbit.

- Blood supply is from both the external and internal branches of the carotid, through the sphenopalatine and the anterior and posterior ethmoidal arteries Innervation is from V2(maxillary branch of trigeminal) and V3(mandibular branch).

A concha bullosa is a pneumatized (air-filled) cavity within a turbinate in the nose.

The Maxillary sinuses:

- The largest sinus.

- Pyramidal shaped with apex near zygomatic arch.

- In child, inferior border near nasal floor. In adult, 1 cm below nasal floor.

- Floor over maxillary dentition, which is often thin and dehiscent over tooth roots.

- The infra-orbital nerve runs along roof, and is often dehiscent. At risk during antral procedures.

- Sinus ostia located anteriorly in the middle meatus.

- Accessory ostia are usually more posterior and are a sign of chronic disease.

- Blood supply is from divisions of the maxillary artery.

- Innervation is via V2(maxillary branch of trigeminal).

- Postganglionic sympathetic fibers are from VII via the sphenopalatine ganglion and the greater superficial petrosal nerve.

OMC is final common pathway for drainage and ventilation of frontal, maxillary sinuses and ant.ethmoidal cells.

Frontal Sinus:

- Drain into frontal recess in the middle meatus near the upper portion of the infundibulum.

- Like the maxillary sinus have a circular muco ciliary clearance.

- the blood supply from supraorbital and superior ophthalmic arteries innervations from nerves of the same name.
- Rarely present at birth; usually not visible until age 2.
- Great variability in size; congenitally absent in 5%.

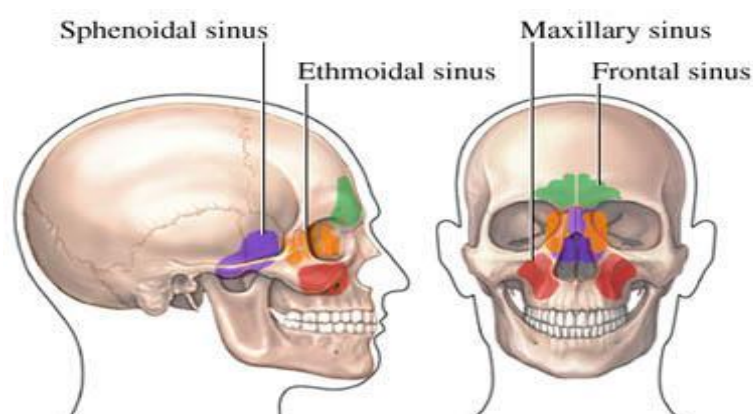
Sphenoid sinus:

Very dangerous because it is near the carotid artery and optic nerve specially when they are dehiscence.

- Rarely present at birth usually seen around age 4
- drain into the superior meatus in the sphenothmoidal recess cistia of variable size
- The optic nerve lie superiorly
- The forams (?) lie posteriorly.
- The cavernous sinus is lateral ,along with CNIII,IV and VI and the carotid artery
- The carotid artery is dehiscent in 50% of specimens
- Blood supply from both internal and external arteries via the sphenopalatine (floor)and the posterior ethmoidal arteries (roof)
- Innervations from V2 and V3
- Patient with sphenoid sinus disease come with headache.

Functions of paranasal sinus :

- Provide mucus to upper airway, vehical to trapping viruses, bacteria, foreign material for removal
- Humidifying and warming inspired air
- Lubrication.
- Give characteristics to voice /resonance.
- Lessen skull weight regulation of intranasal pressure and give voice resonance.
- Increasing surface area for olfaction.
- absorbing shock.
- Contribute to facial growth.



