# NOSE III - IV

## Objectives:

- Know the causes, clinical manifestations and management of acute and chronic sinusitis.
- Know about fungal sinusitis in brief.
- Know the classification and management of sinusitis complications, in addition to the investigation and general management of orbital complications.
- Be familiar with the role of radiology in sinusitis.

[ Color index : Important | Notes | Extra ]

**Resources:** Slides+Notes+Lecture notes of ENT+433team.

**Done by**: Saleh Alshawi.

**Revisde by:** Adel Al Shihri.

## Introduction:

- Nasal infections are common cold (<7 days), acute sinusitis (10 days-3 months) and chronic sinusitis (> 3 months).
- All are an infection within the mucosa of the nasal cavity and paranasal sinuses, the difference between them lies in the **duration** and **some symptoms**.
- Generally they all present with same symptoms **PODS:**
    - Pain or facial pressure.
    - Obstruction.
    - Discharge (which is thick, purulent and sticky).
    - Smell.
    - Discharge can be either anterior rhinorrhea (from anterior nostril) or postnasal drip (expelled by the mouth or swallowed).
- These symptoms are different from Allergic rhinitis symptoms which are absent in common cold and sinusitis. (Sneezing, Itchiness and Runny nose "a term used to describe thin watery and frequent nasal discharge")

### ❖ Common cold:

- Very common, affects almost any person in life.
- Lasts for **less than 7 days**.
- Usually the cause is **viral** (Rhinovirus, Influenza A/B virus, parainfluenza virus, RSV).
- It gets better by time (worst symptoms are in first day then it gets much better by the last day), if it becomes better but then drop again (double peak or "worsening after initial improvement"), it is considered as acute sinusitis even if less than 10 days.
- Why is this important? Because **management** will differ. Common cold is not managed by Antibiotics, rather you only advise the patient to rest, drink large amount of fluids and use analgesics and decongestant if needed.

## Sinusitis:

| | |
|---|---|
| **Acute** | the persistence of upper respiratory symptoms for greater **than a 7--day course but lasts less than 4 weeks.** |
| **Subacute** | nasal symptoms lasting 4 weeks to 12 weeks. |
| **Chronic** | **persistence mucosal inflammation for > 12 consecutive weeks** despite medical therapy or occurrence of more than 4 episodes a year. |

### ❖ Acute rhinosinusitis:

- **Inflammation of the mucosal lining** of the nasal cavity and paranasal sinuses that lasts for more than **10 days and less than 3 months**.
- It affects huge number of people worldwide and has an impact on their life.
- **Women** are affected more than men (Some studies accounted that women deal with children more than men and thus they are more exposed to microorganisms).

➔ ***S*treptococcus pneumonia**
➔ ***H*aemophilus influenza**
➔ ***M*oraxella catarrhalis.**

Infection lasting less than three months with more severe symptoms. The most common cause of acute sinusitis is a **viral infection associated with the common cold.** Bacterial sinusitis occurs much less commonly, in only 0.5 to 2 percent of cases, usually as a complication of viral sinusitis. Nasal sinus become infected whenever there is a blocked drainage introduced by allergy, infection, immunosuppression, or ciliary dysfunction

#### ➔ Predisposing factors

1. **Nasal obstruction** by nasal polyps, tumors, mucous plug, edema, septal deviation or head trauma causing blockage of sinonasal pathway.
2. **Ciliary dysfunction** (Primary ciliary dyskinesia) like in Kartagener's syndrome.
   - ★ Both (obstruction & ciliary dysfunction) will result in stagnation of nasal secretions, creating a good environment for the bacteria to grow.

3. **Altered quantity or quality of the nasal mucous** (That's why patients with sinusitis are advised to drink large amounts of fluids to increase the quantity and to correct the quality of the mucous to be thin and excretable).

★ This is commonly caused by dehydration (common in elderly) and cystic fibrosis (in which, mucous is thick and poorly discharged, almost 99% of cystic fibrosis patient will encounter an episode of sinusitis in their life). Etiology Viral (More in common cold). Bacterial (Streptococcus pneumonia, H.Influenza, Moraxella cattharalis).

