

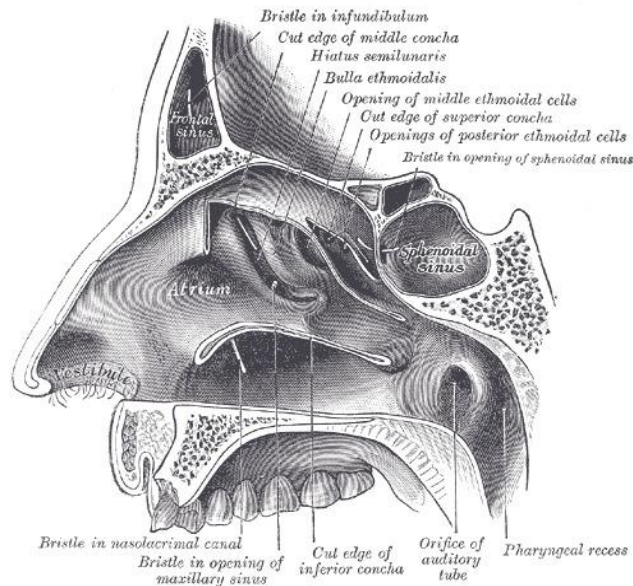
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REVEIUED BY
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Nose III-IV

A2 Presented by Dr.Ahmad Alroqi

★ Lecture Objectives:

- 1st: Sinusitis: Objectives were not mentioned
- 2nd: Diseases of the nasal septum, epistaxis, turbinate hypertrophy and operations.

Color Index:

We prefer using the term Rhinosinusitis, because when nose is mainly affected (rhinitis) , the sinuses will be affected to a certain degree as well and vice versa regarding sinusitis

Acute rhinitis (common cold)

- Mostly viral (adenovirus, picornavirus, **rhinovirus** (the most common))
- **Symptoms:** Burning sensation in the nose, nasal congestion, obstruction, secretions and hyposmia or even anosmia.
- Can be secondarily infected by **bacteria** (Strep. pneum, Staph a., H.Inf, Kleb. Pneum, M.Catarrhalis. Has worsening symptoms and double sickening with longer duration.
- Can progress into acute bacterial rhinosinusitis.
- Influenza rhinitis:
 - Influenza A, B, C viruses
 - Similar symptoms of common cold but with more **constitutional symptoms:** headache, vomiting, high grade fever. Esp in immunocompromised: DM, asthma it can progress to RTI and pulmonary failure.
 - Role of influenza vaccine. Bc it's a disease that has a risk of complications
- **Investigations:** not done routinely bc it is not cost effective and will not change management
- **Treatment:** Bed rest, rehydration, analgesia and decongestants, antibiotic use is in selected pts bc its mostly viral (adults 70%, peds 90%)

Types of sinusitis

1

Acute

a sudden onset of flu like symptoms such as runny, stuffy nose and facial pain that does not go away after 10 to 14 days (lasts longer than an influenza). Acute sinusitis typically lasts 4 weeks or less.

2

Subacute

- between acute and chronic
- An inflammation lasting 4 to 8 weeks

3

Chronic

- more than 8-12 weeks.
- a condition characterized by sinus inflammation symptoms lasting 8 weeks or longer.

4

Recurrent

- several attacks within a year.
- Recurrent sinusitis is not common so you have to intervene.

1-Acute sinusitis

- Sinusitis is a broad term, so saying it's sinusitis is not enough to formulate a plan.
- Inflammation of the mucosal lining of the nose (same as sinus lining; recently called rhinosinusitis) and paranasal sinuses.
- Affects 35 million patients in the US annually, with 16 millions office visits.
- Women are more affected in some studies (2:1,dealing with children)

Pathophysiology

Three general factors: (we usually mean bacterial when we talk about sinusitis, as different types have different pathophysiology, example: in allergic fungal sinusitis we don't have obstruction or ciliary impairment , also no infection only inflammation)

- 1- Obstruction of sinus drainage (mechanical)
- 2- Ciliary impairment (primary ciliary dyskinesia)
- 3-Altered quality or quantity of the mucus (cystic fibrosis)

Microbiology	
Acute viral	Rhinoviruses , influenza A&B, Para-influenza, corona viruses, RSV, adenoviruses, enteroviruses
Acute bacterial (most common)	Streptococcus pneumoniae 20-30%, Haemophilus influenzae 15-20%, Moraxella catarrhalis 16-20%. <small>mnemonic : SHM شم</small>

Clinical (PODS)

Hallmark of acute sinusitis (to differentiate it from URTI or flu) : Nasal congestion + **headache** + **facial pain and tenderness** + post-nasal drip + **purulent nasal discharge** (most URTI cause runny nose with watery discharge meanwhile in sinusitis its yellowish or greenish).

We need the presence of 2 out of 4 (PODS) to start investigations.

- **Pain/Pressure: facial** (frontal (forehead pain), periorbital (or between eyes if ethmoidal), cheek (maxillary), dental (maxillary)).
- **Nasal Obstruction:** unilateral vs bilateral, complete vs partial.
- **Discharge:** anterior (secretions coming out from nose) vs. posterior (post nasal discharge, feeling like something is stuck in throat), thick vs thin, clear vs mucopurulent vs **purulent nasal discharge**.
- **Smell:** anosmia vs hyposmia.
- **Other symptoms:**
 - Ear symptoms: clicking of the ear. (eustachian tube closes due to infection or enlargement of turbinates).
 - Visual and neurological symptoms (complications) rare.
 - Fever, fatigue, **headache** which gets worse when leaning forward (patient will say when i pray or try to get something from the floor i feel like my head is heavy), hoarseness due to postnasal drip causing patient to cough which will affect vocal cords eventually , halitosis (bad breath), cough mainly with children and constitutional symptoms.
- **Duration:** **more than 10 days (or worsening after initial improvement) but less than 3 months**, unlike rhinitis 7-10 days only (if more, that is chronic, and subacute is between 4 weeks and 3 months.)
- **History of:**
 - **Immunosuppression.** In certain types, example: pts referred from ICU with subnasal discharge due to acute fulminant invasive fungal sinusitis which can be fatal (60-70% mortality), so different presentation means different prognosis and management. Dental issues/pain (as a cause of odontogenic sinusitis) due to maxillary nerve, usually midfacial pain over maxillary sinus (one side)
- **Presentation:** ICU (complicated or invasive), ER (acute bacterial), Clinic (allergic or chronic).

Physical Exam

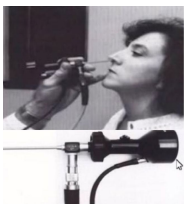
- Fever
- Nasal tenderness and erythema around the nostrils
- Facial erythema or tenderness
- Mucosal oedema, erythema, purulent discharge
- **Causative issues:** septal deviation, hypertrophied inferior turbinates
- **Clinical exam:** Anterior Rhinoscopy , nasal endoscopy

Investigations

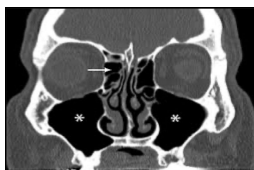
- **CBC:** for WBC, ESR in a sick patient
- **Sinus x-rays:** not used now, very low yield.
- **Sinonasal culture:** not done as routine, only if no response to ATB and suspicion of unusual or resistant organisms. endoscopic guided.
- **CT scan Sinuses:** mostly requested when there is a suspicion of complications (with contrast).
- **MRI:** used only in complications or suspicion of malignancy in the sinuses.
- **Nasal endoscopy** or anterior rhinoscopy is used to confirm dx by the presence of pus or discharge coming from the sinus, if you don't have an endoscope you can use a nasal speculum to examine the nose.
- Type of bacteria confirmed by taking a swab.

Soft tissue window

Bone window



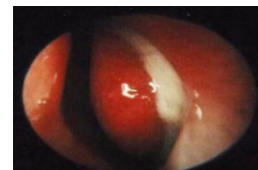
Nasal endoscopy



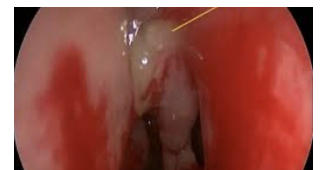
Normal CT (sinuses filled with air) w/ mild deviation & right inferior turbinate hypertrophy



Air fluid level, that's acute sinusitis and mucosal thickening



middle turbinate: Discharge coming from the maxillary sinus



Discharge (pus) is seen at middle meatus which is a hallmark of acute sinusitis. I can say 100% sure sinusitis

Treatment

Antibiotics

- The most common organism is bacterial.
- Most common bacterial organism in adults: strept. pneumoniae unlike children
- When to give Abx? if you found pus yellowish in color or symptoms getting worse or presence of complications.



- First line: amoxicillin, clarithromycin or azithromycin. (no need to know names)
- Second line: Amoxicillin-clavulanate, fluoroquinolone

Supportive

- Intranasal corticosteroids (nasonex) new guidelines suggest a 48h trial, we can start with it before ABx
- Analgesia (non-narcotic)
- Sinus irrigation. High volume irrigation causes immediate relief
- Decongestant (local spray and systemic) atropine used for 3 days works by decongesting the mucosa so the pus comes out (to decrease congestion and open ostia of sinuses)
- Hydration
- Smoking cessation, etc. avoid provoking or irritative.

Most patients improve spontaneously or after a course of conservative management. specially if viral
 - If no response, or develop recurrent symptoms should be considered more aggressive medical management such as: anti-histamines, prolonged course antibiotics, decongestants, nasal steroids or vasoconstrictors.

Surgery

reserved for patients who fail 3 to 5 months of medical management or have complications. Or if it became chronic or if it was recurrent.

One of the most common disease with direct impact on the quality of life of the patient. Persistent inflammation of the nose and paranasal cavities that lasts more than 12 weeks. we have to intervene and do surgery if it became chronic because it affects life

Pathophysiology

- Persistence of infection
- Intrinsic factors of the airway
- Metabolic abnormalities such as ASA sensitivity
- Allergy or other immunologic disorder
- Superantigens
- Fungi that induce and sustain eosinophilic inflammation (allergic fungal sinusitis is common here)

Microbiology

Most common bacteria

- Staph aureus (most common)
- Coagulase negative staph
- **Pseudomonas** (in cystic fibrosis) (new name is **Bukholderia cepacia**)
- Bacteroides and other anaerobes

Etiology

Normal infection that is continuous due to (predisposing factors for sinusitis to become chronic):

- **Obstruction:**
 - Structural: tumors, trauma, tubes (so secretion will collect in sinus, stagnate and get infected)
 - Anatomical: (nasal septum deviation, enlarged turbinate).
 - Etc persistent from acute.
- **Allergy and atopy** (asthma, ASA sensitivity, allergic rhinitis) more tendency, they have hyper-reactive immune system and their mucosa will always be congested closing the sinus opening.
- **Defects in ciliary clearance**
 - (PCD) pseudocolumnar epithelial defect (congenital defects in cilia, cilia continually moves nasal secretions into nasopharynx, if there's a defect in ciliary clearance it will lead to stagnation of secretions in the sinus)
 - Quality of mucus (CF) cystic fibrosis in which secretion is very thick so they always present with sinusitis.
- **Hormonal** (puberty and pregnancy) due to decreased immunity.
- **Irritant** (smoking, pollutant, acid reflux) .
- **Immune deficiency** (AIDS, DM, renal transplant, immunosuppressant medications) cartilaginous syndrome = chronic sinusitis + chronic discharge bronchitis. in immune deficiency fungal sinusitis is our concern because some types are fatal and must be diagnosed within few hours.
- **Systemic** (Wegener, Churg-Strauss syndrome, sarcoidosis)
- **Dental** rarely oroantral fistula. some patients might have their root of last tooth inside the sinus which will cause fistula between mouth and maxillary sinus if the tooth was extracted, so anything can go inside the sinus such as food causing chronic sinusitis.