Diseases of the nose :

*congenital :

- A- **congenital atresia** → atresia and stenosis of anterior nares which is rare is caused by non canalization of an epithelial plug between the median and lateral nasal process treated by excision.
atresia of posterior nares (congenital choanal atresia)

Types:

- bony: most commonly
- membranous.
- 3-mixed

as you know there are goblet cells secreting mucous and there is discharge (The amount of postnasal mucus drip (through cilia) :0.5 L/day (like a small bottle of water) usually we do not feel it except if it is large or thick

Degree:

- 1- complete unilateral is the **most common** usually asymptomatic Diagnosed by history of rhinorrhea from one side.
- 2- complete bilateral →
- 3- incomplete unilateral
- 4- incomplete bilateral

Females are more commonly than affected than males.

Clinical features:

- Unilateral atresia: nasal obstruction, excessive nasal discharge.
- Bilateral atresia: asphyxia, nasal discharge → it is an emergency because new born are obligatory nasal breather and don't know how to breath from mouth

Diagnosis:

- 1- Total absence of the nasal air flow.
- 2- Plastic catheter can not be passed through the nose (suction at birth)
- 3- Post-rhinocopy.
- 4- Radiographs with contrast → not used now

Treatment:

- 1- Emergency. Keep the neonates mouth open by oral airway because they don't know how.
- 2- Transnasal perforation.

B- **Nasal glioma :**

- Glioma is uncapsulated collections of glial cells situated outside the CNS.
- Present in childhood as intranasal (30%), extra nasal (60%) or combined masses (10%).
- Glioma form a noncompressible mass that does not increase in size on valsalva testing and does not transilluminate.
- 15% of gliomas connect with the dura.
- Patients may present with unilateral nasal mass, epistaxis or cerebrospinal rhinorrhea.

- If a less than 6 months baby present with snoring and breathing from the mouth it's not adenoid because adenoid is lymph and the immunity until 6 months is from the mother so you need to rule out congenital cause.
- Simultaneous bilateral digital compression on the internal jugular veins does not lead to distention of the mass (Furstenberg sign).
- Management: surgical excision of the mass.

C- **Encephalocele:**

- encephalocele signify the herniation of the nasal tissue through defect in skull.
- They may contain meninges (meningocele), brain matter and meninges (encephalomeningocele) or they may communicate with a ventricle(encephalomeningocystocele).
- 20% of all encephaloceles occur in the cranium, 15% nasal.
- encephaloceles typically present as soft compressible masses over the glabella or inside the nose.
- Tx: surgery

D- **Nasal dermoids :**

- Nasal dermoids are epithelial lined cavities or sinus tracts (usually in the midline).
- They constitute the most common congenital nasal anomaly
- These nasal lesions account for 3% of dermoids in the head and neck and 1% of all body dermoids.
- Dx: CT to know the tissue type
- Tx: surgical excision

***common nasal diseases:**

A- **Furunculosis of nasal vestibulae:** Acute staphylococcal infection of hair follicle

Clinical feature:

- pain
- tenderness
- indurated swelling in the vestibulae

Treatment :systemic antibiotics or topical depends if the patient is immune-compromised or extreme of age

Complication : cavernous sinus thrombosis, cellulitis of upper lip

IT is dangerous zone because the infection can go to the brain through the angular vein so it's need to be treated locally and systematically

B- **Rhinitis:** Not used anymore we say **rhino-sinusitis** because they are both covered by mucous membrane.

- In rhinitis turbulent is small in same side.

Definition: inflammation of the mucosa of the nasal fossae.

Type: acute or chronic rhinitis.

Acute Rhinitis: common cold (URTI) (resolves in 3 weeks)

Symptoms:

- low grade Fever
- Rhinorrhea (watery if super-infection occur it will become yellowish or greenish)
- nasal obstruction
- cough worst at night
- fetid breath (bad)
- painless periorbital swelling
- rarely facial pain.