## ➔ History

- **Symptoms:** (PODS)
  - **Pain**: Ask about the site to know which sinuses are affected and to exclude other causes of upper facial pain and pressure e.g. Migraine)
  - **Obstruction**: Ask whether unilateral or bilateral (Each has a list of differentials).
  - **Discharge**: Ask about thickness, consistency, color, amount, frequency Acute Sinusitis and if anterior or Posterior (post nasal discharge).
  - **Deceased in smell sensation** (Anosmia "Complete" or Hyposmia "Partial").
  - **Systemic symptoms**: **fever,** fatigue and muscle pain.
  - **Ear symptoms**: patients with acute sinusitis may present with otitis media due to Eustachian tube dysfunction secondary to sinusitis.
  - Dental issues (Especially if unilateral symptoms) (e.g. a patient presents with symptoms of acute sinusitis due to tooth extraction and spread of organisms "Usually anaerobes" from the tooth origin to maxillary sinus all the way to the other paranasal sinuses causing acute sinusitis). (In this case the Treatment is: Metronidazole or Clindamycin).
  - Visual and neurological symptoms: symptoms of sinusitis complications (Will be discussed later).
  - **Duration** (10 days – 3 months) Immune status (Be more aggressive in the treatment with immunocompromised patients).

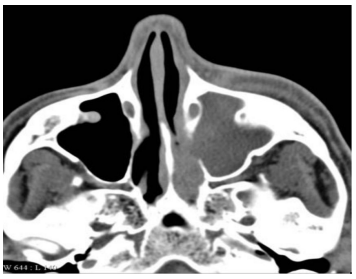
## ➔ Examination

- Fever, facial edema, erythema and tenderness around the nose.
- Using a speculum to inspect the nose from inside or by a Rhinoscope: signs of inflammation (redness, swelling and discharge).
- Look at any cause of obstruction or deviated nasal septum.
- Sometimes, brief look at the oral cavity to see the teeth is important if you suspect dental origin of infection.

## ➔ Investigations

- It depends on how bad the disease is, sometimes no investigations are required at all.
- If the patient is really sick, do: **CBC, ESR.**
- Culture: only done if the patient had been given antibiotics and didn't improve, or if you suspect uncommon microorganism.

- CT scan, when you suspect something serious (e.g. Meningitis, like when the patient reported photophobia).



- CT shows: Mucosal thickening, fluid filled sinuses and soft tissue density

## ➔ Treatment

- The initial treatment aims to relieve the symptoms, since almost everyone **will improve within 7--10 days.** At this stage, antibiotics can only be used if there is clear evidence of severe bacterial infection.
- So as an initial treatment, we can give acetaminophen or ibuprofen for the pain, flushing the nose and sinuses with a saline solution to decrease pain associated with nasal congestion, and nasal decongestants to temporarily treat congestion.
- Nasal decongestants ⟶ (No nasal adverse effects with Systemic nasal decongestant, but local might cause Physiological addiction).

- Antibiotics:
    - 1st line: Amoxicillin, if the patient is penicillin allergic, give Macrolides (Clarithromycin or Azithromycin).
    - 2nd line (when 1st line treatment fails): Amoxicillin + Clavulanic acid, and if the patient is penicillin allergic, give Fluoroquinolones (Ciprofloxacin or Levofloxacin).

- Analgesics, Decongestant, High fluid intake and Sinus wash.
- Intranasal Corticosteroids. (Help to avoid the progression to chronic sinusitis).

## ❖ Chronic rhinosinusitis:

- Inflammation of the mucosal lining of the nasal cavity and paranasal sinuses that lasts **more than 3 months**.
- Those patients suffer a lot while nobody can feel or understand their problem, It's one of the diseases that severely affect the quality of life.

### ➔ Predisposing factors

- Long standing nasal obstruction.
- Transnasal tube or NG tube that is left for a long time (e.g. in ICU).
- Atopic (Allergic) rhinitis.
- Primary ciliary dyskinesia.
- Poor quality of the mucous.
- Hormonal factors (chronic sinusitis is a common disease in puberty and pregnancy due to hormonal changes).
- Acid reflex (GERD).
- Immunodeficiency.
- Patients with hyper inflammatory status such as Wegner's disease (also called Granulomatosis polyangitis).
- Dental procedures.
- Churg-Strauss syndrome.