Types of chronic sinusitis

Chronic Rhinosinusitis (CRS) (Main types):

- A- with nasal polyposis (CRSwNP) **most common**
- B- without nasal polyposis (CRSwoNP)

Allergic Fungal sinusitis:

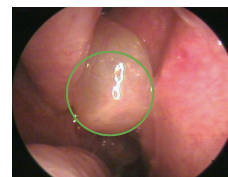
Mainly related to immunological status so fungus stagnate in sinus type 1 IgG

Clinical (PODS)

- For diagnosis: Presence of obstruction or drainage and at least two other symptoms of the CPODS for 8 -12 weeks plus Documented inflammation of the paranasal sinuses or nasal mucosa and confirmed by either:
 - Endoscopy
 - CT scan, preferably in coronal view.
- Facial Congestion or fullness
- Pain/Pressure: facial (frontal, periorbital, cheek, dental).
- Obstruction: unilateral vs bilateral, complete vs partial.
- Discharge: anterior vs posterior (usually posterior), thick vs thin, clear vs muco-purulent usually
- **Smell:** anosmia can't smell vs hyposmia decrease smell (i can only smell strong odors).
- Example: Pain + facial smell + congestion
- Symptoms are less severe than acute, **NO fever**
- **Other symptoms:**
 - o Fatigue, Malaise, Halitosis, Cough
 - o Ear symptoms
 - o Visual and neurological symptoms (complications) (rare, more common with fungal sinusitis)
 - o Exacerbation of asthma
- **Duration:** More than 3 months.
- **History of:**
 - o Immune suppression
 - o Dental issues (as a cause of sinusitis)
 - o Need to know about previous medical and surgical treatment, their effectiveness and duration of benefits
 - o **Exposure to allergens** (aid in obstruction) very important to ask about
- Usually in chronic sinusitis all sinuses are involved.

Physical Exam

- Facial erythema or tenderness (seen more in acute)
- Mucosal oedema, erythema, purulent discharge (we don't usually see pus because its not acute unless if the polyp stayed for a long time and obstructed the sinus), **polyps** (single big, or multiple small)
- **Causative issues:** septal deviation, hypertrophied inferior or middle turbinates
- **Dental exam** (specially if you're suspecting oro-antral fistula) for tenderness and dental hygiene due to maxillary sinusitis
- Orbital, cranial nerves examination when complication is suspected



Nasal polyp in middle meatus



Purulent discharge

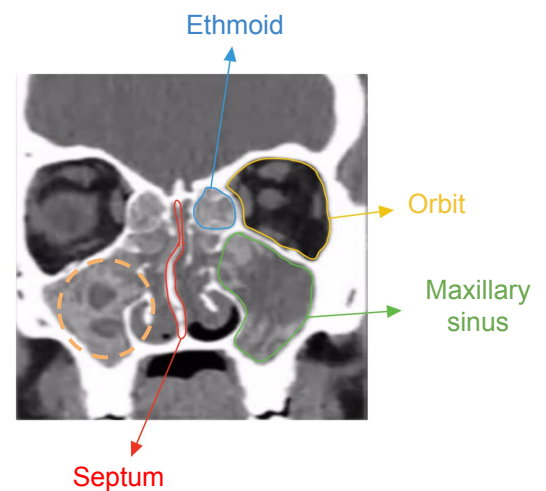
Doctor notes:

- Acute sinusitis is a clinical diagnosis not a radiological.
- Any patient with unilateral sinusitis is a red flag for tumor.

Investigations

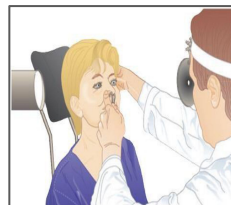
- **Endoscopic Examination:** to assess erythema, edema, discharge, polyps, anatomical variations
- **CBC:** for WBC and eosinophilia (CRSwNP)
- Sinonasal swab for culture
- **CT scan:** most important to establish diagnosis, to assess severity and extent of disease, to r/o complications and for surgical planning and mapping.
- **MRI:** in cases of orbital and intracranial complications
- **Other tests:** IgE and other immunoglobulins, ESR¹, CRP, RF, ANA, C-ANCA¹, P-ANCA², lymphocytes subtypes, HIV serology.
- Allergy assessment Septum
- Chloride sweat test³ and ciliary brushing

- Mostly fungal Orbit, because it has areas of hypodensity and areas of hyperdensity (double densities area) which is characteristic of a fungal infection
- example of allergic fungal sinusitis.
- bilateral opacification of the nasal cavities, usually a sign of an inflammatory process or polyps. [link](#)

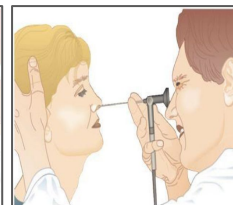


Endoscopic Examination Extra

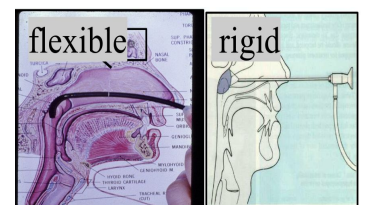
- Rhinoscopy
- Endoscopy (two types):
 - 1- rigid (poorly tolerated)
 - 2- flexible (best way)



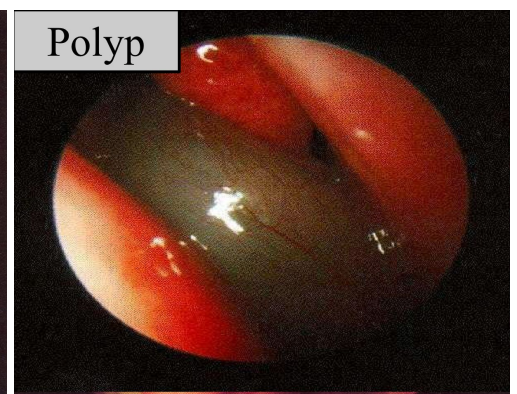
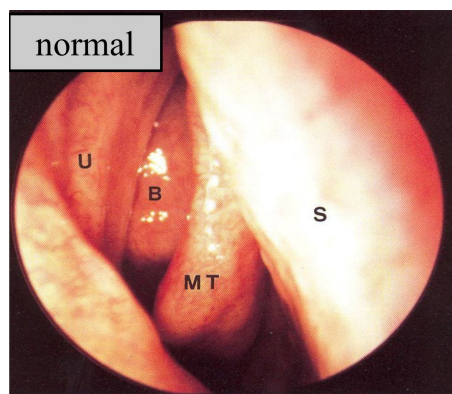
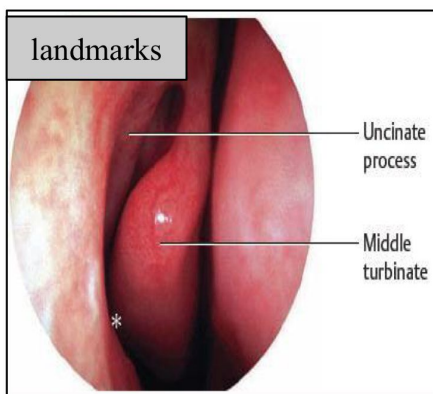
Rhinoscopy



Endoscopy



Endoscopy types



U:uncinate process
 B:bullae ethmoidalis
 MT: middle turbinate
 S: septum

Treatment

Local treatment

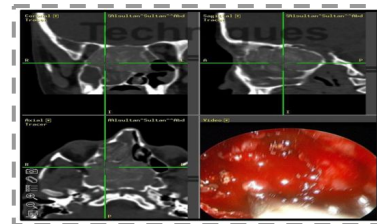
- **Intra-nasal corticosteroid sprays: mainstay Rx** most imp, and it's safe since its topical steroids
- Sinus rinses: most important water and salt sprays that clean the nose and remove secretions
- Others: no evidence or recommendation against

Systemic treatment

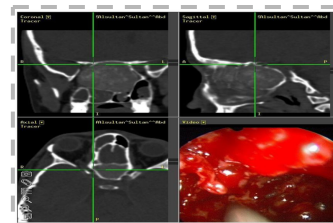
- Po Steroids: short term (5-15 days, different regimens) can shrink big polyps reduce symptoms very quickly and improve access for intranasal steroids.
- Po ATB: If polyp with signs of infection such as pus
First line: amoxil, clarithromycin or azithromycin.
Second line: Amoxi-clav, fluoroquinolone.

Surgical (FESS)

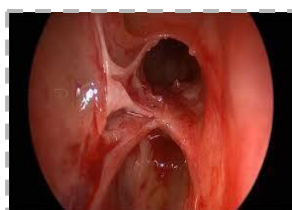
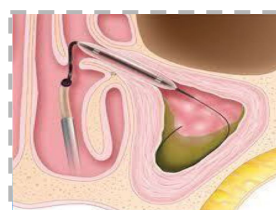
- **Functional Endoscopic Sinus Surgery: opening sinus and clean it.**
- **gold standard for chronic rhinosinusitis, acute when there is complication**
- NOT A TREATMENT, the goal of it is to open the airways to help steroids to do it's work, so DON'T stop topical steroids (FESS is an adjunctive treatment but has significant change on the patient)
- rinses, remove any obstruction and send a sample for culture and pathology.



- Computer Assisted Surgery (Navigator): Done with pt. has intracranial or intraorbital.



