The Nose

Embryology

The nose developed from the frontonasal process.

Anatomy

The nose is formed of external nose and nasal cavity

(A) The external nose

- Pyramidal in shape shows:
  - The skeleton is formed of:

1- Bony upper 1/3:
   - Two nasal bones.
   - Nasal (frontal) process of maxilla.
   - Nasal process of frontal bone.

2- Cartilaginous lower 2/3:
   - Upper lateral cartilage
   - Lower lateral cartilage
   - Septal cartilage

(B) Nasal cavity

Each nasal cavity has 2 openings and 4 walls.

1- Anterior nares or nostrils: separated by the columella.
2- Posterior nares or choanae: open into nasopharynx.
3- Roof: cribriform plate of ethmoid bone, frontal bone ant.
4- Floor: hard palate
5- Medial wall: Septum
   - Vertical plate of ethmoid: postero superior.
   - Vomer bone postero inferior.
   - Quadrangular Septal cartilage
   - Maxillary crest inferiorly.
6- Lateral wall: formed by medical wall of maxilla(ethmoidal labrynth) , vertical plate of palatine bone, and (inner aspect of nasal bone, frontal process of maxilla, lacrimal bone) it shows:
A- 3 bony projections: superior, middle, and inferior conchae or turbinates.

B- Each turbinate covers a recess called meatus, there are superior, middle, and inferior meati, in addition to spheno-ethmoidal recess above the superior turbinate.

- Inferior meatus drains nasolacrimal duct (site of I.N.A)
- Middle meatus drains.
  Anterior ethmoids via bulla ethmoidalis.
  Frontal sinus via ant. part of hiatus semilunaris.
  Maxillary sinus via postero inf. Part or hiatus semi lunaris.
- Superior meatus drains: posterior ethmoids.
- Spheno-ethmoidal recess drains sphenoid sinus.

**Blood supply**

(A) **Arterial**

**External nose**
- Facial → ECA
- Ophthalmic → ICA
- Infra orbital → maxillary → ECA
- Septal arteries

**Nasal cavity**
- Ant and post ethmoidal → ophthalmic.
- Spheno palatine → maxillary.
- Greater palatine → maxillary.
- Sup labial → facial.

(B) **Venous drainage** (Connected to cavernous sinus)

- Ant & post ethmoidal v.
- Spheno palatine v.
- Angular vein.

**Nerve supply**

1. **Sensory:** 5th (trigeminal). (maxillary, anterior and posterior ethmoidal nerves of sphenopalatine ganglion)
2- **Olfaction**: 1\textsuperscript{st} (olfactory).

3- **Autonomic**: via sphenopalatine ganglion.
   - Para sympathetic: facial via greater superficial petrosal.
   - Sympathetic plexus around ICA.

**Lymphatic**
- Anterior portion: sub mandibular
- Posterior portion: retropharyngeal

**Histology**
+ **Olfactory area** (upper part): olfactory mucosa (columner non ciliated containing nerve endings)

+ **Respiratory area** (major part): pseudo-stratified columnar ciliated with mucous and serous glands.

+ **Vestibule** (Anterior part): skin (stratified squamous) with hairs (vibrissae).

**Physiology (Functions of the nose)**
1- **Respiratory function** (airway with variable resister)

2- **Protective function through:**
   a- Humidification & warming of inspired air.
   b- Filtrating large particles by vibrissae (hairs).
   c- Mucociliary clearance (mucous blanket, which is moved by cilia: filter small particles, very important)
   d- Sneezing.
   e- Lysozymes have bacteriolytic effects.
3- **Olfactory function**

4- **Phonatory function** voice resonance

5- **Lacrimal and sinuses drainage.**

6- **Reflex function:** sneezing, increase saliva & gastric juice with good smell, and vomiting with bad smell

**History & Clinical Examination.**

**Symptoms of nasal diseases:**

1- Nasal obstruction: unilateral or bilateral. (mouth breathing)

2- Nasal discharge: characters.

3- Epistaxis: cause, severity.

4- Facial pain & headache: site, referral, what increase or decrease.

5- Hyposmia (smell disorders) 6- Epiphora. 7- Nasal tone.

**NB:** Symptoms for external nose: pain & swelling

**Examination:**

(A) **External:**

- **Inspection:** Swelling, deformity, scars.

- **Palpation:** Tenderness.

  Crepitus (sound due to friction between fractured ends)

  Crepitation (sensation of air under the skin).

(B) **Internal:**

- **Anterior rhinoscopy:** using Thudicum speculum.

  In children pinching nasal tip with the thumb is enough.

- **Posterior rhinoscopy:** using a post nasal mirror.

- **Nasal endoscopy.**
**Investigations:**

1- Radiology  X ray sinus view.  C-T nose & para nasal sinuses.
2-Endoscopy  Rigid endoscope: 0, 30, 70  Flexible fiberoptic endoscope.
3-Culture and sensitivity.
4-Rhinomanometry

**Nasal diseases**

| Congenital | Congenital choanal atresia  
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**Congenital choanal atresia**

**Def.:** Obstruction of the choana.

**Aet.:** Persistent bucco nasal membrane.

**Incid.:** Unilateral or bilateral. **Pathology:** bony (90%) or membranous (10%).

**Symptoms:**

(A) Unilateral: detected in early childhood by:

- Unilateral nasal obstruction.  - Unilateral mucoid discharge.

(B) Bilateral: present at birth

- Sever cyclic respiratory distress: periods of apnea & cyanosis broken by crying & gasping respiration, this may lead to asphyxia.

- Difficult suckling

- Bilateral persistent nasal obstruction.

- Bilateral mucopurulent nasal discharge.
**Signs:**
Failure to pass coloured drops or rubber catheter
Nasal endoscopy.

**Investigations:**
1- Radiology: X ray with lipiodol.
   CT: Shows bony or membranous
2- Nasal endoscopy

**Treatment:**
(A) Bilateral atresia: emergency ttt.
   - Plastic airway or Mc Govern rubber nipple.
   - Intubation.
(B) Unilateral cases (and bilateral cases when the condition stabilized).
   - Excision of atretic plate: Trans nasal or Trans palatal.
   - Laser may be used.

**NB:** Congenital external nasal anomlies include: arhinia, cleft nose, dermoid cyst and deformities.

**Congenital nasal masses**

**Nasal dermoid**

**Def. and Act:** Epithelial inclusion at the site of embryological fusion

**Path.** Sites: external on dorsum
   Internal: nose & NPX
   Structure: cystic or solid contains ectodermal components (skin hairs)

**Symptoms** external swelling, discharging sinus, nasal obstruction

**Signs** cystic or solid external or internal mass, may not present at birth but later

**Investigations** C.T

**Ttt** Good surgical excision to avoid recurrence
Nose

Nasal glioma

**Aet:** inclusion of neural tissue into the nose

**Path:** site: external 60% internal 30% combined 10%

Structure: glial tissue (astrocytes) & fibrous tissue

Solid nasal mass with no intra cranial connection

**Symptoms** ext. mass, nasal obstruction or both

**Signs** solid mass at the root of the nose or intranasal

**Investigations** C.T & MRI **Tt** surgical excision

Meningencephalocele

**Def.:** Herniation of meninges and sometimes neural tissue via

**Aet.:** Congenital defects in skull base

**Sym.:** Dating since birth, external swelling, nasal obstruction, proptosis

**Signs:** cystic mass …. external …. or intranasal as polyp

Pulsatile, increase on straining, partially compressible (never pull the polyp)

**Inv.:** MRI & CT

**Tt:** Endoscopic, external neurosurgical excision + repair of skull base

Traumatic Conditions

A - Trauma to the nose & midface

I - Fracture of the nasal pyramid

**Aet.:** Blow or accident.

**Incidence:** Common, due to its position More in male.

**Path:** types depends on the direction & force of trauma

Lat. Trauma: fracture at the weakest point near suture line, resulting in lat. deviation

AP trauma: results in either:

Comminution : multiple fractured bone fragments

Flaring of both nasal bone over the frontal process of maxilla

Telescoping of the nasal bone into the ethmoidal labyrinth.
**Symptoms:** History of trauma.