### ➔ Etiology

- Almost always a bacterial cause (Staphylococcus aureus, coagulase negative staphylococci and pseudomonas species and less commonly Bacteroids and other anaerobes).
- "Staph Aureus and some other bacteria are able to release what is called Superantigen; in which the immune system is activated aggressively in a nonfunctional way, this is done in order to distract the immune system from the site of infection and deviate it to other sites in the body. When this occurs, immune cells start proliferating to release huge amount of useless antibodies, those patients have Eosinophilia, Hyper IgE".

### ➔ History

- Symptoms: Just like acute sinusitis (PODS).
- There are four cardinal signs/symptoms of CRS in adults:
    - Anterior and/or posterior nasal mucopurulent drainage.
    - Nasal obstruction/nasal blockage/congestion.
    - Facial pain, pressure, and/or fullness.
    - Reduction or loss of sense of smell.

- No fever (very important). However they may encounter other systemic symptoms (fatigue, tiredness and muscle pain).
- Ear symptoms.
- Halitosis.
- Dental issues.

- Visual and neurological symptoms.
- Immune status.
- **Duration: more than 3 months**.
- It's important to ask about cough and exaggeration of asthma (They are commonly associated with chronic sinusitis).
- It was noticed that when you deal with chronic sinusitis, asthma symptoms improve a lot and the need of asthma medications is reduced dramatically.

### ➔ Examination

- Facial edema, erythema and tenderness around the nose.
- Swelling and redness of nasal cavity using a Rhinoscope, you may also see nasal polyps as a predisposing factor to develop chronic sinusitis or as a complication of long standing chronic sinusitis.
- Brief dental exam.

### ➔ Investigations

- CBC (Eosinophilia, since many patients have chronic sinusitis due to allergic rhinitis).
- Culture (If the patient show no response to the treatment).
- CT (standard to be done in chronic sinusitis, to confirm the diagnosis and to assess the severity of the disease, also should be done pre-surgically).
- MRI (look for complications).
- Others: IgE, ESR, Serology (in case of autoimmune diseases).

### ➔ Treatment

- Mainstay treatment is local intranasal corticosteroids.
- Systemic steroids orally (Only given in chronic sinusitis), Steroids may help decreasing polyps size and improving olfaction.

- Antibiotics (same): given for 14 days.
    - 1st line: Amoxicillin, if the patient is penicillin allergic, give Macrolides (Clarithromycin or Azithromycin).
    - 2nd line (when 1st line treatment fails): Amoxicillin + Clavulanic acid, and if the patient is penicillin allergic, give Fluoroquinolones (Ciprofloxacin or Levofloxacin).

- Next step is surgical treatment (FESS) + Steroids, given after the surgery to reduce the inflammatory changes (e.g. scarring) during the process of healing.
- FESS: Functional endoscopic sinus surgery.
- Steam inhalation and nasal saline irrigation may help by **moistening dry secretions, reducing mucosal edema and mucus viscosity.**

## Sinusitis Complication:

Three main categories:

- **Orbital**(60--75%)
- **Intracranial**(15--20)
- **Bony**(5--10%)

**Radiography:**

- Computed tomography (CT) best for orbit.
- Magnetic resonance imaging (MRI) best for intracranium.

### ❖ Orbital:

**Orbital Complications:** "Chandler Criteria"

**Five classifications:**

- Preseptal cellulitis.
- Orbital cellulitis.
- Subperiosteal abscess.
- Orbital abscess.
- Cavernous sinus thrombosis

#### ➔ Preseptal Cellulitis

- "managed by antibiotics

#### ➔ Orbital Cellulitis

- Patients may complain of pain and diplopia and a history of recent orbital trauma or dental surgery.
- Diagnosis of sinusitis complications: based on the symptoms and the CT scan or MRI findings.

## ➔ Subperiosteal Abscess

- surgical drainage is indicated if there is worsening of visual acuity or extraocular movement, or in case of lack of improvement after 48 hours.