- Balloon Sino-plasty: new procedure, expensive, good for fronto-ethmoid recess



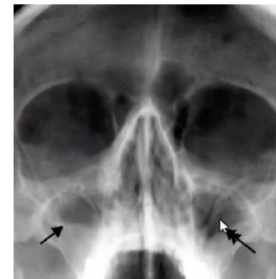
Clinical indication for diagnostic imaging:

- **Not indicated** in acute, uncomplicated rhinosinusitis or to confirm the resolution of the infection.
- The goal of sinus imaging is to visualize the sinus to determine if there is an underlying **anatomical disorder** contributing to the **persistence or recurrence** of symptom.
- imaging in case of chronic is used to know which sinus is inflamed and if there is complications, or in case of recurrence. we don't need imaging in acute unless there is anatomical disorder due to trauma, or severe deviation

1

Plain (X-ray) sinus films:

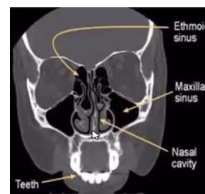
- **rarely indicated**, not done anymore
- Plain films don't differentiate the etiology (infectious vs. non infectious)
- Correlate poorly with clinical events.
- Over 80% of children with persistent respiratory symptoms have abnormal findings on plain films.
- There is poor correlation between x-ray and C.T. scan findings.



2

C.T. scan:

- recurrent or chronic sinus disease when surgery is being considered.
- Complicated rhinosinusitis with signs of extension beyond the bony sinus.
- Bony changes of chronic inflammation from osteitis.
- Recurrent or persistent mucocoeles.
- Large polyps on physical exam. or abnormal looking polyp.
- sinus tumors/malignancy. unilateral nasal polyp is a red flag.



Normal sinus = black because its filled with air



sinusitis, both ethmoid and maxillary are filled



Mostly fungal



Normal maxillary
Abnormal

unilateral sinusitis mainly involving maxillary sinus "red flag"

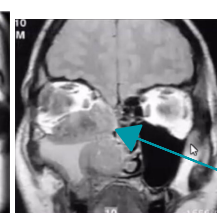
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MRI:

- To evaluate suspected intracranial or orbital involvement of complicated of rhinosinusitis. (if you're suspecting extension of tumor to brain or orbit).
- Mapping of sinonasal neoplasms.



tumor pushing orbit



Mass pushing orbit up

Complications of rhinosinusitis:

Table 5. Complications of Acute Sinusitis

Bony	Orbital
Osteomyelitis	Cavernous sinus thrombosis
Pott's puffy tumor	Inflammatory edema and erythema (preseptal cellulitis)
<u>Intracranial</u>	Orbital abscess
Cavernous sinus thrombosis	Orbital cellulitis
Epidural abscess	Subperiosteal abscess
Intracranial abscess	
Meningitis	
Subdural abscess	
Superior sagittal sinus thrombosis	

Information from references 7 and 9.

no need to need to know all detail



FYI: pott's puffy tumor is when someone has acute frontal sinusitis leading to pus formation so it breaks the weak area which is the anterior cover of the sinus so pus collects under skin of forehead

Three main complications

Orbital

Cranial

Extracranial

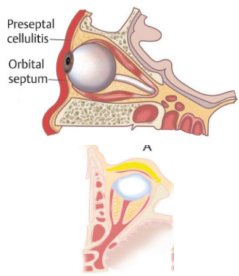
1-Orbital complication

- The **frontal, maxillary, ethmoid** and **sphenoid** sinuses sit immediately **above, below**, between and **behind** the eyes respectively.
- Infection of any of the sinuses may spread to the orbit causing complications from mild inflammation of the eyelid to abscess with possible blindness. Intra-orbital spread of sinusitis
- Chandler classification "Orbital Complication": **VERY IMP** (next slide)

Stage I

Preseptal cellulitis

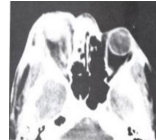
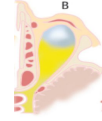
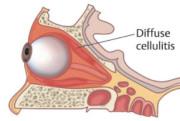
- lid edema otherwise normal
- Periorbital inflammatory edema (cellulitis)
- Obstruction of venous channels
- No vision loss
- No EOM limitation “Extra-ocular muscle”
- **Acute stage**
- The infection out of the socket of the eye في الجفن (septum)
- common in children
- treated medically



Stage II

Orbital cellulitis

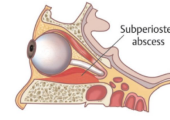
- diffuse edema
- Passed through septum to orbit
- Orbital cellulitis with edema, chemosis, proptosis (bulging due to inflammation that pushes the orbit), pain
- No abscess (so we can still treat it with antibiotics)
- Ophthalmoplegia may occur due to edema (not due to muscle its due to lid swelling) or spasm
- **No visual loss.** (Visual loss requires emergency surgery)



Stage III

Subperiosteal abscess

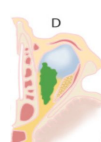
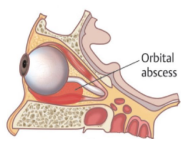
- usually seen near lamina papyracea (part of medial wall of the orbit) & from the ethmoid sinus
- Under periosteum, starts pushing muscles of eye movement, so eye movement will be affected. also pushes the nerve a little but mainly muscles
- Vision decreased depends on size of abscess
- we put him on ABx and assess vision, we have to drain it surgically if didn't respond to ABx
- Globe displaced laterally or downward
- Orbital cellulitis present with decreased EOM



Stage IV

Orbital abscess

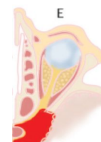
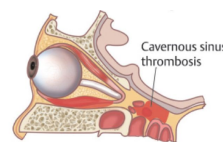
- collection within orbit
- Severe proptosis and chemosis
- Usually no globe displacement
- Can lead to blindness because it starts compressing orbit nerve & can go to cavernous sinus.
- Ophthalmoplegia present (can't move eye muscles)
- visual loss (13%) due to ischemia or neuritis due to the compression of blood vessels by the abscess



Stage V

Cavernous sinus thrombosis

- bilateral
- usually results from retrograde transmission through valveless veins leading to the cavernous sinus through optic nerve
- starts unilateral then becomes **bilateral** 24-48hs later (whenever you see bilateral, it's CST)
- fixation of orbit (no movement of eye at all)
- CN II, IV, VI, III, V(v1 and v2). abducent is first to be affected
- Meningitis and thrombosis
- High mortality 50% with antibiotics
- Progressive symptoms
- proptosis and fixation



2-intracranial complication

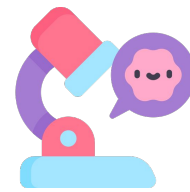
Extra

- The **frontal, ethmoid** and **sphenoid** sinuses are separated from the intracranial cavity by a layer of bone.
- If infection spread it may cause meningitis or brain abscess.
- Meningitis **Common in Children**
- Subdural or Epidural Abscess
- Cavernous sinus thrombosis
- Cerebral Abscess: Neurosurgery, Ophthalmology, ID (infectious diseases) (they should be involved)

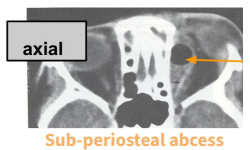
Treatment & investigations of acute complications



- Admit the patient
- IV antibiotics: 3rd Generation of Cephalosporins + Clindamycin
- Abscess incision & drainage and Surgery of the primary site
- Consultation of the Related Speciality



CT scan PNS (paranasal sinuses)



Mucoceles

Mucoceles are **chronic**, cystic lesions of the sinuses lined by pseudostratified epithelium.

- **Expand slowly**, often requiring many years.
- Etiology Either due to obstruction of ostia or to simple obstruction of minor salivary gland.
- 30% are idiopathic.

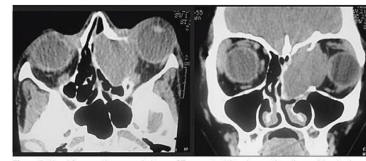
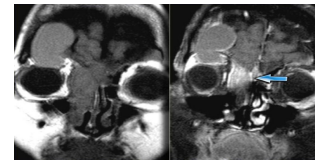


Figure 2. Nasal fossa and paranasal sinuses CT scan at axial and coronal sections evidencing image of left frontoethmoidal region with displacement of ocular globe on the left (proptosis).



3-other complications

Osteitis:

diagnose initially with technetium bone scan (osteoblastic activity) and gallium bone scan (inflammation), follow with gallium scans.

Rx: parenteral antibiotics, surgical debridement, sinus surgery.

Pott's Puffy Tumor:

frontal bone osteomyelitis, soft doughy swelling of forehead, high risk of intracranial extension.
Rx: parenteral antibiotics, trephination, may require surgical debridement.

Superior Orbital Fissure Syndrome:

fixed globe, dilated pupil (CN III, IV, VI), ptosis, hypesthesia of upper eyelid (CN V1).
Rx: urgent surgical decompression.

Orbital Apex Syndrome:

similar to Superior Orbital Fissure Syndrome with added involvement of optic nerve (papilledema, vision changes).

Sino-cutaneous Fistula:

usually begins as a frontal osteomyelitis

Bilateral nasal obstruction, if unilateral → rule out tumors

Invasive fungal sinusitis

- Presence of fungal hyphae within the mucosa, submucosa, bone, or blood vessels of the paranasal sinuses
- Acute Invasive Fungal Sinusitis (cause: mucormycosis)
- Chronic Invasive Fungal Sinusitis
- Chronic Granulomatous Invasive Fungal Sinusitis

VS

Non-invasive fungal sinusitis

- Absence of fungal hyphae within the mucosa and other structures of the paranasal sinuses.
- Allergic Fungal Sinusitis.
- Fungus Ball (fungus Mycetoma).

Acute Invasive Fungal Sinusitis:

- Most common patients in general are immunocompromised, usually due to diabetes, cancer, HIV, organ transplantation or using systemic or intranasal glucocorticoids.
- Mucormycosis is encountered in dust and soil and enters through the respiratory tract
- Ketoacidosis predisposes to mucormycosis, as the fungus thrives in acidic environments
- Initially seen as engorgement of turbinates, followed by ischemia and necrosis of the turbinates and adjacent nose
- The fungus invades vascular channels and causes hemorrhagic ischemia and necrosis
- Frequently fatal. 90% mortality in immunocompromised.
- Patients with acute invasive fungal sinusitis are usually hospitalized and are very sick with fever, cough, nasal discharge, headache, and mental status changes.
- Signs and symptoms include dark ulcers on the septum, turbinates, or palate. In the late stages, signs and symptoms of cavernous sinus thrombosis are present.

Treatment of acute invasive fungal sinusitis:

- Initial systemic antifungal treatment after **surgical debridement**.
- High doses of **amphotericin B** (1-1.5 mg/kg/d) are recommended followed by oral itraconazole.
- correction of underlying immunosuppression.

Chronic Invasive Fungal Sinusitis:

- usually seen in patients who are less immunocompromised with a time course greater than 12 weeks
- Chronic Granulomatous Invasive Fungal Sinusitis

Treatment of chronic invasive fungal sinusitis:

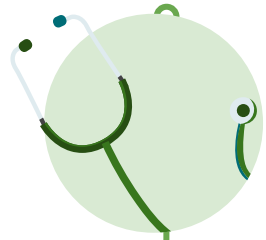
- Surgical treatment is mandatory.
- Initiate medical treatment with systemic antifungals once invasion is diagnosed.