Etiology: virus, bacteria, conveyed by contact or air borne droplets

90% are viral infections so that's why we don't give Abx but sometimes it progress to bacterial when symptoms stays more than 10 days or discharge become greenish blue so we give Abx

Clinical feature:

- Ischemic stage:
 - 1-3 days incubation period.
 - Burning sensation in the nasopharynx.
 - Sneezing, loss of smell.
- hyperaemic stage:
 - Profuse rhinorrhea.
 - Nasal obstruction.
 - Pyrexia.
- Stage secondary infection: discharge becomes yellow or green.
- Stage resolution: resolution occurs 5-10 days.

treatment is supportive treatment

decongestant, salt and water to clean the nose and analgesic and we do not need antibiotic, but if the symptoms continue for more than 10 days or the symptoms become worse → start antibiotic

Chronic Rhinitis: (lasting more than 3 months)

Non specific or specific.

Non Specific (the etiology is unknown) :

Simple chronic rhinitis

Etiology: neighboring infections e.g.

- chronic tonsillitis
- adenoids
- vasomotor rhinitis: dripping of nose due to smell something like perfume.
- chronic irritation (dust, smoker)
- swelling of inferior turbinate

Treatment: correction of any predisposing Factor

Hypertrophic rhinitis

Etiology: permanent hypertrophic changes due to advanced stage of simple chronic rhinitis.

Medicamentosa (caused by overuse of atropine):

Clinical features: like simple chronic rhinitis

Treatment : like simple chronic rhinitis + reduction of inferior turbinate

start local and systemic steroids → dr mention it in the lecture

Definition: chronic inflammation of nasal mucosa with atrophy of various nasal

constituents.

مثلا واحد عنده انسداد بالأنف و استخدم atropine و انفتح يصير يستخدمه كل مرة يحس بانسداد , المشكلة إنه يدمن عليها بعد 5 أيام يصير انفه ما يفتح إلا بالدوا because the erectile tissue and sinuses of the turbinate do not open unless the patient use the medication

Atrophic rhinitis (MCQ)

Etiology: not fully known, infection, endocrine or vitamin disturbances (can be happen when turbenectomy done)

Type: primary or secondary

Primary atrophic rhinitis

Clinical features:

foul stench, epistaxis , sensation of obstruction more in females than males

Pathology :

1- degeneration of epithelium glands :

- thick crust in the nose --> infected
- Foul smell from the nose.

2- atrophy of the turbinal bones

treatment:

- Removal of the crusts.
- Glucose 25% in glycerine drop.
- Local or systemic antibiotics.
- Surgical measures.

Nasal allergy: MCQ

Allergy is an abnormal reaction of the tissues to certain substances. (in history there is triggering factor)

Types:

- 1- Seasonal.
- 2- Non seasonal (perennial) طول السنة تجي بأي وقت

Etiology:

25-30% in Saudi Arabia, 26% unknown cause (genetic factors or environment factors e.g. cat, mite, cockroach)

Clinical features:

nasal obstruction, rhinorrhea, sneezing, nasal irritation, palatine itching).

Diagnosis:

environmental history, eosinophilis, skin test, blood test

skin test: insert antigen below the skin → mast cell will react to it → degranulation and release allergic substances and causing redness and rise the skin

Treatment:

avoidance of precipitating factors, antihistamine drugs (for rhinorrhea and itching not for nasal congestion), desensitization (for severe surgery), surgery

desensitization : gradually give the patient the antigen and increase the concentration gradually, can result in anaphylactic shock, need long time but has high cure rate.

Nasal polypi:

Definition:

a pendunculated portion of oedematous mucosa of the nose.

Etiology: allergy, inflammation, neoplastic. You need to rule out cancer (specially in old patient + unilateral)

Site of origin: Ethmoidal (**commonest sites** due to gravity) then maxillary and it's called antral (antrochoanal polyps) then sphenoidal.

Clinical features:

Nasal obstruction, sneezing, clear rhinorrhea, expansion of the nasal bones (frog face)

- Nasal polyps are common in child (8-9 yrs) with cystic fibrosis (especially in middle turbulent).

Treatment: depend on the cause

antibiotic, antihistaminic, topical and systemic steroid therapy, surgical excision (FESS) Functional Endoscopic Sinus Surgery it is the definitive treatment.