- Pain – swelling & deformity.
- Nasal obstruction.
- Epistaxis.

**Signs:** External: Inspection swelling – deformity, oedema.

- Palpation: -Tenderness.
- Crepitus.
- Crepitations due to surgical emphysema.

Anterior rhinoscopy: septal hematoma, blood clots, mucosal lacerations.

**Investigations:**

X ray nasal bones lat.view: important medicolegally.

**Treatment:**

- First control epistaxis.

(A) If patient is seen shortly after trauma; no marked edema:

- Reduction by walsham & ash forceps.
- Fixation by nasal pack & plaster of paris.

(B) If there is marked edema:

- Wait for 5-7 days, give antibiotics, anti inflammatory till edema subsides then reduction and fixation.

(C) If patient is seen late: after two weeks there is malunion → rhinoplasty 3-6 months later.

- Give prophylactic antibiotics in all cases.
2- **Trauma to maxille:**

According to the force and direction of trauma, the fracture may be:

- **Le Forte I** (Floating palate): The fracture lines passes above the floor of the nasal cavity, through the nasal septum, maxillary sinus and inferior part of pterygoid plates.

- **Le Forte II**: The fracture lines passes from floor of maxillary sinus along the zygomaticomaxillary suture ...... infra orbital margin ...... Lacrimal bone .... Nasion ..... other orbit ..... other maxilla ..... posteriorly it passes through the middle of the pterygoid plates.

- **Le Forte III** (Craniofacial disconnection): The fracture lines passes from ..... medial wall of the orbit .... Superior orbital fissure .... Upper 1/3 of pterygoid plates ..... Greater wing of sphenoid .... Zygomaticofrontal suture ...... passes to the other side.

**Symp:**

- History of trauma
- Pain
- Shock
- Haemorrhage
- Airway obstruction due to posterior dropping of palate.

**Signs:**

- Shock
- Haemorrhage
- Cyanosis.
- Edema of the face
- Ecchymosis in the face and palate
- Crepitus, floating palate or midface
- Cranial nerve palsy
- Deformity in the form of open or crossed bite

**Inv.:** CT

**Ttt:**

- Secure airway
- Mange shock
- Reduction of the fracture bone
- Internal fixation by plates and screws

3- **Blow out fracture of orbit:**

**Aet:** Blunt trauma to the orbit leading to increase intraorbital pressure, the floor of the orbit will give way with prolapse of the orbital contents inside the maxilla.

**CP:**

- Enophthalmos
- Failure of upward gaze due to entrapment of the inferior rectus

**Inv.:** Panoramic x-ray, CT.

**Ttt:** Reduction of the orbital contents and grafting of the orbital floor via sublabial antrostomy or incision along orbital rim
**B- Foreign body**

**Incidence:** children and mentally retarded, rarely iatrogenic.

**Pathology:** hard: glass, beads, and buttons.

Soft: paper, seeds, beans.

**Symptoms:**
- Unilateral nasal obstruction
- Unilateral offensive MP, or bloody discharge.
- Pain – sneezing – discomfort initially.

**Signs:**
- F.B seen by ant. Rhinoscopy or endoscope.

**Investigations:**
- X ray if radio opaque
- Endoscopy

**Treatment:**
- Removal by hook, forceps or suction.
- If not seen or uncooperative patient remove under general anesthesia.
- Very rare lat. rhinotomy for rhinolith.

**Complications:**
- infection: rhinitis or sinusitis
- inhalation: lung abscess and respiratory obstruction
- rhinolith: nasal stone due to precipitated Ca and Mg.

(C) **CSF Rhinorrhea**

**Def.:** leakage of CSF from the nose

**Aet.:**
- Congenital: defect in cribriform plate
- Traumatic: accidental: fracture base
  - Surgical e.g. ESS
- Inflammatory: Osteomyelitis, $\$
- Neoplastic: e.g. nasal carcinoma
- Idiopathic: due to increased ICT

**Incidence:**

**Pathology:** origin may be:
- Roof of nose (cribriform plate) - Roof of ethmoids.
- Sphenoid sinus - Middle ear cleft.
Symptoms:
- Unilateral, clear, watery, salty discharge increase by straining, coughing, leaning forwards, does not stiffen the handkerchief (no mucous).
- Headache: due to increase or decrease ICT.
- Hyposmia

**Signs:** discharge (as above).

**Investigations:**
1- Chemical analysis of the discharge: clear, colorless, no mucous, reduce Fehling’s solution as it contains glucose (30 mg %), Cl, MPS & β2 transferrin (most specific).
2- CT scan with contrast.
3- Intra thecal dyes: fluorescence appears in the nose.
4- Radio isotopic studies.

**Treatment:**

*Conservative:* - Bed rest in head up position.
- Avoid nose blowing and straining.
- Avoid intra nasal ttt.
- Prophylactic antibiotics.
- Sometimes repeated lumber puncture

*Surgical:* If failed medical ttt for 3 weeks or complications.
Repair the defect by: graft: fat, muscle, fascia.
- Flab: septal flap.


**Complications:** Meningitis brain herniation Aerocele

(D) **Oro antral Fistula**

**Def:** Fistula between oral cavity and maxillary sinus

**Aet.:** 1- Traumatic: Surgical:

- Dental extraction of 2nd pre molar or 1st molar tooth.
- Excision of dental cyst.
- Radical antrum operation.
Accidental: penetrating wounds.
2-inflammtory: osteomyelitis, $.
3-Neoplastic: cancer maxi

**Symptoms:** 1- Nasal regurgitation, air via mouth during nose blowing
2- Purulent discharge through the fistula
3- Unilateral purulent nasal discharge.
4- Facial pain (sinusitis)

**Signs:** a probe may be passed through the fistula (usually not done).
Visible discharging fistulous opening

**Investigations:**
- X ray: maxillary sinusitis
- CT: localize the fistula
- Fistulography

**Treatment:**
(a) Recent cases within 24h.
- Heal spontaneously (antibiotics, nasal decongestants & avoid nose blowing).
- Surgical repair by suture in two layers.
(b) Late cases.
- Excise & trim the edges, surgical repair by sutures.
- Rotational flap. (Then radical antrum).
(c) Failed repair: dental obturator.

(E) **Septal hematoma**

**Inflammations of the Nose**

**I- External nose :**
- Furunculosis
- Vestibulitis

**II- Rhinitis:**

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Furunculosis of the vestibule

**Def.:** Acute staphylococcus infection of a hair follicle.

**Aet.:** staphylococcus aureus → nose picking.

**Incid.:** More in D.M.

**Symptoms:** pain, swelling.

**Signs:** hard, tender, red swelling.

**Investigations:** Blood sugar.

**Treatment:**
- Systemic & local antibiotics.
- Analgesics & local heat.
- Avoid squeezing, incise only when pointing

**Complications:**
- Septal abscess.
- Cavernous sinus thrombosis.(via facial & ophthalmic veins)
  (Dangerous area of the face, so avoid squeezing)

Vestibulitis

Infection of the vestibular skin with pyogenic organisms

Dryness, crustation, & bloody discharge

Systemic & local antibiotics

Common cold (Coryza)

**Def.:** Acute non specific viral rhinitis  

**Aet.:** rhino virus > 100 types

**Incid.:** commonest infection.

Predisposing factors:
- Over crowdedness & poor resistance
- Chills, cold, temperature changes
- Nasal obstruction

**Path:** droplet infection, incubation period 1-3 days

4 stages: ischaemia hyperemia bacterial infection recovery
Symptoms:

(1st) Ischaemic stage: burning sensation (dry tickling), sneezing, generalized bony aches.

(2nd) Hyperaemic stage: slight fever, headache, malaise, nasal obstruction, bilateral Watery discharge.

(3rd) Secondary bacterial infection: ↑ general symptoms
       Nasal obstruction
       Mucopurulent thick discharge

(4th) Resolution: within 3-5 days

Signs: Redness, congestion, oedema of mucosa
       Mucoid, MP, Purulent, discharge
       Redness of nostrils

Investigations:

Treatment: - Prophylactic: Avoid predisposing factor - Vaccine !!
            - Curative Bed rest, plenty of fluids, steam inhalation
              Analgesics, antipyretics, vit. C
              Antibiotics, antihistaminics, Decongestants.