Allergic Fungal Sinusitis:

- Nasal obstruction
- Allergic rhinitis, or chronic sinusitis
Nasal congestion, Purulent rhinorrhea, Post-Nasal Drainage, or Headaches
- Patients are atopic
Unresponsive to antihistamines, Intranasal Corticosteroids, and prior immunotherapy
- Patients are always immunocompetent
- 5-10% of chronic rhinosinusitis patients actually cases of AFS (allergic fungal sinusitis)
- Two thirds of patients report a history of allergic rhinitis.
- 90% of patients demonstrate elevated specific IgE to one or more fungal antigens.
- 50% of patients in a series by Manning et al had asthma.
- No linkage to aspirin sensitivity has been established.

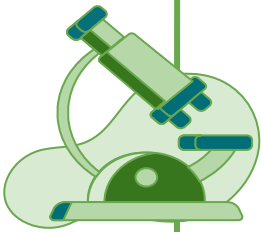
Treatment of allergic fungal sinusitis:

- The treatment of choice:
 - Endoscopic debridement (FESS)
 - a perioperative short course of steroids.
- Postoperative mold containing immunotherapy is a promising therapeutic advance in limiting recurrence.
- The role of systemic antifungal therapy is inadequately studied. (just mentioned to have a complete discussion)
 - Itraconazole orally is well tolerated and effective in vitro against common causes of AFS



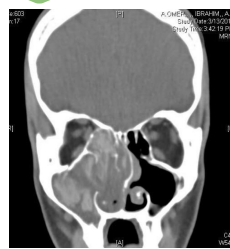
Examination

- findings are typically broad
 - intranasal inflammation and polyposis
- facial polymorphism:
 - ptosis
 - telecanthus
 - malar flattening
 - more often in children
- orbital features:
 - proptosis occurring over a long period, no diplopia.
 - visual loss, from ophthalmic nerve compression or inflammatory process



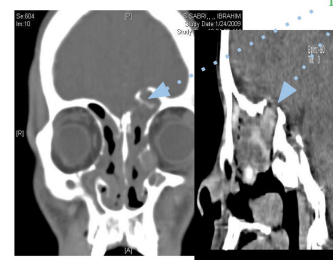
Investigations

CT scan

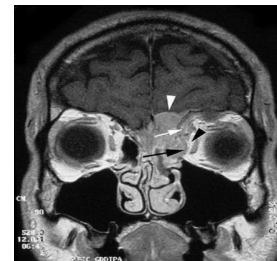


pathognomonic

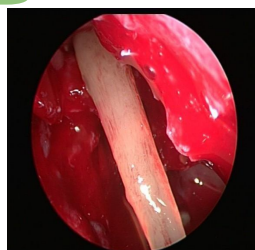
- calcification
- heterogeneity
- expansion



Intracranial extension



Mucin & fungal stain



437 Doctor's notes (rhinosinusitis)

1

Anatomy

- Frontal sinus is absent (aplastic) in most patients
 - All the sinuses drain into the lateral wall, except? sphenoid (drain into the spheno-ethmoidal recess)
 - middle meatus is also called "osteomeatal complex"
 - medial orbital wall is called lamina papyracea
-

2

Management

- Rhinosinusitis is caused mostly by gram +
→ use **penicillin** or **2nd generation cephalosporin**
 - **FESS surgery** is minimally invasive
 - if both medical and surgical treatment failed, what's the next step? use **biological treatment**
-

3

Complications

- head and neck venous system is valveless
infections can easily spread
 - infections of membranous bones which have no bone marrow is called osteitis (not osteomyelitis)
-

4

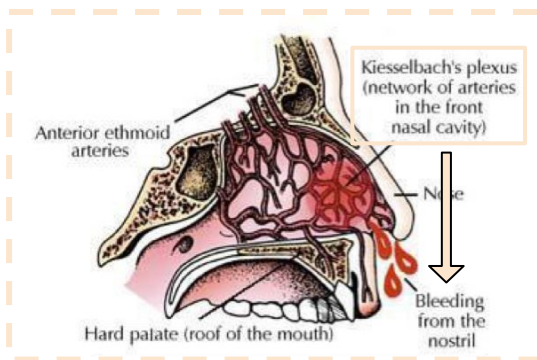
Fungal sinusitis

- how to differentiate invasive and non-invasive?
by histopathology (if the basement membrane is intact > non-invasive)
- acute invasive vs chronic invasive fungal sinusitis?
chronic: no blood invasion, no necrosis
- treatment of invasive fungal sinusitis is radical surgical
(debridement until we find a fresh blood) + amphotericin B

Epistaxis

Nasal blood supply

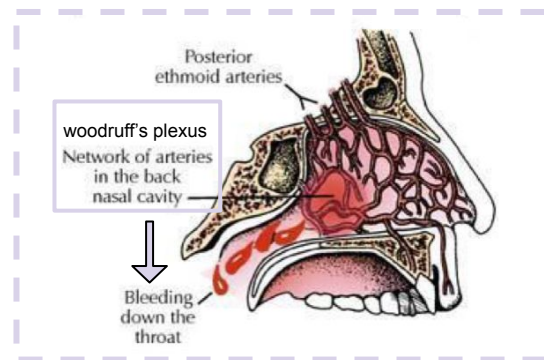
- internal and external carotid arteries (mainly external)
- many arterial and venous anastomoses
- Kiesselbach's plexus (Little's area) most common area of epistaxis because it is exposed to air any irritation will cause bleeding in anterior septum (Causes anterior nose bleeding)
- Woodruff's plexus in posterior septum (Causes posterior nose bleeding)



Kiesselbach's plexus/Little's area:

1. Anterior Ethmoid (Oph).
2. Superior Labial A (Facial).
3. Sphenopalatine A (IMAX).
4. Greater Palatine (IMAX)

* IMAX= Internal Maxillary Art.



Woodruff's Plexus:

1. Sphenopalatine A (IMAX).
- * IMAX= Internal Maxillary Art.

Types of nosebleeds

Imp to know the location to manage

01

Anterior (little's area)

- 90% of cases resolve spontaneously
- Most common in younger population
- Usually due to nasal mucosal dryness
- Usually controlled with conservative measures (pressing the nose)

Posterior (vicinity of sphenopalatine foramen)

02

- Usually occurs in older population
- HTN and systemic diseases are common contributing factors
- Significant bleeding in posterior pharynx
- More challenging to control (you may see nothing with endoscopy because epistaxis already happened and stopped)

Epistaxis

Local causes of epistaxis

- **Drying of the nasal mucosa**
from low humidity
- **Nasal trauma (specially in kids):** digital, surgical, facial trauma, nose picking, foreign bodies, forceful nose blowing. Acute or chronic.
- **Chemical irritants/ environment:** pollutants, irritants, allergens
- **Medications** (topical), INCS, cocaine (ask for drug abuse)
- **Deviation of nasal septum** or septal perforation
- **Allergic**, chronic or infectious Rhinitis
- **Bleeding polyp of the septum** or lateral nasal wall (inverted papilloma)
- Neoplasms of the nose or Sinuses
- Tumors of the nasopharynx especially **Nasopharyngeal Angiofibroma**
- Vascular malformation

Systemic causes of epistaxis

Usually cause general bleeding not only to the nose

- Systemic arterial **hypertension**
- **Endocrine Causes:**
Pregnancy, pheochromocytoma
- Hereditary hemorrhagic telangiectasia
- Anticoagulants (ASA, NSAIDS)
- **Hepatic disease**
- **Blood diseases** and coagulopathies such as Thrombocytopenia, ITP, Leukemia, Hemophilia

Most Common Causes of Epistaxis

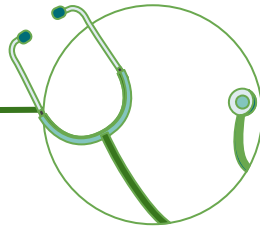
- **Disruption of the nasal mucosa** - local trauma, dry Environment
- Scars and damage from previous nosebleeds that reopen and bleed
- **Intranasal medications**
- **Hypertension** and/or arteriosclerosis
- **Anticoagulant** medications

Epistaxis



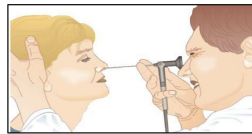
History

- Frequency, quantity
- unilateral vs. bilateral
- Dizziness or LOC
- Visits to ER
- Postural hypotension
- Hyperdynamic state due to low hemoglobin
- Nasal trauma
- Previous bleeding episodes
- Family history of bleeding like hereditary telangiectasia
- current medications and how tightly controlled
- Use of anticoagulants
- medical conditions: hepatic disease, DM, CAD, Low Hgb, etc.

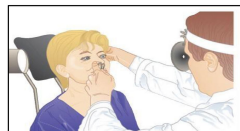


Examination

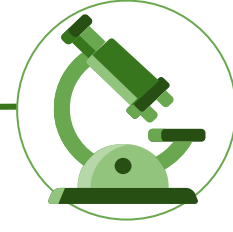
- ABC's
- Measure blood pressure and vital signs
- Pallor, signs of anemia
- Use vasoconstricting spray mixed with tetracaine in a 1:1 ratio for topical anesthesia
- **Anterior rhinoscopy and Endoscopic exam: to localize area of bleeding**



endoscopy



anterior rhinoscopy

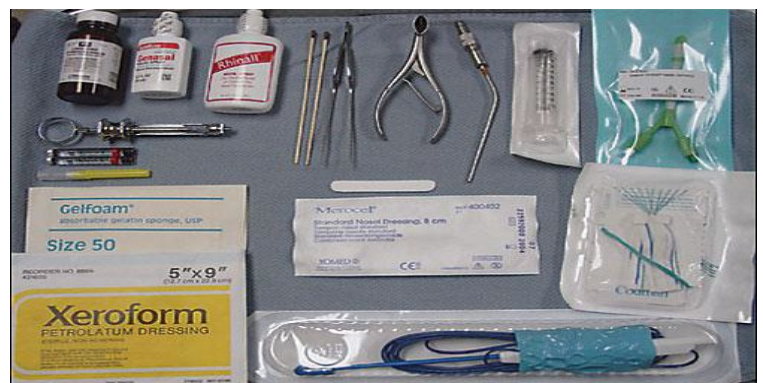


Investigation

- **CBC:** Hb, MCV, MCH, PLT
- **Coagulation profile:** Standard: PT, aPTT, INR
- **Coagulation factors**
- Consultation for **haematology**
- **Cross matching** for blood transfusion
- **CT scan** sinuses if surgical intervention is needed.
- **Angiography:** diagnostic +/-Therapeutic artery embolization to stop bleeding.