"Antibiotics then drainage"

- Approaches :
  - External ethmoidectomy (Lynch incision) is most preferred.
  - Endoscopic ideal for medial abscesses.
  - Transcaruncular approach

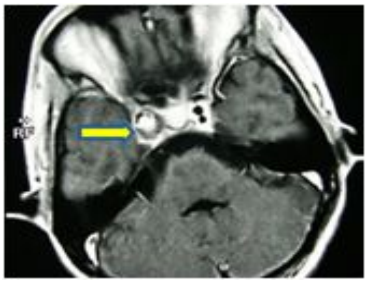
## ➔ Orbital Abscess

- Similar approaches as with subperiosteal abscess:
  - Lynch incision.
  - Endoscopic.

## ➔ Cavernous Sinus Thrombosis

- Symptoms of Cavernous Sinus Thrombosis :
  - Orbital pain, Proptosis, chemosis Ophthalmoplegia, Symptoms in contralateral eye, Associated with sepsis and meningitis.
- Radiology: Better visualized on MRI.
- Mortality rate up to 30%. Needs surgical drainage and intravenous antibiotics.

Transcaruncular approach allegedly does not utilize a facial incision



## ❖ Intracranial Complications :

**Five** types:

- **Meningitis "the most common".**
- Epidural abscess.
- Subdural abscess.
- Intracerebral abscess.
- Cavernous sinus, venous sinus thrombosis

Teenagers affected more because of developed frontal and sphenoid sinuses, and because they are more prone to URI's than adults.
Thrombophlebitis originating in the mucosal veins progressively involves the emissary veins of the skull, the dural venous sinuses, the subdural veins, and, finally, the cerebral veins. By this mode, the subdural space may be selectively infected without contamination of the intermediary structure; a subdural empyema can exist without evidence of extradural infection or osteomyelitis.

## ❖ Bony Complications:

### ➔ Pott's puffy tumor

- Frontal sinusitis with acute osteomyelitis.
- Subperiosteal pus collection leads to "puffy" fluctuance.
- Rare complication.

Sir Percivall Pott described Pott's Puffy tumor in 1768 as a local subperiosteal abscess due to frontal bone suppuration resulting from trauma. Pott reported another case due to frontal sinusitis.

## Fungal sinusitis:

- Fungal rhinosinusitis is a fungal infection of the paranasal sinuses. Fungal colonization of the upper and lower airways is a common condition, since fungal spores are constantly inhaled into the sinuses and lungs.
- **Allergic fungal rhinosinusitis involves a hypersensitivity response to colonizing fungi.**
- **Invasive fungal sinusitis** can be acute or chronic. Acute invasive fungal sinusitis is usually seen in immunocompromised patients and has a time course of days to few weeks, whereas chronic fungal sinusitis is usually seen in patients who are less immunocompromised with a time course greater than 12 weeks.
- So the patients in general are immunocompromised, usually due to diabetes, cancer, HIV, organ transplantation or using systemic or intranasal glucocorticoids.

- 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.

- Patients with chronic invasive fungal sinusitis present with symptoms of long--standing sinusitis. Symptoms are usually not acute, and fever and mental status changes are absent. Orbital apex syndrome, which is characterized by a decrease in vision and ocular immobility due to a mass in the superior portion of the orbit, is usually associated with this condition.
- **Diagnosis:** early nasal endoscopy with biopsies of affected tissues. Cultures of the affected biopsy specimen are usually positive. Assessing the extant of infection should be done using CT scan or MRI.

- **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.
- **Treatment of chronic invasive fungal sinusitis: Surgical treatment** is mandatory. Initiate medical treatment with systemic antifungals once invasion is diagnosed. **Amphotericin B** (2 g/d) is recommended; this can be replaced by **ketoconazole** or **itraconazole** once the disease is under control.

# Disease Of The Nasal Septum:

- The nasal septum is made up of bone and cartilage.
- It can be deviated, perforated, or collapsed.

## ❖ Deviated nasal septum

- 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 sino-nasal pathology by obstructing the normal sinus drainage pathways.
- Septal deviation can be corrected by surgery, with excellent results.
- 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.