Complications: otitis media, sinusitis, pharyngitis, laryngitis, bronchitis, pneumonia, permanent anosmia, vestibular neuritis.

Influenzal rhinitis

- Caused by influenza Virus (many types)
- More severe → more frequent bacterial infection → severe general condition → more complications.

Vaccine especially in: children, old, low immunity, high exposed persons

**H1N1 FLU**

Definition

Novel H1N1 flu, popularly known as swine flu, is a respiratory infection caused by an influenza virus first recognized in spring 2009. The new virus, which is officially called swine influenza A (H1N1), contains genetic material from human, swine and avian flu viruses.
H1N1 flu spreads quickly and easily. In June 2009, when the infection's spread had been verified worldwide, the World Health Organization declared H1N1 flu a global pandemic.

**Symptoms**
Swine flu symptoms in humans are similar to those of infection with other flu strains:

- Fever
- Cough
- Sore throat
- Body aches
- Headache
- Chills
- Fatigue
- Diarrhea and Vomiting

Swine flu symptoms develop three to five days after exposure to the virus and continue for about eight days.

**Pathogenesis**
Influenza viruses infect the cells lining nose, throat and lungs. The virus enters the body when person inhales contaminated droplets or transfer live virus from a contaminated surface to eyes, nose or mouth on hand.

**Complications**
Influenza complications include:

- Worsening of chronic conditions, such as heart disease, diabetes and asthma
- Pneumonia
- Respiratory failure

**Treatments and drugs**
Most cases of flu, including human swine flu, need no treatment other than symptom relief. If a patient has a chronic respiratory disease, doctor may prescribe additional medication to decrease inflammation, open airways and help clear lung secretions.

The antiviral drugs oseltamivir (Tamiflu) and zanamivir (Relenza) can reduce the severity of symptoms, but flu viruses can develop resistance to them.

High-risk groups are those who:

- Are hospitalized
- Have shortness of breath along with other flu symptoms
- Are younger than 5 years of age
- Are 65 years and older
- Are pregnant
- Are younger than 19 years of age and are receiving long-term aspirin therapy, because of an increased risk for Reye's syndrome
Nose

- Have certain chronic medical conditions, including asthma, emphysema, heart disease, diabetes, neuromuscular disease, and kidney, liver or blood disease
- Are immunosuppressed due to medications or HIV

**Lifestyle and home remedies**
If you come down with any type of flu, these measures may help ease your symptoms:

- Drink plenty of liquids.
- Rest.
- Take over-the-counter medication to reduce symptoms.

**Prevention**
A vaccine has been developed to prevent swine flu, vaccination is recommended for:

- Pregnant women.
- Household contacts and caregivers for children younger than 6 months of age.
- Health care and emergency medical services personnel.
- Babies, children and teens, from 6 months through 18 years of age.
- People ages 25 through 64 years who have health conditions associated with higher risk of medical complications from influenza.

**Exanthemata**
- Fever with rash (measles, chicken pox, rubella)
- Often rhinitis precedes by 2-3 days.

**Chronic Hypertrophic rhinitis**

*Def.*: Ch. non specific rhinitis associated with hypertrophy of m.m specially that of the turbinates.

*Aet.*: 1- Recurrent acute rhinitis

2- Allergic & vasomotor rhinitis.

*Path:* hypertrophy & hyperplasia of mucosa & sub mucosa

*Symptoms:* 1- Bilateral nasal obstruction

2- Bilateral mucoid or MP discharge, may be post nasal

*Signs:* Enlarged inferior turbinates with swollen congested mucosa → does not shrink by vaso constrictors (irreversible)
**Treatment:** - control predisposing factors

-reduce size of inferior turbinate by:

- Partial inferior turbinectomy
- Laser turbinectomy
- Radiofrequency
- Coblation
- Sub mucous diathermy

*N.B:* Topical steroids may be tried (for at least 3 weeks)

**Rhinitis medicamentosa**

Due to prolonged use of vasoconstrictors ……… rebound V D & edema obstruction again …… more use, treated as chronic hypertrophic rhinitis

**Chronic atrophic rhinitis**

**Def.:** ch. non specific rhinitis, associated with atrophy of nasal mucosa and bony turbinates.

**Aet.:** (A) Primary: idiopathic or ozaena may be due to

1- Endocrinal imbalance: as it is more in females.
2- Infections: long standing, by Klebsiella ozaenae
3- Autoimmune. 4- Autonomic imbalance: sympathetic overtone
5- Deficiency of vit A & Fe

(B) Secondary to

1- Nasal granuloma: scleroma, syphitis, lupus.
2- Nasal operations: inferior turbinectomy.
3- Post irradiation.

**Incid.:** Primary type is more common in females at puberty

**Path:** Atrophy of epithlium & cilia

Atrophy of glands nerve endings, endarteritis

Atrophy of bones.
**Symptoms:**

1. Viscid crusty greenish or black discharge with marked foetor.
2. Nasal obstruction: Accumulation of crusts
   - Dullness of air sensation
3. Hyposmia: degenerated olfactory mucosa.
4. Epistaxis: crust separation.

**Signs:**

- Roomy nose.
- Pale glazed atrophic mucosa.
- Atrophic turbinates.
- Greenish black crustation with marked foetor, causing epistaxis on removal.

**Investigations:** biopsy, if suspected to be 2ry to granuloma.

**Treatment:**

A) Treat the cause

B) Medical

   - Alkaline nasal lotion: dissolve, separate the crusts and improve the foeter.
   - Mentol paraffin nasal drops: To prevent dryness & improve smell
   - 25% glucose in glycerine ↓ proteolytic organisms, ↓ foetor.
     - Local estrogen, KI, Fe, Vit A, mucolytics.

C) Surgical: Aiming at decrease the air so improve dryness and promote healing!!

   - Medical displacement of lateral wall of nose.
   - Narrowing roomy nose by submucosal implants.
   - Temporary closure of nostrils (young’s operation)
**Rhinocleroma:**

*Def.:* Chronic specific infection (granuloma) of the upper respiratory tract.

*Aet.:* Klebsiella rhinoscleromatis (gram – ve Frisch bacillus)

*Incid.:*  
- Commonest granuloma in Egypt.  
- Endemic in sharkayia, Menofea & Fayoum.  
- More in female.

*Path.:*  
A) **Nodular stage** submucosa shows increased vascularity & cellular infiltration:  
- Lymphocytes, macrophages, plasma cells  
- Mikulicz cells: large vaculated cells with foamy cytoplasm and small central nucleus, bacilli present within the vacules  
- Russel bodies: Plasma cells with hyaline degeneration, bright red with no nucleus.

B) **Atrophic stage:** Similar to atrophic rhinitis, with chronic inflammatory cells.

C) **Fibrotic stage:** Dense fibrosis, ↓ vascularity & cellularity

*Clinical picture*  
Insidious onset, slow course, several stages  
May be more than one stage at a time (1&2 are active, while 3 is inactive)

1- **Atrophic stage**: similar to atrophic rhinitis

2- **Nodular stage**  
*Symptoms:* obstruction – discharge – epistaxis  
*Signs:* bil submucosal mucocutaneous nodules.  
First discrete, red, small then grey, large  
May coalesce together to form large masses.

3- **Fibrotic stage**  
*Symptoms:* nasal obstruction.  
*Signs:* Dense fibrosis, narrowing of nasal cavities, hard alae.
**Investigations:**
- Biopsy: diagnostic in active stage
- Electron microscopic examination (in atrophic stage & for follow up).

**Sequela:**

a) Extension
   - Nasal tip, columella, upper lip.
   - Lacrimal sac (dacryoscleroma).
   - Pharynx & larynx.
   - Nasal dorsum.

b) Fibrosis → deformity, 2ry atrophic rhinitis.