Physical Exam - Equipment

- **Protective equipment** - gloves, safety goggles
- **Headlight** if available
- **Nasal Speculum**
- Suction
- forceps
- Tongue depressor
- Vasoconstricting agent
- Topical anesthetic



General Epistaxis Supplies

Epistaxis

Cont: Epistaxis



Epistaxis Management

Self Management:

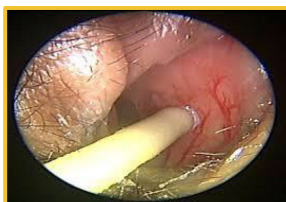
- Pinching the nose (on cartilaginous, applying indirect pressure over Little's area)
- Bending the head over
- Waiting 5 mins
- Do not blow

Acute Management: (ONLY ON 438)

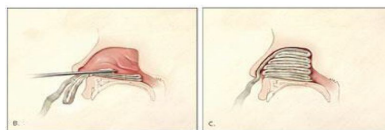
- ABC
- 2 large bore IV Lines, in case of need of fluid.
- Cross match and transfuse if needed.
- PRBCs , FFP, PLTs. cryoprecipitate.
- Packing

Mainstay treatment:

- Localized digital pressure by pinching the cartilaginous part of nose and leaning forward so patient doesn't swallow blood for minimum of 5-10 minutes.
- Cautery: chemical vs. electrical (If pressure didn't stop the bleeding):
 - Silver nitrate cautery (Chemical cauterization) Vs. electrical
 - Don't do both sides at the same time to avoid perforation, wait 6 weeks.
- Packing: absorbable vs. non-absorbable:
 - Anterior nasal packing for refractory epistaxis (bleed after cautery, or if extensive)
 - Post Nasal Packing (Done by inflatable nasal balloon catheter)
- if everything failed:
 - Arterial Ligation: anterior ethmoid or sphenopalatine artery
 - Arterial Embolization: sphenopalatine artery (very severe epistaxis non controlled by previous measures)
- Collagen Absorbable Hemostat or other topical coagulant

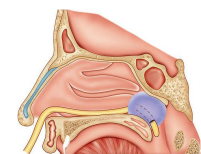


Chemical cauterization
By Silver nitrate



Anterior Nasal Packs

- if heavy bleeding or nonstop
- Formed expandable sponges are very effective
- Available in many shapes, sizes and some are impregnated with antibacterial agents



Post Nasal Packs

- If anterior packing did not control the bleeding.
- Can be done using a foley catheter.

Prevention: (counseling)

- Avoid digital trauma, manipulation of the nose with fingers or other objects
- Humidification and lubrication
- Correct coagulopathy or vasculopathy
- Keep allergic rhinitis under control. Use saline nasal spray frequently to cleanse and moisturize the nose.
- Use saline-based gel intranasally for mucosal dryness
- Avoid forceful nose blowing
- Keep vasoconstricting spray at home to use only prn epistaxis

Treat the cause:
correct coagulopathy
or vasculopathy if so.

Epistaxis

Duration of Packing Placement

- Actual duration will **vary according to the patient's** particular needs.
- Typically, **anterior pack at least 24-48 hours**, sometimes longer
- Posterior pack may need to remain for 48-72 hours.
- If a balloon pack is used, advised tapered deflation of balloons.

Patients with Nasal Packing

- Best to place patient on a p.o. antibiotic to decrease risk of **sinusitis** and **Toxic Shock Syndrome**
- Advise pt to avoid straining, bending forward or removing packing early
- Most patients may be treated as outpatients but hospital admission and observation should be strongly considered when a posterior pack is used. SaO₂ should be monitored as well. (to avoid O₂ desaturation)
- Admission may also be prudent for those with **CAD**, severe **HTN** or significant **anemia**. Give supplemental oxygen via humidified face tent

Epistaxis

Other Treatments for Refractory Epistaxis

- Greater palatine foramen block
- **Septoplasty**
- Endoscopic cauterization elective embolization by interventional radiologist
- **Internal maxillary artery ligation**
- Transantral sphenopalatine artery ligation
- Intraoral ligation of the maxillary artery
- Anterior and posterior **ethmoid artery ligation**
- External carotid artery ligation

Blood Loss Management

- **Blood loss Estimate**
 - Vital sign
 - Blood workup
- **Blood volume Expansion**
- **Blood Transportation**
 - Blood Component

-Direct question from the Doctor :

How to estimate blood loss with a patient that has epistaxis?

1-Do blood workup and look for **Hematocrit** (it will give you an accurate indication of blood loss).

2- Measure vital signs

3-notice patient's tachycardia

4-drop in blood pressure due to hypovolemic shock (help patient before he reach this stage)

- in an acute hemorrhage you **can not** use hemoglobin level as an indication for blood loss due to hemoconcentration which will make hemoglobin level seem normal

Diseases of nasal septum

Part of obj

- The nasal septum is made up of bone and cartilage, and blood vessels between septum and cartilage.
- It can be deviated, perforated, or collapsed.
- collagen is a-vascular and obtains nutrition by diffusion. If there was hematoma this would lead to necrosis.

The Nasal Septum Development

1- Cartilaginous Septum

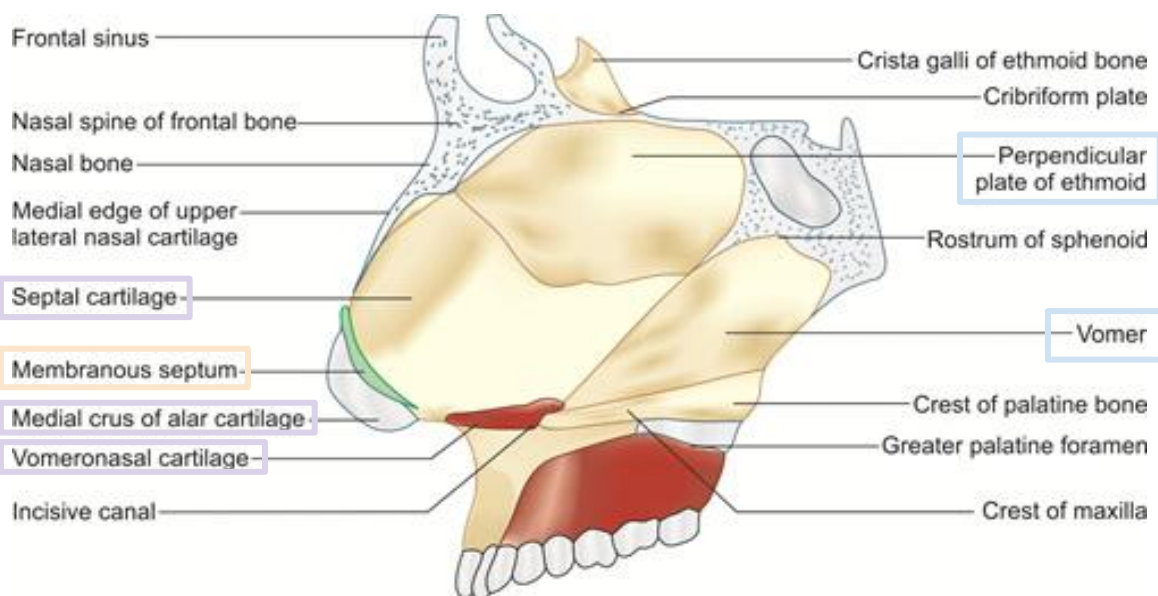
- Septal (quadrilateral) cartilage
- The vomeronasal cartilages
- Medial crura of the alar (lower lateral) cartilages

2- The Membranous Septum (Mobile Septum)

- Anterior to the end of the septal cartilage
- It is formed by skin and subcutaneous tissue of the nasal columella.
- The nose is lined by pseudostratified columnar epithelium except the anterior 1cm which is the membranous septum is lined by squamous epithelium.
- This membranous septum is lined by skin and hair so it will have skin disease rather than mucosal disease such as :hair follicles inflammation.

3- Bony septum:

- Composed of two major elements:
 - The Vomer: Develops from connective tissue membrane on each side of the septal cartilage. The intervening cartilage absorbed completed by mid adulthood.
 - The Perpendicular plate of the Ethmoid (Mesethmoid): Ossification completed by 17th year of age. Replacement of cartilaginous septum with thin bone. At the nasal roof it articulates with the cribriform plate and extends as the crista galli.



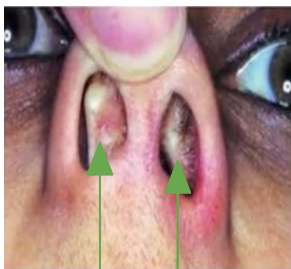
Inequality of Growth:

Creating septal spur → Septum Elevations and ridge like protuberances

1

Deviated nasal septum

- Approximately 80 % of humans have DNS, any or all parts of the septum except for the **posterior free border at the choanae. A common area of deflection is along the articulation between the vomer and the perpendicular plate of the ethmoid.**
- DNS to one side or S shape example: anterior deviated to the left & posterior deviated to the right to both side. The nasal septum is rarely exactly in the midline, minor deviations are normal and cause no symptoms, marked deviation will cause nasal airway obstruction and may contribute to sinonasal pathology by obstructing the normal sinus drainage pathways.
- Septal deviation can be corrected by surgery, with excellent results.
- Causes: Most cases of deviated nasal septum (DNS) result from:
 - **trauma**, either recent or long forgotten, perhaps during birth or childhood. 'Buckling' in children may become more pronounced as the septum grows.
 - **Maldevelopment** → Congenital (considered in etiology in addition to trauma).
 - **Nasal surgery**, including cosmetic surgery, can cause septal deviation. Spurs, crests, dislocation of quadrangular septal cartilage, buckling.