### ➔ Effects

- Symptoms:
  - Nasal obstruction.
  - External deformity.
  - Crusting, epistaxis. Due to dryness

- Nasal obstruction – may be unilateral or bilateral.
- Recurrent sinus infection due to impairment of sinus ventilation by the displaced septum.
- The middle turbinate on the concave side of the septum may hypertrophy and interfere with sinus ventilation.
- Severe deviation is apparent on looking at the nose and septal surgery is an important component of aesthetic nasal surgery (septorhinoplasty).
- Can cause facial pain but this is rare.
- Otitis media. DNS may impair the ability to equalize middle-ear pressure.
- Nosebleeds – a sharp spur can be a focus for epistaxis (Fig. 17.2).

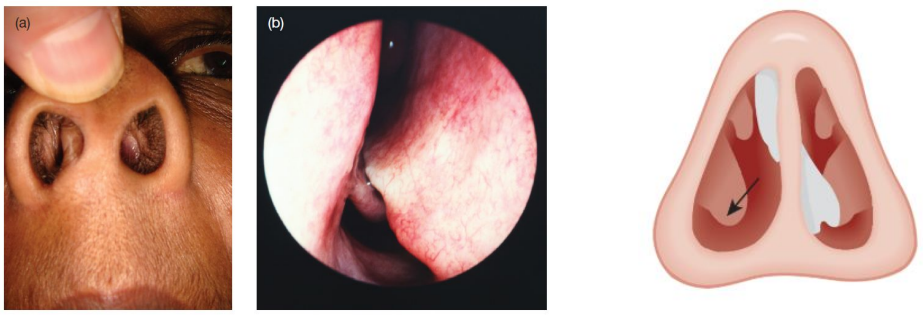
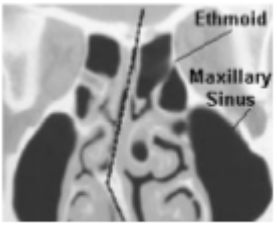



Figure 17.2 (a) Deviated nasal septum and (b) endoscopic view.

## ➔ Diagnosis:




- The diagnosis is mostly clinical in deviated septum.
- Radiology is unnecessary in most cases.

## ➔ Treatment

- If symptoms are minimal (**asymptomatic**) and there is only a minor degree of deviation, **no treatment** is needed.
- Septal deviations are often found in patients with allergic rhinitis. Treat the rhinitis rather than the septal deviation. Where symptoms are more severe correction of the septal deformity is justified (though never essential).
- Surgery involves elevating mucosal flaps from the septal cartilage and resecting part of the deviated cartilage before replacing it in the midline (septoplasty, check the figure).
- 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").

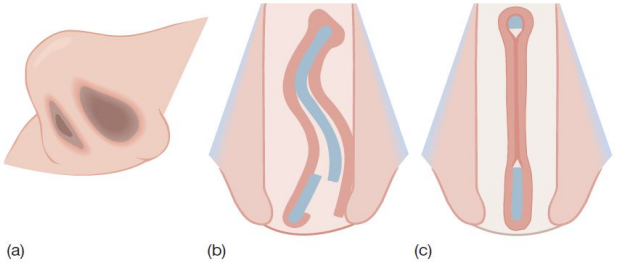



Figure 17.3 Nasal septal surgery (septoplasty). (a) Incision through the muco-perichondrium. (b) Elevation of muco-perichondrial flaps on either side of the septal skeleton. (c) The displaced cartilage and bone have been resected, allowing the septum to resume a midline position.

★ Complications of Septoplasty:

- Septal hematoma And abscess. → due to infection
- Septal perforation.
- Nasal deformity.
- Synechia (Adhesions) → will lead to obstruction.

■ In septal hematoma, the cartilage of the septum receives its blood supply from the perichondrium, so if the hematoma was central it'll separate the perichondrium from the septum → Necrosis & deformity
And if you have a central hematoma ⟶ emergency/direct drainage.

## ❖ Hematoma of the septum

### ➔ Etiology:

- Direct trauma.
- Operative trauma. “Septoplasty”
- Blood dyscrasias. “bleeding disorders”

### ➔ Clinical features:

- Obstruction.
- bleeding.
- lacerations.