**Treatment**

a) Medical
   - Rifampicine (Rimactan) 600mg, orally for 8-10 weeks
     - Side effects: hepatotoxic, red urine.
   - streptomycin 1gm. I.M for 6 weeks
     - Side effects: ototoxic & nephrotoxic
     - Antibiotics have poor effects as organism is intracellular.
   - If atrophic stage → like atrophic rhinitis.

b) Surgical: 1- Removal of localized masses by surgery or laser
   - 2-Widening of fibrotic narrowing, by surgery or laser.
   - 3- Plastic reconstruction, for deformity.

c) Radiotherapy: not used.

[**Nasal Syphilis**]

*Act.*: Spirochete: Treponema pallidum

Congenital (early, late) Acquired 1ry, 2ry, 3ry

**Congenital**

Early: like 2ry acquired Late: like 3ry acquired + other stigmata:

Hutchinson Triad: Hutchinson teeth, Keratitis, SNHL
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<td>Swelling &amp; irritation</td>
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<td>Hard red papule</td>
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<td>Rubbery discrete LN</td>
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<td>Secondary</td>
<td>Mucous patches → snail tract ulcer</td>
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<td>Rash, lymphadenopathy</td>
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<td>Tertiary</td>
<td>Red, rubbery gumma. → punched out ulcer → fibrosis</td>
<td>Nasal obstruction.</td>
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<td>Blood stained discharge</td>
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<td>Headache</td>
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<td>Septal and palatal perforation</td>
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**Investigations:**

1- Serological: WR, TPIT, FTA.

2- Direct smear: motile spirochaetes.

3- Biopsy.

**Complications:**

1- Secondary bacterial infection.

2- Secondary atrophic rhinitis.

3- Septal perforation in bony part.

4- Saddle nose.

5- Scarring & stenosis.

**Treatment:**

1- Penicillin. 2- Alkaline nasal lotion. 3- Plastic reconstruction.
**Lupus vulgaris:**

**Def.:** Chronic form of T.B.  
**Aet.:** attenuated T.B.

**Incid.:** more in females.

**Symptoms:** nasal obstruction, discharge, epistaxis.

**Signs:**  
- Apple jelly nodules on vestibule & face.  
- Shallow ulcer → septal perforation (anterior).  
- Deformity & fibrosis

**Investigations:**  
- Serologic: tuberculin rest.  
- Biopsy.  
- Bacteriologic exam.: T.B bacilli.

**Complications:** 1, 2, 3, 5 like syphilis.

**Treatment:**  
1- Anti T.B: Rifampicin, PASA, isoniazid + vit. D  
2- 3 like syphilis

**Leprosy:**  

**Def.:** Chronic granulomatous disease  
**Aet.:** M. leprae

**Path.:** a disease of peripheral nerves, skin, mucosa.  

1- Tuberculoid leprosy: anesthetic cutaneous patches, isolated cranial n. palsies.  
2- lepromatous leprosy: diffuse skin infiltration multiple nerve affection.  
3- Borderline: in between.

**Symptoms:** Nasal obstruction, discharge, epistaxis

**Signs:** Nodules, ulceration, fibrosis.

**Investigation:** Biopsy, bacteriology.

**Complications:** like lupus.

**Treatment:**  
1- Rifampicine, Dapsone  
2- 3 like syphilis.
Nasal septum

Deviated septum

Def.: Deviation of nasal septum away from midline

Aet.:

A) Developmental

- Excessive development of one plate of vomer more than the other
- Excessive development of turbinates, pushing septum.
- High arched palate

B) Traumatic

- Intrauterine trauma
- Birth trauma
- Accidental trauma

Incid.: very common but usually not severe to cause symptoms.

Pathological variants:

a) Deviation: C or S shaped, angular or irregular

b) Spur: sharp angulation at the function between cartilage and bone.

c) Dislocation: lower border projects into nostril.

d) Septal thickening: trauma leading to cartilage reduplication or organized hematoma

Symptoms:

1- Nasal obstruction unilateral or bilateral.

2- Nasal discharge and post nasal drip.

3- Epistaxis: Convex side vessels angulated.

    Concave side atrophic changes (dry friable mucosa).
4- Hyposmia
5- Neuralgia & headache: contact (anterior ethmoidal nerve compression)

Vacuum(fronto nasal duct obstruction)

6- Recurrent sinusitis
7- E.T dysfunction due to distorted nasal pathology
8- External nasal deformity

**Signs:**

Septal deviation, spur, or dislocation.

Compensatory turbinate hypertrophy

**Investigations:** - CT if sinusitis

- Endoscope for bony part
  - Rhinomanometry & acoustic rhinometry

**Treatment:** surgical correction, indicated in symptomatic cases

Operation 1- Sub mucous resection (SMR)

2- Septoplasty indicated when SMR is not useful: children – septal dislocation.

**NB:** during surgery for septal correction: Treat sinusitis if present by ESS

Reduce size of inferior turbinate if large.

**Septal Haematoma**

**Def.:** Blood collection between mucoperichondrium & cartilage

**Aet.:** Traumatic: accidental or surgical

  Spontaneous: bleeding tendency

**Symptoms:** 1- history of trauma, or surgery

  2- bilateral nasal obstruction

**Signs:** Bilateral fluctuant swelling, on both sides of septum.

  Aspiration reveals blood.

**Complications:**

  - Septal abscess Organization & septal thickening
**Treatment:**

1- Aspiration

2- Incision & evacuation: vertically on one side & horizontally on the opposite
   - Nasal pack, for 24h. + drain tubes

3- Antibiotics

**Septal Abscess**

**Def.:** pus collection between mucoperichondrium & cartilage

**Aet.:** - Infected haematoma, vestibulitis

**Symptoms:**
- Fever, headache, and malaise.
  - Throbbing pain
  - Bilateral Nasal obstruction
  - Purulent discharge, if ruptured

**Signs:**
- Bilateral fluctuant, tender swelling on both sides of septum
  - Tenderness and edema of nasal tip.

**Complications:**
- Septal perforation, external deformity
- Cavernous sinus thrombosis

**Treatment:** as hemATOMA

**Septal perforation**

**Aetiology:**

**Traumatic:** Surgical: (SMR), cauterization.
- Nose picking.
- Cocaine addiction (snuff takers perforation).
- Pressure necrosis
- Accidental: (rare).

**Inflammatory:** Septal abscess, lupus, leprosy, syphilis and midline granuloma.

**Neoplasic:** Malignancy.

**Path:** All perforation affect cartilage (ant.), except syphilis affects bone (post.)
Symptoms: A symptomatic, irritation, crustation & epistaxis, or whistling sound.

Treatment:
1-Alkaline nasal lotion, for crustation.
2-Silastic obturator.
3-Surgical repair, by rotational mucosal flap.

Allergic rhinitis

Def.: allergy is an exaggerated response to various foreign substances.

Aet.: (A) Predisposing factors
1- Genetic predisposition: tendency to allergy called atopy. family history 50%
2- Psychogenic (stress).
3- Physical: Change in temperature and humidity.
4- Endocrinal puberty, menses, & menopause.
5- Infection increase tissue permeability to allergens

(B) Exiting factors
1- Inhalants: commonest, house dust, mites, pollens, occupational.
2- Infectants: bacterial, (most important is fungal).
3- Injectants: penicillin.
4- Ingestants: milk, fish, eggs, aspirin.
5- Contacts: face powders

Incidence very common 10 – 20 %, seasonal, perennial, or mixed

Pathogenesis: type I hypersensitivity
Pathology
- Edema - Infiltration with esinophils & plasma cells
- Watery discharge with increase serous content
- Vascular dilatation, stasis leads to purple color
- Polypi: pedunculated edematous mucosa
- Superadded infection: red mucosa and viscid discharge

Symptoms
1. Nasal itching & sneezing.
2. Bilateral watery discharge may be postnasal drip.
3. Bilateral or alternating nasal obstruction.
4. Anosmia, continuous or intermittent.
5. Associated with: lacrimation, asthma, or eczema.