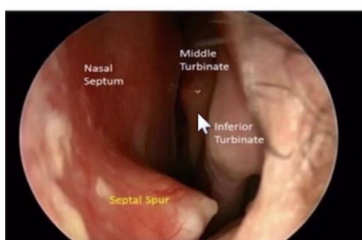


deviated septum

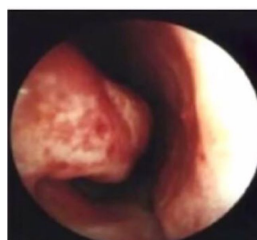


congested

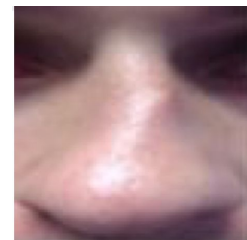
compensatory hypertrophy of turbinate to prevent entry of too much air compared to affected side. that's why they might complain of bilateral obstruction



spur because only a part of septum is deviated



spur



1

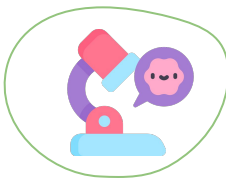
Cont: Diseases of nasal septum

Septal Deviations



Signs and Symptoms

- **unilateral** nasal obstruction, mouth breathing
- Hyposmia
- Epistaxis
- **recurrent sinusitis**
- -Quality of sleep, snoring(If severe could cause obstructive sleep apnea)



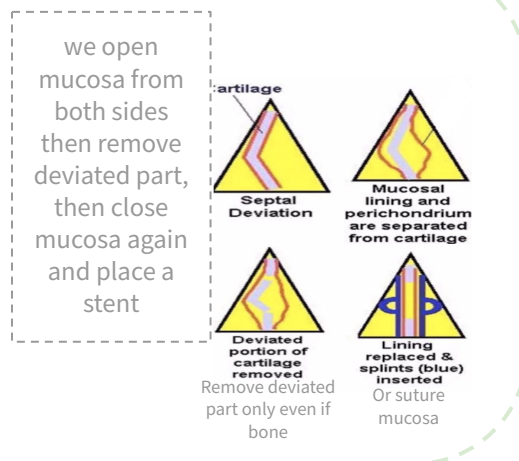
Diagnosis

- **anterior rhinoscopy**
- **Endoscopy**
- CT PNS (paranasal sinus)



Surgical Management

- Submucous Resection(SMR): obstructing cartilaginous and bony portion (removing deviated part)
- Septoplasty: removal of deviated cartilaginous and bony septum with reinsertion after remodeling and repositioning (preserves support system, less risk of perforation) (straightening deviated part and putting it back in)



1

Cont: Deviated nasal septum



Symptoms

- Nasal obstruction (most important sx) may be unilateral or bilateral
- External deformity.
- Crusting, epistaxis (due to dryness caused by air hitting the mucosa directly) (a sharp spur can be a focus for epistaxis)
- Recurrent sinus infection due to impairment of sinus ventilation, the middle turbinate on the concave side of the septum may hypertrophy and interfere with sinus ventilation.
- Anterior can cause facial pain but this is rare.
- Otitis media: DNS may impair the ability to equalize middle-ear pressure
- Septal deviations are often found in patients with allergic rhinitis.

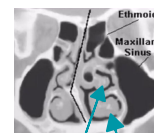


Diagnosis

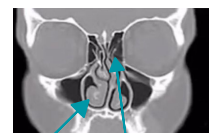
- The **diagnosis is mostly clinical in deviated septum:** elevations and ridge like protuberances, maxillary crest is groove for septum to set sometimes we find this groove projecting little pit as result of fault growth. As well as by endoscopy or speculum.
- **Radiology is unnecessary in most cases** only done when patient is suspected to have sinusitis.
- NSD is a cause of sinusitis.
- As a compensation the turbinate hypertrophies.



Normal



compensatory hypertrophy of turbinate



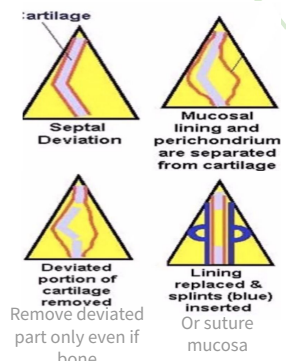
Deviated septum



Treatment

- If symptoms are minimal (asymptomatic) and there is only a minor degree of deviation, **no treatment is needed.**
- Submucous resection: obstructing cartilaginous and bony portion.
- Removal of deviated PART
- Septoplasty if symptomatic to correct the deviated nasal septum but it will not change the external nasal shape unless associated with rhinoplasty

we open mucosa from both sides then remove deviated part, then close mucosa again and place a stent



2

Hematoma of the septum



Etiology

- Direct trauma. broken nose
- Operative trauma. **“Septoplasty”** (most common cause) surgery. we put stent to prevent it
- Blood dyscrasias. “bleeding disorders”/ on anticoagulant



Clinical features

- **Obstruction.** main complaint unilateral or bilateral
 - Bleeding.
 - Lacerations.
 - Septal swelling:
- Unlike the turbinate the hematoma is: 1.red 2. soft 3.fluctuant 4.septal origin



Complications

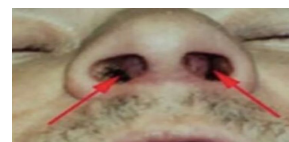
if you leave it it might cause abscess leading to destruction of cartilage and eventually **perforation and nasal deformity**

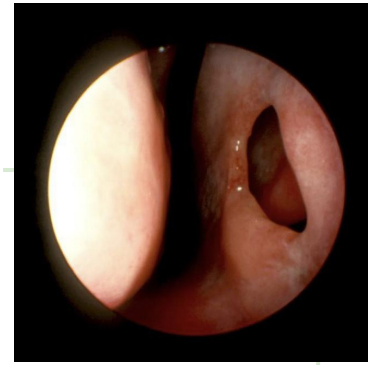
- Cartilage necrosis, causing saddle nose deformity.
- Septal abscess.
- Septal perforation
- Cavernous sinus thrombosis.
- Permanent thickening of the septum.



Treatment

- Immediate **Incision and drainage** of hematoma
- Nasal packing
- Systemic Antibiotics. As a prophylactic (don't forget dangerous triangle)





Etiology

- Septoplasties (Most Common Cause, >50%)
- Trauma (including repeated nose-picking).
- Infections (Tertiary syphilis)
- Drugs specially heroin because its a strong vasoconstrictor
- (Chronic inflammation, e.g. nasal granulomatosis such as TB and sarcoidosis, syphilis. it might also affect cartilage or bone) **EXAM Q**
- Inhalation of fumes, e.g. chrome salts.
- Cocaine Abuse (very powerful vasoconstrictor)
- Neoplasm
- Granulomatous Disease
- Vasculitis
- Corticosteroid nasal spray

Clinical features

Clinical features depend on the size and the site of the perforation. A perforation is readily seen and often has unhealthy edges covered with large crusts.

- Asymptomatic
- Obstructive Sensation From Turbulent Flow
- **Crusting** because ciliary movement is responsible for moving crust to nasopharynx so in case of perforation it will be interrupted so crust will collect at edge of perforation. due to turbulence of air
- **Epistaxis**
- **Whistling**, “the smaller the size of the perforation the more the whistling” “And the bigger the perforation → the more obstruction → due to air instead of going back to the nasopharynx there’s going to be turbulence “

Diagnosis

- Anterior rhinoscopy
- Biopsy of granulation tissue or abnormal mucosa
- Nasal endoscopy

Treatment

- No treatment, in asymptomatic patients
- **Nasal wash**
- Surgical closure by **silastic button**
- Consider sliding or rotating mucoperichondrial **flaps** with or without a fascial graft; contraindicated for large perforations (approximately >2 cm of vertical height), cocaine abusers, malignancy, granulomatous or vascular diseases
- **Saline irrigation**, emollients

4

Turbinate Hypertrophy

Chronic Rhinitis leading to turbinate Hypertrophy specially inferior.
Common in both children and adults.



manifestations

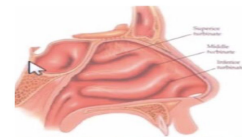
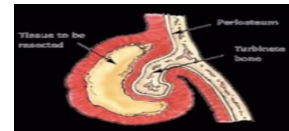
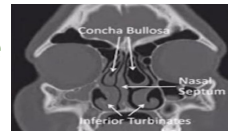
- Nasal obstruction
- mouth breathing



causes

Infectious or noninfectious

- Compensation (nasal deviation on the right may lead to turbinate hypertrophy on the left)
- Dysfunctional (adenoid)
- Allergic or non allergic
- Rhinitis medicamentosa: Due to the overuse of nasal decongestants.
- NSD and tumor



Treatment

Treat underlying cause

Surgical management

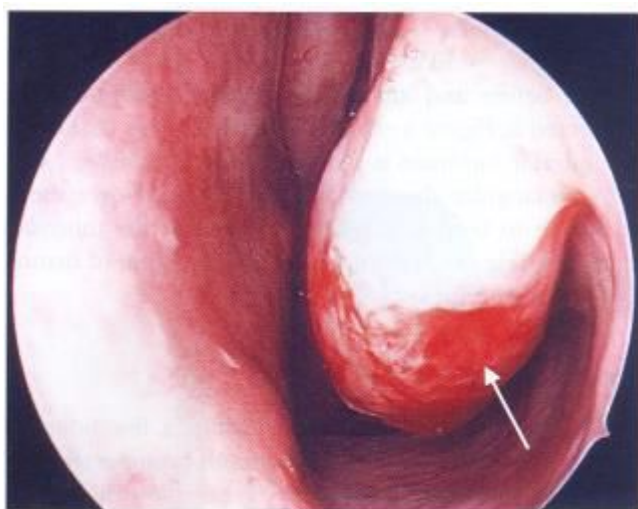
- SMR (submucosal resection)
- Turbinoplasty
- SMD (submucosal diathermy)
- Somnoplasty RF (Radio Frequency)
- Turbinectomy
- Ultrasonic reduction

Turbinate reduction goals:

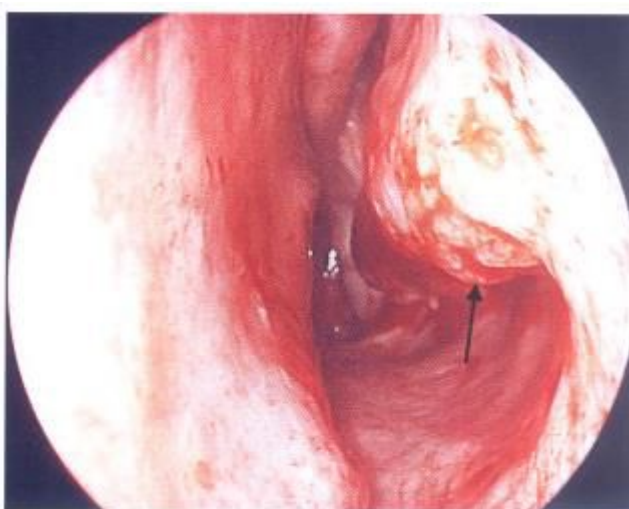
- Mucosal preservation
- Controlled reduction
- Submucous scarring to reduce the erectile nature of the mucosa
- Bony reduction when necessary
- Minimal complications

4

Cont: Turbinate Hypertrophy



Preoperative



Postoperative



Treatment

438 slides

treatment depends on symptoms: if patient complains of obstruction then treat. If no sx even if it's size is big just leave it

Medical management

1st treat the cause if allergy treat it. we usually start by medical.

- Antihistamine
- Decongestant
- Topical nasal steroid, nasal saline, sinus rinses
- Antibiotic if sinusitis
- Immunotherapy if allergic

Surgical management

just know there are multiple surgeries & the goal is to reduce turbinate size. do surgery if medical failed

- Cold steel turbinectomy, turbinoplasty
- Lateralization/outfracture of inferior turbinate
- Diathermy (electrocautery)
- Laser
- Cryosurgery
- Powered microdebrider
- Radiofrequency ablation
- Coblation

In surgery we don't do total turbinectomy we just remove part of it (partial turbinectomy), because it's important for protection of the nose. if you removed the whole turbinate, it might lead to atrophic rhinitis (crusting, bad smell of nose, obstructions, dryness..)