### ➔ Complications:

- Cartilage necrosis.
- Septal abscess.
- Permanent thickening of the septum. At the site where the hematoma has developed → very common in patients who have gotten a Septoplasty due to trauma “it’ll appear as a mass”

### ➔ Treatment:

- Incision and drainage. Emergency
- Systemic Antibiotics. As a prophylactic

## ❖ Perforation of the septum

### ➔ Aetiology:

- Perforation of the nasal septum may result from the following conditions:
  - Nasal surgery.
  - Trauma including repeated nose-picking.
  - Chronic inflammation, e.g. nasal granulomatosis, syphilis.
  - Inhalation of fumes, e.g. chrome salts.
  - Cocaine.
  - Carcinoma.

### ➔ Effects:

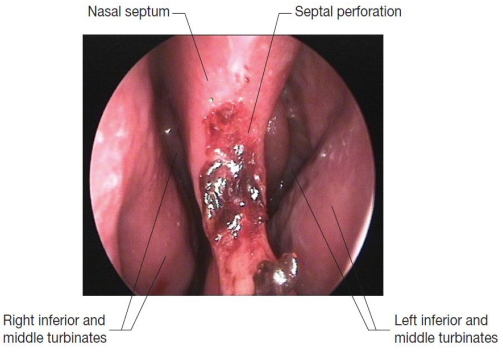
- Many septal perforations cause no trouble. They may give rise to epistaxis and crusting or rarely whistling on inspiration or expiration.
- A perforation is readily seen and often has unhealthy edges covered with large crusts.

➔ **Clinical features:** "clinical features depend on the size and the site of the perforation"

- Asymptomatic.
- Crusting. 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 "

➔ **Treatment:**

- No treatment. "in Asymptomatic patients"
- Nasal wash.
- Surgical closure.




## ★ Surgical reduction of the Inferior Turbinates

- Turbinate is another name for concha.
- Turbinate resection, Total "not done anymore because it'll cause the loss of all the imp functions of the nose like ex: protection and conditioning" or partial.
- Out fracturing of the inferior turbinate. "to widen the airway, Dr said know the name of this procedure"
- Destructive procedures, including electro cautery, cryosurgery, laser surgery, and submucous resection.

According to the doctor, nowadays we prefer going with the submucous resection due to less symptoms and less bleeding.
But still the electro cautery is one of the best options but the problem with it is that it doesn't provide permanent results (lasts for 3 years only) "temporary"

Causes of hypertrophy:
-Compensatory mechanism in septal deviation.
-Rhinitis with chronic use of vasoconstrictors → rebound.

## Epistaxis:

- Nosebleeds are common; they can be persistent, serious and life-threatening.
- One of the functions of the nose is to warm and humidify inspired air. The nasal mucosa has a very rich blood supply and undergoes constant variation in the state of engorgement of its blood vessels.
- Vessels from both the internal and external carotid artery contribute, i.e. the ethmoidal arteries from the internal carotid and the greater palatine, superior labial and sphenopalatine arteries from the external carotid.
- These vessels form a rich plexus on the anterior part of the septum – Little's area or 'Keisselbachs plexus'.
- Nosebleeds in young patients usually settle quickly as the blood clots and the vessels go into spasm.
- In elderly patients the vessels are rigid and atheromatous.

### ➔ Aetiology

- Some common causes are given in Table 34.1.
- Most nosebleeds are idiopathic.
- Spontaneous epistaxis is common in children and young adults; it usually arises from Little's area or from a prominent vein just below.
- It may be precipitated by infection or minor trauma, is easy to stop, but tends to recur.
- Nosebleeds in the elderly are far more difficult to treat.
- The bleeding site is often high up in the posterior part of the nose and on the lateral nasal wall.

**Table 34.1 Causes of epistaxis**

| Local causes | General causes |
|---|---|
| Spontaneous | Cardiovascular conditions |
| Trauma | Hypertension, raised venous pressure |
| Tumours | Coagulation or vessel defects |
| Hereditary telangiectasia | Haemophilia |
| Nasal allergy | Leukaemia |
| | Anticoagulant therapy |
| | Thrombocytopaenia |
| | Fevers (rare) |
| | Influenza |

- Local causes:
  - Acute trauma, Chronic trauma.
  - Deviated septum.
  - Inflammation of the nose and sinuses.
  - Tumors, Idiopathic.