Signs
1. Oedematous pale blue mucosa.
2. Excessive watery secretions.
3. Swollen oedematous turbinates.
4. May be allergic nasal polypi
5. In children: allergic salute

Investigations: Following history and examination
2. Skin prick testing
   Technique: forearm skin is pricked with needle passed via diluted different allergens
   Results: Positve….Central wheel surrounded by erythema
   Value: Confirm suspected allergen …. In relation to history
   Technique: Diluted aqueous extract sprayed in the nose
   - Eosinophilia - Increased total IgE
   - Increased plasma IgE level to specific Ag

Treatment: (A) Medical:
1. Avoid exposure to offending antigen.
2. Hypo sensitization (Immunotherapy) to form IgG (blocking antibodies).
3. Mast cell stabilizers: sodium chromoglycate (spray 4-6 times daily).
4. Anti histaminics: astemizole, loratidine, fexofenadine (oral or nasal spray).
5- Steroids topical, systemic, or depot (most effective)
6- Nasal drops for short time to avoid rhinitis medicamentosa,
7- Oral decongestants.
8- Recently antileukotrienes, anticytokines, & anti interleukines

(B) Surgical: 1- Turbinate reduction
  2- Nasal polypectomy (& ethmoidectomy)
  3- Vidian neurectomy.

**Vasomotor rhinitis**

*Def.*: abnormal reaction to non specific non allergic factors

*Pathogenesis*: probably responsible factor: over activity of nasal parasympathetic system → vasodilatation & ↑ nasal secretions.

*Symptoms, signs*: like allergic rhinitis.

*Investigations*: like allergic rhinitis but negative.

*Treatment*: like allergic rhinitis

**Nasal polyps**

*Def*: pedunculated edematous nasal or sinus mucosa

*types*: 1- Allergic sinonasal polyposis 2- Antrochoanal polyp
  3- Inflammatory polyp 4- Allergic fungal sinusitis

*special forms:*

ASA: Asthma, Sinonasal polyps, Aspirin sensitivity. Usually needs surgery

Cystic fibrosis: Hereditary disorder leads to thick secretions

Extensive nasal polyps in children …….broad nasal bridge

Sweat test (Na level) is diagnostic

<table>
<thead>
<tr>
<th></th>
<th>1- Allergic polyp</th>
<th>2- Antrochoanal polyp</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Def:</strong></td>
<td>- Pedunculated oedematous mucosa projecting into nose or ethmoids.</td>
<td>- pedunculated oedematous mucosa projecting from maxilla to choana to reach asopharynx.</td>
</tr>
<tr>
<td><strong>Aet:</strong></td>
<td>- Allergy commonest</td>
<td>- retention cyst</td>
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<tr>
<td></td>
<td>- Vasomotor rhinitis</td>
<td>- inflammatory</td>
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<tr>
<td>Incidence</td>
<td>Path:</td>
<td>Symtoms</td>
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<tr>
<td>- equal sex usually adults</td>
<td>- Columner ciliated epithelium loose submuscosa with oedema and chronic inflammatory cells including esinophils</td>
<td>- Bil. Nasal obstruction gradual progressive bilateral watery discharge hyposmia, sneezing, itching Facial pain &amp; headache</td>
</tr>
<tr>
<td>more in males, children &amp; young adults.</td>
<td>-similar but no esinophils.</td>
<td>-Unilateral nasal obstruction. - Muciod or M/P discharge in obstructed side. - Snoring - Rhinolalia clausa - Ant.rhin: - greyish soft polyp - swollen inferior turbinate - accumulated secretion - post rhinoscopy: greyish white spherical mass</td>
</tr>
</tbody>
</table>
3- **Inflammatory polyp**

*aet.:* chronic sinusitis

*incid.:* adult, equal sex

*Clinical picture, investigations, and treatment:* as chronic sinusitis

4- **Allergic fungal sinusitis**

*D.D.:* - Benign neoplasm especially inverted papilloma: unilateral firm papillary polyp
  - Malignant neoplasm: unilateral bad odor, soft, bleeding on touch
  - Meningocele & encephalocele: soft pulsating, reddish polyp attached superiorly to skull base

*N B:* nasal endoscopy, C T, & MRI help for diagnosis

**Para nasal sinuses**

- Air filled spaces within skull bones

- Lined by mm similar to and continuous with that of the nose, mucous blanket is directed by cilia towards ostium.

- They are 4 pairs of sinuses: maxillary, frontal, ethmoid & sphenoid.

- Divided into: Anterior group: frontal, maxillary, and anterior ethmoids.
  
  Posterior group: sphenoid and posterior ethmoids.

*Maxillary sinus (antrum)*
- Contained within body of maxilla
- The largest sinus, only one present at birth.
- Ant: cheek - Post: pterygopalatine fossa
- Roof: orbital floor - Floor: alveolus (1st molar & 2nd premolar)
- Maxillary ostium: lies in the middle meatus.
- Surgical importance: mucociliary clearance is directed towards natural ostium
  widening may lead to: orbital injury, or nasolacrimal duct injury.

a) **Frontal Sinus**
- Lies inside frontal bone - Usually unequal, start to appear at 2 – 4 y.
- Ant.: forehead. - Post: ant. Cranial fossa
- Inferior: orbit - Medial: opposite side
- Ostium lies in most dependent area, drains to frontal recess.
- F sinus, ostium & recess look like an hour glass
- Surgical importance: frontal sinusitis is less common than maxillary.
  avoid concentric widening …….. osteal stenosis.

b) **Ethmoidal sinuses**
- Only one ethmoid bone divided into: from 7-17 air cells within 2ethmoidal labyrinth, cribriform plate, & perpendicular plate
- Lying between the orbit and nasal cavity
- Divided into ant. & post. groups by basal lamella (oblique part of middle turbinate)
- Surgical importance: Roof is related to ant cranial fossa
  Spread of infection ……..orbit

c) **Sphenoid sinus**
- Within the body of sphenoid
- Superior: pituitary - Inferior: nasopharynx
- Lateral: optic nerve, cavernous sinus. - Posterolat. ICA

**Sinus drainage:** see lat. Nasal wall
The region of middle turbinate, middle meatus, bulla and sinus ostia is called osteomeatal complex. It is important as all sinuses drain here (Key area). It is the area attacked by FESS.

**Functions of paranasal sinuses**

1. Reduce skull weight
2. Resonance of voice.
3. Regulate intranasal pressure.
5. Mucous secretion.

**Acute Sinusitis**

**Def.:** Acute inflammation of the mucosal lining of one or more of the sinuses.

**Aet.:** +**Organisms:** - most common are haemophilus influenza, streptococcus pneumonia

- Others: gram + ve, gram – ve, anaerobic (dental).

**+Routes**

Nasal: 1- Upper respiratory tract infection
2- Exanthemata.
3- Nasal F.B or packing.
4- Swimming & diving in polluted water.

Dental: 1- infection e.g. periapical abscess.
2- Extraction: OAF

External (Trauma): compound fracture.

**+Predisposing factors**

- Local (obstruction): D.S, allergy, nasal polypi
  
  Disturbed mucociliary clearance: eg. mucoviscidosis.

- General: low resistance

**Path:** Start catarrhal → suppurative

  Congestion, oedema → ostium occlusion → stasis → pus

**Symptoms:** Depend on sinus affected

1- History of rhinitis, dental problem or trauma.
2- General: fever, malaise, anorexia.
3- Nasal obstruction: unilateral or bilateral.
4- Nasal discharge: unilateral or bilateral, mucopurulent or purulent.
5- Posterior nasal discharge.
6- Pain & headache
   - severe may be throbbing
   - Increase on coughing, bending forwards, and head movement.
   - Site depends on sinus affected.
   • Maxilla: over antrum refers to ear & temple.
   • Ethmoids: between eyes, over nasal bridge referred to parietal region.
   • Frontal: supra orbital region & forehead, starts in the morning, becomes worse by midday & lessens gradually at the end of the day (vaccum headache)
   • Sphenoid: retro orbital pain referred to occiput.
7- Hyposmia & nasal tone
8- Symptoms of complications if arise.