Emergencies in nasal obstruction

1

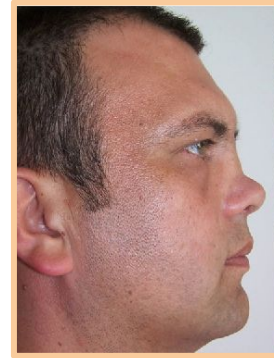
Septum Hematoma

Emergency:

- Elevation of mucosal Septal cartilage
- necrosis
- development perichondrium with cartilage devascularization

Complications:

- Septal cartilage necrosis
- abscess
- development of a **saddle-nose deformity**



2

Septum Abscess

Emergency:

- Intracranial extension of infection

Complications:

- Septal cartilage necrosis
- development of a saddle-nose deformity
- cavernous sinus thrombosis
- intracranial infection

3

Mucormycosis

Emergency:

- Tissue destruction

Complications:

- Extension to brain or orbit

Sadel Nasal Deformity

It is an abnormality in the structure and appearance of the nose that results in difficulty breathing, impaired sense of smell and other concerns



manifestations

- Shape of the nose looks abnormal
- Breathing obstruction



causes

- Previous nasal Surgery
- Trauma
- Malignancy
- Intranasal cocaine use



Treatment

- **Rhinoplasty** to augment nasal dorsum, (remodeling non functioning parts balance between structure and breathability.



Benefits (goals)

- Better nasal breathing
 - Less secretions
 - Less facial pain
 - Better smell
- These symptoms can be improved with surgery
- If the patient complains of headache, we may not be able to minimize these two symptoms with surgery, because most of the time it's a neurological issue (so don't raise patient's expectations)

Risks (think: intra-op vs. immediate vs. late)

- Bleeding (blood stain secretion)
- Infections (not seen with antibiotic use)
- Adhesions (post op follow up to catch synechia before it matures)
- Perforation
- Recurrence/failure/un-satisfactory benefits
- Injury to Skull Base, rare
- Injury to Orbit, rare

Alternatives

- Not useful in advanced cases example: stage 4 bilateral polyp. We do surgery to facilitate treatment after surgery.
- Saline sprays/irrigations
- INCS
- PO ATB
- PO Steroids
- Biological therapy: recently approved, very effective for CRS with nasal polyps

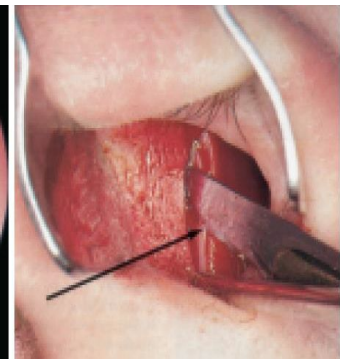
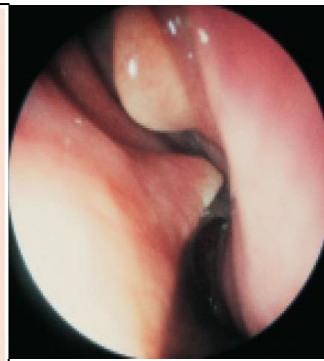
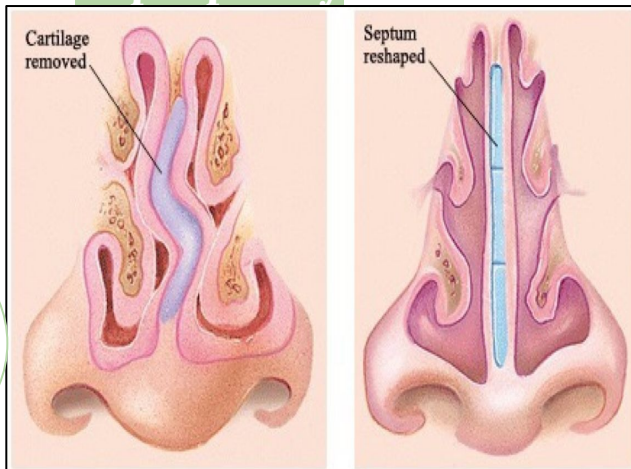
Indications

- **Failed medical treatment**
- **Complicated disease**
- Part of another procedure
- Reasonable patient preference

Nature

- Day surgery vs. admission (in cases of comorbidity)
- GA vs. LA
- Recovery: medications, complaints, contra-indications

Septoplasty



Goal of septoplasty is straightening septum and improve air-way.

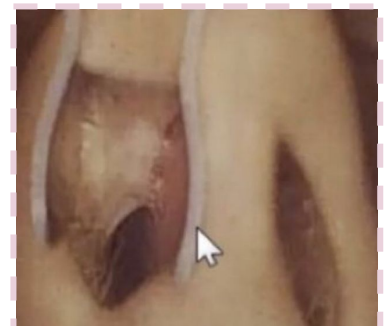
- Surgery involves elevating mucosal flaps from the septal cartilage and resecting part of the deviated cartilage, straighten it and put it back in place.
- Septal surgery should be undertaken with caution if at all in children as it may interfere with the growth of the mid-face.
- Nowadays we go in with certain techniques “we crush the deviated part with a specific tool for that” to repair the cartilage and put it back in place and also put splint inside “removable after 5 days”)

Indications of septoplasty

- Done only if the deviation causes symptoms, because a lot of people have mild deviation
- Nasal obstruction (deviated nasal septum)
- Epistaxis (when septum is deviated, air will crush it while inspiration, making it more dry, therefore more exposed to epistaxis)
- Access for transseptal sphenoidotomy (skull base approach)
- chronic sinusitis (when septum is obstructing)
- Headache from impacted spur
- Septal neoplasia (rare)
- Loss of smell
- When the septum is pushing a turbinate causing headache

Complications of Septoplasty

- **Synechia (Adhesions)** between septum and lateral side of the nose → will lead to obstruction. Exp next page
- Septal perforation
- Saddle nose deformity (over resecting cartilage anteriorly)
- Cribriform plate fracture
- Septal hematoma and abscess → due to infection
- Anosmia
- Septal abscess
- Bleeding



Synechia

Adhesion between septum and lateral nasal wall



Manifestation

- **Obstruction**
- **Scarring of nasal passage**



causes

- Complication of a nasal surgery
- Trauma



Treatment

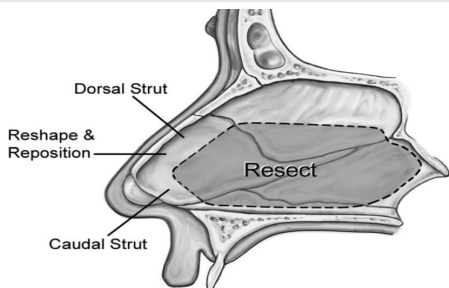
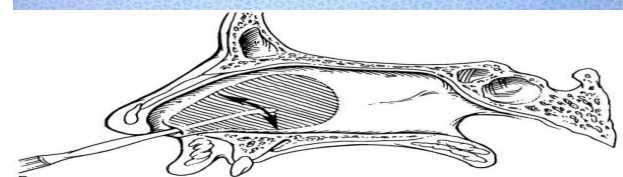
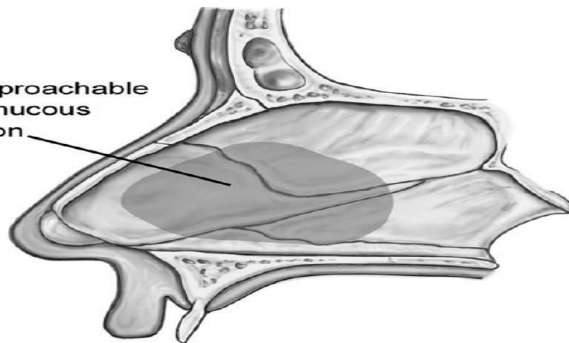
- If synechia is present we have to **slice it** and put a **silastic Button** to prevent recurrence of synechia

Submucous Resection

Surgical correction of nasal valve deformities

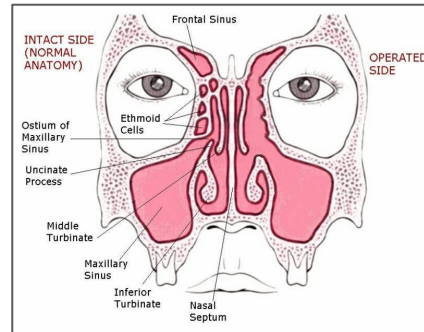
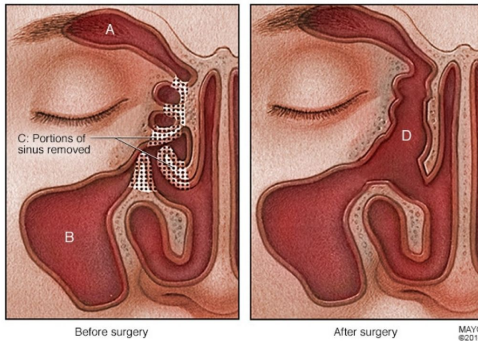
- Widening the valve apex
 - Spreader grafts
 - Osteotomies
- Widening the valve angle
 - Flaring sutures
 - Suspension sutures
 - Butterfly grafts
- Stiffening the lateral crura
 - Alar batten grafts
 - Lateral crural J-flap

Area Approachable by Submucous Resection





Functional Endoscopic Sinus Surgery (FESS)



- minimally invasive technique in which sinus air cells and sinus ostia are opened under direct visualization. The goal of this procedure is to restore sinus ventilation and normal function.
- Open all sinuses to increases ventilation and drugs effects on the sinus.
- The idea is to remove the lamella
- We always start with uncinata process, After that we remove the anterior ethmoid, The third lamella we remove is the basal lamella of the middle turbinate.
- The extent of the surgery depends on the disease
- Any procedure within the nose could be done with **endoscope**

Indications of FESS

- Chronic sinusitis
- Complicated sinusitis
- recurrent acute sinusitis, Failed medical management of acute sinusitis, fungal sinusitis, Obstructive nasal polyposis, Sinus mucocoeles, Remove foreign bodies, Tumor excision, Transsphenoidal hypophysectomy, Orbital decompression, Dacryocystorhinostomy, Septoplasty, Orbital nerve decompression, Grave's ophthalmopathy, Choanal atresia repair, CSF leak repair, Control epistaxis, Turbinectomy.

FESS goals

- Eradication of disease.
- Permanent drainage and ventilation of the affected sinuses Drainage.
- Postoperative access to the previously diseased areas

FESS Landmarks (CLOSE)

1. **Cribriform plate**
 2. **Lamina papyracea**
 3. **Orbit**
 4. **Sphenoid**
 5. **Ethmoid**
- Complete extirpation of all the disease
 - Permanent drainage and ventilation of the affected sinuses
 - Postoperative access to the previously diseased areas.