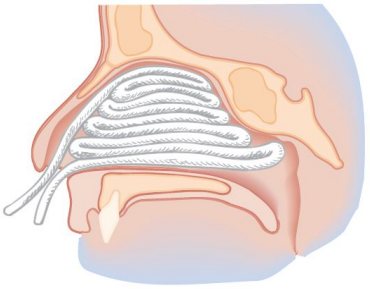
- Systemic causes:
    - Coagulation and bleeding diseases.
    - Atherosclerosis.
    - Familial hemorrhagic telangiectasia, “Autosomal dominant disease where they have no muscles around the blood vessels thus will present with bruises and GI bleeding”

## ➔ Treatment

- The treatment priorities are twofold: stop the bleeding and resuscitate the patient who has had a serious bleed.
- General measures. “ABC”
- Stop the bleeding.
- Prevent further bleeding.

## ★ Control the bleeding

- Digital pressure. +Leaning forward.
- Cautery. “With silver nitrate”.
- Anterior nasal packing, Postnasal packing.
- Arterial ligation : Maxillary, Ethmoids, External carotid.
- Arterial embolization.



Anterior nasal packing.

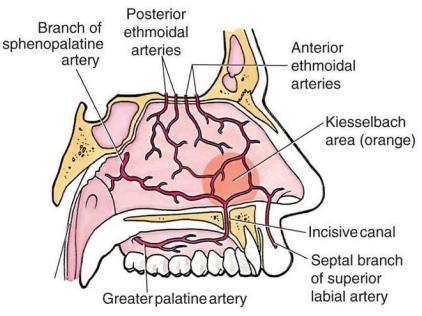
In anterior nasal packing, it can be used for as long as needed. But usually we have to remove it before 24 hours or in left more than you need to give prophylactic Antibiotics → to prevent against infection “toxic shock syndrome”

## ➔ Why bleeding from the nose?

- Vascular organ secondary to incredible heating/humidification requirements.
- Vasculature runs just under the mucosa. “Very rich in blood supply”.
- Arterial to venous anastomoses.
- ICA and ECA blood flow.

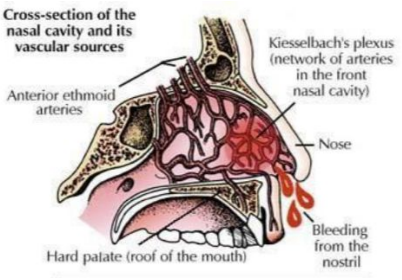
## ➔ Sites:

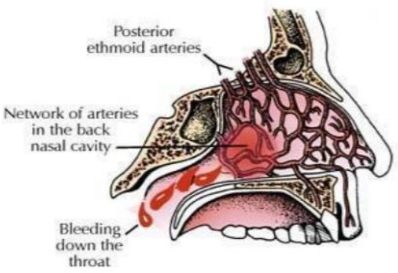
- Anterior (Little’s area).
- Posterior (vicinity of sphenopalatine foramen)



## ★ Kesselbach's plexus/Little's area:

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




## ★ Woodruff's plexus:

- Spenopalatine A (IMAX).
- IMAX= Internal Maxillary Art.

Anterior ethmoid art → came from ophthalmic → from internal carotid Superior labial Art → From facial → from external carotid artery Sphenopalatine → IMAX → From external carotid artery
Greater palatine → Imax → External carotid artery.

External carotid gives many branches in the neck, starting from: the superior thyroid, lingual, posterior oracular/occipital, internal maxillary, superficial temporal.
Internal carotid branches in the neck → None, it moves upward into the brain and form the circle of wills then give the ophthalmic branch.

## ➢ Angiofibroma

- Juvenile nasopharengeal.
- Benign.
- Adolcent Males "always males between 10-20 try to exclude angiofibroma first".
- Frequent chronic epistaxis.
- Nasal obstruction.
- Rhinorrhea.
- Conductive hearing loss.
- Diplopia.
- Otitis Media.
- Treatment: embolization & Surgery.