**Signs:**
General: fever, higher in complications
External: Tenderness over affected sinus.

**Ant Rhinoscopy:** congestion & oedema of nasal mucosa
MP or P discharge, site according to sinus

**Post Rhinoscopy:** post nasal MP or P discharge.

**Investigations:**
1- Radiology: X ray sinus view: opacity or fluid level
2- CT paranasal sinuses: investigation of choice
3- Culture & sensitivity.
4- Trans illumination for maxillary & frontal sinuses

**Treatment**

(A) **Medical**
1- Bed rest, light diet, plenty of fluids.
2- Analgesics, antipyretics, and mucolytics.
3. Local decongestant drops, steam inhalation.

4. Systemic antibiotics.
   - Start by broad spectrum antibiotics till results of C & S, commonest amoxyccillin, Amoxycillin + clavulanate, 3rd generation cephalosporins, or quinolones

**(B) Surgical indicated in:**

2. Complications.
3. Pus under tension.
   - **Aim:** drainage.
   - **Method.**
     - Maxillary sinusitis: antral puncture & lavage, or endoscopic drainage (MMA).
     - Frontal sinusitis: External frontal trephine or Endoscopic drainage.
     - Ethmoidal sinusitis: External or endoscope ethmoidectomy
     - Sphenoidal sinusitis: External sphenoid ethmoidectomy, or endoscopic.

**Chronic Sinusitis**

**Def.:** Chronic inflammation of the nucoperiosteal lining of sinuses with irreversible pathological changes

**Aet.:** 1. Repeated acute attacks:
   - Persistent predisposing factor (nasal obstruction)
   - Inadequate ttt with residual infection
2. Low patient resistance, high virulence of organisms.

**Incid.:** Equal sex, more in adults

   Most common the ethmoids………maxillary …..frontal……sphenoid.
**Path:** - Congestion, edema, degeneration of ciliated epithelium, fibrosis and chronic inflammatory cells.

**Symptoms:**

1- Nasal obstruction: unilateral or bilateral, persistent or intermittent.

2- Nasal discharge: unilateral or bilateral, MP or P may be post nasal.

3- Pain & headache
   - Recurrent, periodic, dull aching
   - Increase on coughing, bending forwards
   - Site depends on sinus affected.

4- Hyposmia and cacosmia (bad smell).

5- Septic focus low grade fever, fatigue, or arthralgia.

6- Descending infections: rhinitis, otitis media, pharyngitis, laryngitis and chest infection.

7- Complications.

**Signs:**

- External: tenderness over affected sinus.
- Anti Rhinoscopy: Congestion & edema
  - MP or P discharge site according to sinus
  - Nasal polypi in chronic ethmoiditis.
- Post Rhin: post nasal MP or P discharge
- Diagnostic endoscopy: nasal or sinus now commonly used

**Investigations:**

1- Nasal endoscopy
2- Radiology X ray & CT (opacity at OMC & sinuses)
3- Culture & Sensitivity.
4- Transillumination (opaque sinus).
5- Diagnostic puncture & lavage (old)
**Treatment**

a) Conservative
   1- Correction of predisposing factor.
   2- Systemic antibiotics according to C&S at least 2 weeks.
   3- Oral decongestants – local decongestant: nasal drops.
   4- Mucolytics, alkaline nasal wash.

b) Surgical In failed medical ttt, mechanical obstruction e.g. D.S

**(I)** *Chronic maxillary sinusitis*
   1- Repeated puncture and lavage (does not remove obstruction at OMC ).
   2- Intra nasal inferior antrostomy (ciliary movement still beat to natural ostium)
   3- Radical antrum operation (culd well luc’s) (remove natural mucosa, fibrosis, decrease mucociliary clearance )
   4- Endoscopic middle meatal antrostomy (MMA) (of choice).

**(II)** *Chronic frontal sinusitis*
   External frontal operation (external scar, bone injury, can not attack all sinuses)
   Endoscopic clearance of frontal recess.

**(III)** *Chronic ethmoiditis*
   External ethmoidectomy (same ………)
   Endoscopic ethmoidectomy

**(IV)** *Chronic sphenoiditis*
   External spheno ethmoidectomy
   Endoscopic spheno ethmoidectomy
N.B: Sinusitis in children

Incid.: 5-8 years, maxillary & ethmoids are commonest.

Aet.: 1- Repeated respiratory tract infection
2- Exanthemata 3- Mucoviscidosis: cystic fibrosis
4- Immotile cilia syndrome: kartagner syndrome (sinusitis, brochiectasis, sterility)
5- Immune deficiency 6- Local adenoid, F.B, choanal atresia

Organism: usual + moraxella catarrhalis

Clinical picture

a) Acute sinusitis

Symptoms: fever is higher; child is irritable, obstruction, discharge, and pain.

Signs: tenderness over affected sinus, mucosal congestion and edema

b) Chronic sinusitis

Symptoms: MP, P discharge, laryngitis, cough, recurrent otitis media.

Treatment: as usual.

Complications of sinusitis

Def.: Extension of infection beyond mucoperiosteal lining.

Classifications:

1- Cranial complications:
   - Mucocele  - Pyocele
   - Osteomyelitis  - OAF

2- Intracranial complications:
   - Extra dural abscess  - Subdural abscess
   - Meningitis  - Frontal lobe abscess
   - Cavernous sinus thrombosis

3- Orbital.

4- Extra cranial complications:  - Descending infections.  -Septic focus.
**Nose**

**Aet.:** acute or acute on top of chronic sinusitis

Organisms: same, anaerobes play an important role in intracranial complications

**Routes of spread:**

a) Direct spread via bone.(osteitis,osteomyelitis)

b) Venous and lymphatic spread.

c) Performed pathway (bone defect & natural foramina)

---

**Mucocele**

**Def.:** Expansion of one or more of the sinuses by accumulated secretion

**Aet.:** 2\textsuperscript{nd}: to obstructed sinus by inflammation, osteoma, trauma.

1\textsuperscript{st}: cystic dilatation of mucous gland.

**Incid.:** frontal, ethmoid , frontoethmoidal, or sphenoidal.

**Path:** bony walls become thinned, out lined by cuboidal epithelium, contains viscid sterile mucous.

**Symptoms:**

- Painless, slowly growing swelling

- Frontal headache & proptosis.

**Signs:**

- Swelling, usually at inner canthus or at medial ½ of orbital roof, at 1\textsuperscript{st} hard then egg shell crackling sensation

- Proptosis

- May be seen by anterior rhinoscopy in middle meatus.

**Investigations:**

- X ray: loss of scalloped appearance of frontal sinus.

- CT: diagnostic.

**Treatment:** External or endoscopic drainage.

- A tube may be left in sinus ostium.
Complications:

- Infection → pyocele
  
  Pain, overlying skin is tender & red, may be purulent nasal discharge.

- Mucopyocele may rupture to produce → Fistula.

- ttt similar to mucocele + Antibiotics.

Osteomyelitis

a) Frontal Osteomyelitis:

- Fever, malaise - Severe headache - Marked tenderness & oedema

+ Subperiosteal abscess: large fluctuant swelling (pott’s puffy tumor) → rupture → Fistule.

X ray: moth eaten appearance, later on sequestrum  
CT: diagnostic

ttt: - Antibiotic therapy - External frontal drainage operation

b) Maxillary osteomyelitis

- Fever & malaise - Pain, oedema, tenderness over cheek

+ Sub periosteal abscess → rupture → OAF

CT: diagnostic

ttt: - Parenteral antibiotics - Drainage of sub periosteal abscess

Extra dural abscess

Similar to otogenic extra dural abscess

+ Surgical drainage of the sinus by external approach

Meningitis

- Commonest intra cranial complications. - Similar to otogenic meningitis

+ Surgical drainage of the sinus by external approach.

Brain (Frontal lobe) abscess

- Similar to otogenic brain abscess.

  Localizing signs: personality & memory changes.

+ Surgical drainage of the sinus by external approach.
**Cavernous Sinus thrombosis**

**Def.:** inflammation of cavernous venous sinus

**Aet.:** spread of infection from:

1. Skin of face, nose, forehead. (via anterior facial vein)
2. Sinusitis. (via pterygoid venous plexus)
3. Orbital cellulites (via ophthalmic veins).
4. Pharyngeal suppuration e.g. quinsy (via pterygoid venous plexus).
5. CSOM → lateral sinus thrombosis.