The steps of FESS

1. Medialized middle turbinate
2. Excise uncinata process
3. Anterior then posterior ethmoidectomies
4. Sphenoidotomy
5. Frontal recess sinusotomy
6. Create maxillary antrostomy

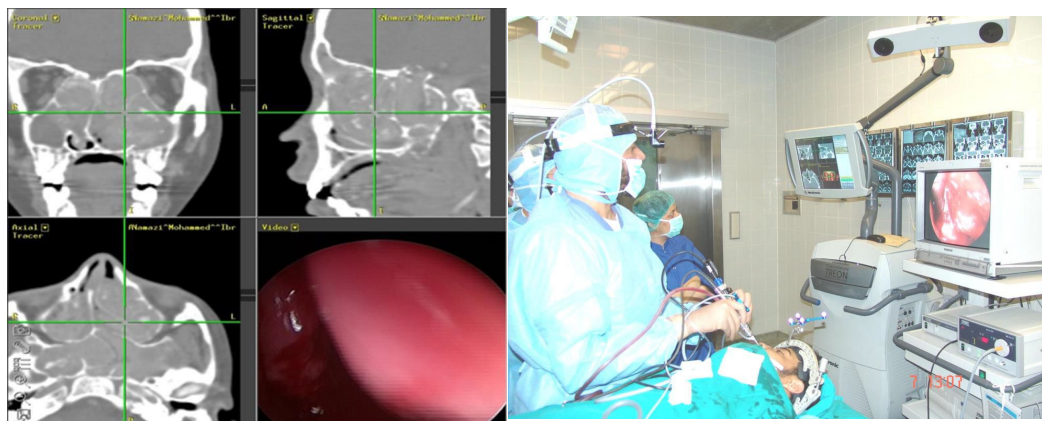
Postoperative Care

- Sinus Packing.
- Oral Antibiotics for a minimum of 2 week.
- Aggressive nasal hygiene to prevent adhesions (saline irrigations).
- Nasal steroids.
- Nasal debridement at 1, 3, and 6 weeks.

Cont: Nasal operations

Extended FESS

- CT Guided FESS
- Power Instrument
- Mini FESS



Polypectomy



Ethmoidectomy

Excellent results

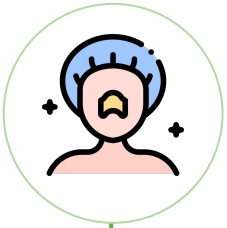
- 71% normal at one year
- Meta analysis 89% success
- with 0.6% complications

FESS Orbital Complications

- **Blindness**
 - Indirect injury (retrobulbar Hematoma)
 - Direct injury to the optic nerve
- **Orbital Fat Penetration**
 - increases risk of retrobulbar hematoma
 - Rx: recognize orbital fat (orbital fat floats)
 - avoid further trauma
 - may complete the FESS
 - avoid tight nasal packing
 - Observe for vision changes, proptosis, or restricted ocular gaze
- **Diplopia:** orbital muscle injury, most commonly from medial rectus and superior oblique muscles
- **Epiphora:** injury to lacrimal duct system, avoid operating anterior to the attachment of the uncinata; Rx: observation initially, if no resolution then dacryocystorhinostomy

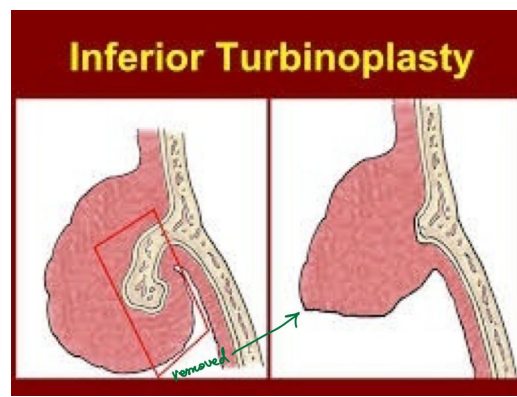
Retrobulbar Hematoma

- **Pathophysiology:** most commonly from retraction injury of the anterior ethmoid artery which causes increased orbital pressure that compresses the vascular supply to the optic nerve, also may occur from venous injury near the lamina papyracea
- **Avoidance:**
 - Maintain orientation and operate under direct vision
 - Examine CT for dehiscence
 - Correct coagulopathies

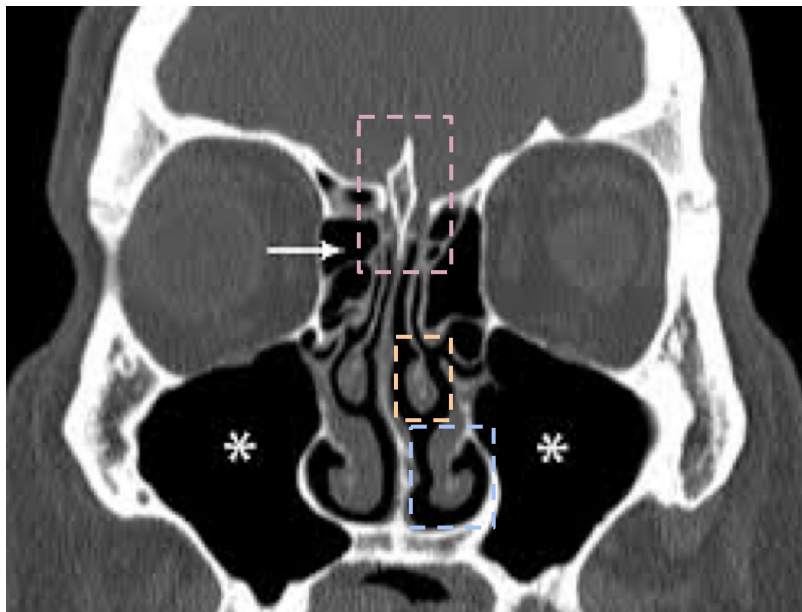


Turbinoplasty

- Removal of an enlarged inferior turbinate.
- Always start with topical corticosteroids before doing turbinoplasty, because most of the patients with enlarged inferior turbinate respond very well to topical corticosteroids.
- If not respond to corticosteroids, we offer them turbinoplasty



CT SCAN



As you can see, the attachment of the middle turbinates can change, could be into the skull base sometimes .

crysta gali: part of perpendicular plate of ethmoid bone

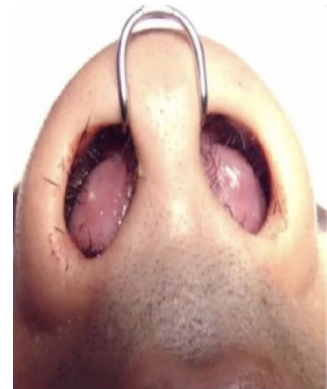
Middle turbinate

Inferior turbinate

Questions from 437 Dr's slides

Q1. A 25 year old man post RTA with fever and nasal obstruction.

- What is your diagnosis?
Bilateral Septal Hematoma or abscess due the presence of FEVER.
- What is your management?
Antibiotic and incision & drainage

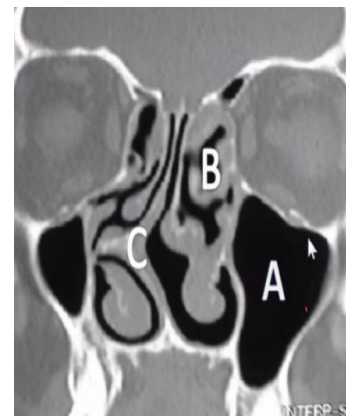


Q2. What is the Radiological study?

CT

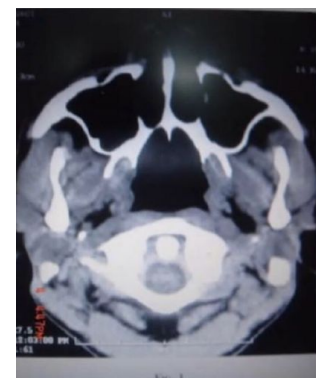
What is A, B and C?

- A is the maxillary sinus
- B is the ethmoid
- C is the deviated septum



Q3. This is a CT of a newborn who presented with respiratory distress.

- What is your diagnosis?
Bilateral choanal atresia
- What is the management?
Initial: oropharyngeal airway
Definitive: perforation



Questions (thanks to 436)

1- A child presented with foul smell from the nose with discharge and obstruction what is the most common condition?

- A. Foreign body
- B. Polyp
- C. Allergic rhinitis
- D. Nasopharyngeal carcinoma

2- Young Patient came with unilateral nasal obstruction. In endoscope we found a pedunculated friable mass that bleeds with touch. What's the diagnosis?

- A. Nasopharyngeal cancer
- B. Inverted papilloma
- C. Allergic fungal sinusitis
- D. Chronic rhinitis

3- 20 year-old lady had aggressive inferior turbinectomies few years ago. Since then she is complaining of nasal obstruction, with foul nasal smell. What is the possible complication?

- A. Allergic rhinitis.
- B. Atrophic rhinitis.
- C. Chronic sinusitis.
- D. Nasal polyp

4- 30 year-old women complaining of headache increase on leaning forward during praying and mucopurulent post-nasal discharge.

On examination, there was nasal discharge in both nasal fossae. What is the investigation required to reach the diagnosis?

- A. Skin allergy test.
- B. CT sinuses.
- C. Plain x-ray to the nasal bone.
- D. Full blood count.

5- A 20 years old patient was on antibiotics for acute frontal sinusitis. He developed diplopia, decreased vision in the left eye and pain behind the left eye. What is the diagnosis?

- A. Brain abscess
- B. Cavernous sinus thrombosis
- C. Preseptal cellulitis

Answers:A/B/B/B/B

Questions (cont.)

6- 78 year-old patient noticed right sided nasal obstruction associated with a bloody discharge that had developed over the last month. What is the most likely diagnosis?

- A. Adenoidal hypertrophy.
- B. Allergic rhinitis.
- C. Carcinoma paranasal sinuses.
- D. Nasal polyposis.

7- A New born child had cyanosis and difficulty breathing immediately after delivery. The cyanosis improves with crying. Which of the following is the most likely diagnosis?

- A. Enlarged Adenoid
- B. Laryngomalacia
- C. Laryngeal web
- D. Bilateral choanal atresia

8- A 45 years old patient presented with progressive bilateral nasal obstruction. He was diagnosed as a case of bilateral nasal polyp. He underwent polypectomy and histological examination was required. What is the expected finding that confirms the clinical diagnosis?

- A. Benign neoplasm
- B. Granuloma
- C. Malignant neoplasm
- D. Oedematous mucosa

9- A 12-year-old girl is complaining of left unilateral nasal obstruction worse on expiration for 5 months. Examination of the nose showed a single pale grayish glistening pedicle mass in the posterior part of the left nasal cavity. A CT showed pacification of the left nasal cavity, maxillary sinus and the nasopharynx. What is the most likely diagnosis?

- A. Antrochoanal polyp
- B. Inferior turbinate enlargement
- C. Mucocele
- D. Juvenile angiofibroma

Answers:C/D/A/A

THANK YOU!

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Special Thanks to

439 Team