**Symptoms:**

General: Fever, rigor, toxic facies, anorexia, nausea.

Severe headache and diplopia.

**Signs:** Swelling & oedema of upper eyelid

Proptosis (may be pulsating)

Chemosis

Ophthalmoplegia: affection of ophthalmic & maxillary nerves

Fundus exam: papilloedema

**Investigations:**

1. CBC: leucocytosis, high ESR.
2. CT with contrast.
3. MRI with angiography: diagnostic.

**Complications:**

- Affection of other eye
- Meningitis, cerebral thrombophlebitis
- Mortality 30%

**ttt:**

1. Massive antibiotics
2. Anti coagulants
3. Care of comatose
4. After control, treat sinus infection.
**Orbital Complications**

**Def.:** extension of infection to the orbit

**Aet.:** 1- Ethmoiditis; thin lamina papyracea. 2- Pyocele.

**Incid.:** commonest complication of sinusitis

**Pathology and clinical picture:**

I - Preseptal cellulites (Orbital oedema)

- Mild inflammatory reactionary oedema due to venous obstruction:
  - Upper eyelid is swollen. No other symptoms

II- Subperiosteal abscess

- Pus collection beneath the periosteum
  - Pain, mild limitation of eye movements, lateral proptosis & normal vision

III- Orbital cellulitis

- Inflammatory cells & bacteria invade the orbit with no pus:
  - Fever & bad general condition
  - Severe pain in the eye
  - Chemosis
  - Proptosis (inferolateral)
  - Ophthalmoplegia (transient)
  - Reversible diminution of vision & optic atrophy

IV- Orbital abscess

- Pus collection within the orbit due to rupture of subperiosteal abscess
  - (Same clinical picture but blindness may be irreversible)

V- Cavernous sinus thrombosis

- Thrombosis of superior & inferior ophthalmic veins
Investigations:
1- CT of paranasal sinuses & orbit  2- Fundus exam.  3- C & S

Treatment:
1- Hospitalization & massive parenteral antibiotics
2- Surgery in: - No improvement after 48 h. of medical tt.
   - Progressive loss of vision.
   - CT shows subperiosteal abscess.

External or endoscopic drainage, with orbital decompression.
3- Surgical tt of sinusitis.

Superior orbital fissure syndrome
Affection of 3, 4, 6 & ophthalmic division of 5

Orbital apex syndrome
As above + affection of optic nerve

Ttt: Parenteral antibiotics  steroids to relieve edema
Orbital and optic nerve decompression

Fungal Infections of nose and sinuses

Classification
1- Invasive: - Fulminant type (acute form) (mucormycosis)
   - Indolent type (chronic form)
2- non invasive: - Fugal ball
   - Allergic fungal sinusitis

1- Fungal ball

Immunity: immune competent
Site: maxillary sinus…………………sphenoid sinus
Aet.: mainly Aspergillus
Symptoms: nasal discharge.
Signs: nasal discharge seen by endoscope
Invest.: X-ray & CT: unilateral opacity of affected sinus
Ttt: endoscopic middle meatal antrostomy &\ sphenoidotomy with removal of fungal ball

Recurrence: uncommon

2- Allergic fungal sinusitis -

Immunity: immune competent.
Site: ethmoids & maxillary sinuses.
Aet.: allergy to fungi mainly aspergillus.
Nose

**Symptoms:**
- Nasal obstruction: unilateral, gradual onset & progressive course
- Nasal discharge: unilateral, thick, viscid & offensive
- Proptosis: in advanced cases

**Signs:**
- Unilateral, soft, grey, glistening, multiple nasal polypi arising mainly from middle meatus
- Unilateral thick yellow & mucoid nasal discharge

**Invest.:**
- CT unilateral opacity affecting the nose & sinuses on one side with calcification (mottling)
- Biopsy polyps with esinophils, fungal hyphae are absent

**Ttt.:**
- Medical: 1- steroids local & systemic
  2- Antifungal drugs: local
  3- Immunotherapy
- Surgical: E S S aiming at: Removal of polyps, mucin, and fungal debris.
  - Proper aeration & drainage.

3- **Invasive fulminant type**

**Immunity:** immune compromised

**Aet.:** Mucormycosis causing intravascular thrombosis & gangrene
- Acute onset, rapid progressive course, & fatal in short time

**Symptoms:**
- Early: pain headache, & fever
  - Late: unilateral nasal obstruction, ocular & cranial symptoms

**Signs:**
- Black nasal structure include inferior & middle turbinate, then the septum gangrene of cheek & palate
- Proptosis, ophthalmoplegia, & blindness
- Cranial nerve palsy, coma, & lastly death

**Invest.:**
- CT extensive opacity of sinuses extending to orbit & cranial cavity
  - Biopsy granuloma & fungal hyphae

**Ttt.:** Surgical debridement
- Systemic antifungal drugs (Amphotericin B) (monitor liver & renal functions daily)
- Control cause of low immunity (D M )

**Prognosis:** very bad
4- **Indolent fungal sinusitis**

**Immunity:** immune competent  
**Aet.:** Aspergillus  
Insidious onset slow course, fatal after long time  
**Clinically:** unilateral nasal mass, ocular & cranial affection occur late  
**Invest.:** As 3  
**Ttt:** As 3  
**Prognosis:** bad

### Tumors of Nose and Sinuses

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<th>Intermediate</th>
<th>Malignant</th>
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<td>Papilloma</td>
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<td>fibro-osseous lesions</td>
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<td><strong>Odontogenic</strong></td>
<td>Dental &amp; dentigerous cysts</td>
<td>Adamantinoma (ameloblastoma)</td>
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### I- Osteoma

**Def.:** benign tumor of bone  
**Aet.:** persistent embryonal periostium at junction between frontal & ethmoids .  
**Incid.:** The commonest benign tumor. young adult 15-30y.  
Commonest: frontal 70% ethmoids 25%.  
**Path:** Compact (Ivory) osteosma: frontal  
Cancellous (spongy) osteosma: ethmoids  
Multiple osteomata may be associated with intestinal polyposis(Gardner syndrome)
**Symptoms:**
- Symptomless
- Slowly growing swelling
- Headache, proptosis, nasal obstruction

**Signs:**
- Hard, rounded, well-defined swelling, may be seen by ant. Rhinoscopy.

**Investigations:**
- X ray – CT

**Treatment:**
Surgical excision if symptomatizing, usually by external approach.

**Complication:** 2\textsuperscript{nd} mucocele.

**II- Papilloma**

Squamous cell papilloma (wart)
- From skin of vestibule.
- Pendunculated warty growth.
- ttt surgical excision & cauterize the base.

**III- Haemangioma**

1- **Capillary haemangioma** (Bleeding polypus of septum)
- Soft red blue polyp
- Epistaxis
- ttt surgical excision – laser.

2- **Cavernous haemangioma**
- Affects children, lateral nasal wall.
- Variable sized vascular mass
- Epistaxis
- ttt laser or cryo surgery

3- **Multiple telangiectasia (osler- rendu disease)**
Congenital vascular malformation involving nose, lips, mouth, pharynx

**IV Fibrous dysplasia**

**Def.:** replacement of normal bone by fibrous tissue & poorly formed bone.

**Aet.:** May be developmental?

**Incid.:** maxilla of teenagers females.

**Path:**
1- monostotic: single site.
2- Polystotic: several sites unilaterally.
3- Albright syndrome: polystotic + endocrinal disturbance (DM, precocious puberty).

**Symptoms:** Disfigurement, nasal obstruction, proptosis.

**Signs:** Diffuse, ill defined, hard, bony swelling.

Loosening of teeth, facial pain

**Investigations:** X ray- CT: Ground glass appearance

**Treatment:** Limited trimming if disfiguring

**Intermediate tumors:**

**I- Inverted papilloma** (*Transitional cell papilloma*)

**Def.:** Intermediate tumor, locally aggressive

**Incid.:** male \ female : 5\1 40-50 y.

**Path:** - Arise from lateral nasal wall

- From schneiderian membrane, which is ectodermal in origin.

- Proliferating epithelial cell invert into underlying stroma

- Epithelial covering: squamous, columner & transitional.

- It can erode bone & invade maxilla

- May be associated with malignancy

**Symptoms:**

Unilateral nasal obstruction    Unilateral nasal discharge

Unilateral epistaxis           Unilateral epiphora

Facial swelling, proptosis

**Signs:**

Unilateral, firm, reddish grey mass.

May be mistaken as, or hidden among nasal polypi

**Investigations:** - CT.   - Biopsy.
**Treatment:**

Wide surgical excision (medial maxillectomy) via lat. Rhinotomy.

Endoscopic excision, if small. - Recurrence is common

Malignant transformation 5%

**D D:** Nasal polypi

**II- Adamantinoma (Ameloblastoma)**

**Def.:** locally invasive odontogenic tumor

**Incid.:** Rare, commonest odontogenic tumor, male > female, 40-50 y.

**Path:** Arise from epithelium responsible for tooth formation Mandible > maxilla.

Forms: basal cells, cystic, follicular, & plexiform

**Symptoms:** Slow expansion of mandible, facial deformity, loose teeth, malocclusion

**Signs:** Hard swelling → egg shell crackling

**Investigations:** X ray & CT (multicystic localized radiolucent swelling). Biopsy

**ttt:** radical resection

**III- Osteoclastoma (giant cell tumor)**

- Rare, locally malignant tumor of bone origin, affect middle aged males
- more in maxilla, ttt by wide surgical excision.

**Malignant Tumors**

**Def.:** Malignant tumor of nose & para nasal sinuses

**Aet:** Predisposing factors:

1- Exposure to formaldehyde, wood dust, hydrocarbons. 2- Ch. Sinusitis.

**Incid.:** - In sinuses more common than benign. - More in males

- Carcinoma affects old age. - Sarcoma affects young age.

**Pathology:**

- Site: maxilla 60%, nose 20%, ethmoid 10%.
- M/P commonest is squamous cell carcinoma 80%, adeno carcinoma 8% adenoidcystic & mucoepidermoid
• **Clinical picture:** Depends upon primary site & direction of spread

**(A) Manifestation of spread**

I- Cancer maxilla

1- Oral & palatal manifestation:
   a- Dental pain. 
   b- Loosening of teeth
   c- Oroantral fistula. 
   d- Swelling → ulceration of palate or alveolar ridge.

2- Nasal manifestation:
   a) Unilateral progressive nasal obstruction 
   b) Unilateral blood stained discharge 
   c) Cacosmia 
   d) Unilateral soft, friable nasal mass bleeds on touch, attached to lateral nasal wall.

3- Orbital manifestations:
   a- Proptosis, diplopia, pain. 
   b- Ophthalmoplegia. 
   c- Diminution of vision. 
   d- Unilateral epiphora

4- Facial (ant.) manifestations:
   - Facial swelling. 
   - Unilateral facial numbness & pain. (Infra orbital nerve) 
   - Skin ulceration.

5- Pterygo palatine & infra temporal (post) manifestations:
   - Trismus; pterygoid muscle. 
   - Numbness over face; maxillary nerve. 
   - Absent corneal reflex; sphenopalatine ganglion.

6- Neurological manifestations
   - Intra cranial extension….headache, vomiting, & blurring of vision 
   - Infra orbital nerve - Maxillary nerve 
   - 3,4,5 nerves in sup. Orbital fissure syndrome & 2 in orbital apex syndrome 
   - 9,10,11,12 by lymph nodes
II- Cancer ethmoids

1- Nasal: early.
2- Orbital: lateral proptosis, swelling at inner canthus.
3- Intracranial: CSF rhinorrhea

III- Nasal cancer: Nasal symptoms.

IV Cancer sphenoid

1- Neurological symptoms: headache
2- Orbital: diplopia, diminution of vision.

(B) Metastatic manifestations

I- Lymphatic

1- Anterior group: submandibular LN (palatal & sublabial M M)
2- Post group: retropharyngeal LN (IX X XI palsies), then both to UDCLN


Investigations:

1- Endoscopic exam in unexplained or persistent symptoms
2- Radiology: X ray, CT, MRI. 3-Biopsy: Direct or by endoscope.

Treatment:

Combined surgery & radiotherapy

a) Total maxillectomy via Weber Fergusson incision

b) Partial maxillectomy .

1- Medial maxillectomy via Mour’s lateral Rhinotomy.

2- Inferior maxillectomy (palatal) via sublabial approach.

+ Reconstruction ............. Dental prosthesis.
+ Orbital exentration ........... if involved orbital periostium
+ RND ..........................if palpable cervical LN.
+ Craniofacial resection ........to involve cribriform plate.
+ Post operative radiotherapy .
Palliative ttt:

If bilateral, distant metastasis, irresectable structures (extensive skull base) old age & bad general condition.

→ Radio or chemotherapy, palliative resection, pain killers, adequate feeding.

Prognosis

Poor 30 % 5 years due to:
Complex anatomy ................. nearby intracranial structures
Late presentation ................. symptoms similar to chronic sinusitis

Cysts of maxilla & palate:

I- Odontogenic cyst

Arise from dental origin

Developmental

1- Dentigerous: Due to fluid collection within layers of reduced enamel epith.
   In relation to non erupted tooth
   May be central, lateral, or circumferential
   Ttt: excision

2- Eruption cyst  bluish translucent, overlying erupting teeth in children.

Inflammatory:  Radicular, periodontal.

II- Non odontogenic

Fissural:  Arise from epithelial remnants at line of fusion of palate.

1- Nasopalatine:
   Epithelial remnants of nasopalatine duct, presents as palatal swelling.
2- Naso labial: Arise in upper lip below alar margin.

Swelling fills nasolabial fold and appears at nasal floor.

3- Globulo maxillary: Arise between roots of the second incisor & canine.

4-Median palatal: Arise in the palate behind incisive foramen

Non fissural

1- Hemorrhagic Bone cyst: due to trauma, cause pain & unilateral swelling of the alveolus, treated by excision

2- Aneurysmal bone cyst: may be due to local hemodynamic disturbance, multilocular, bleeds much during removal, occurs in young age

3- Giant cell granuloma: in response to trauma, slowly growing painless swelling histologically shows multiple giant cells, treated by curettage

Symptoms of nasal diseases

1) Nasal Obstruction  Sense of nasal block, most common

<table>
<thead>
<tr>
<th>Category</th>
<th>Bilateral</th>
<th>Unilateral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congenital</td>
<td>Bil congenital CA</td>
<td>Unil congenital C.A</td>
</tr>
<tr>
<td>Traumatic</td>
<td>Fracture nose</td>
<td>Fracture nose</td>
</tr>
<tr>
<td></td>
<td>Septal haematoma</td>
<td>F. B</td>
</tr>
<tr>
<td>Inflammatory</td>
<td>Acute non sp. rhinitis</td>
<td>Diphtheria</td>
</tr>
<tr>
<td></td>
<td>Chronic rhinitis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Granulomas</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acute &amp; ch. sinusitis</td>
<td>Unil. Sinusitis</td>
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<tr>
<td></td>
<td>Septal abscess</td>
<td></td>
</tr>
<tr>
<td>Neoplastic</td>
<td>Extensive malignant</td>
<td>Benign &amp; malignant</td>
</tr>
<tr>
<td>Septum</td>
<td>S shaped D.S</td>
<td>C shaped D.S</td>
</tr>
<tr>
<td>Allergy</td>
<td>Allergic rhinitis</td>
<td>Antro choanal polyp</td>
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<tr>
<td></td>
<td>vasomotor rhinitis</td>
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<tr>
<td></td>
<td>Allergic polyp</td>
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</tr>
<tr>
<td>Nasopharyngeal</td>
<td>Adenoids</td>
<td></td>
</tr>
<tr>
<td>swelling</td>
<td>Angiofibroma</td>
<td></td>
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<tr>
<td></td>
<td>Carcinoma</td>
<td></td>
</tr>
</tbody>
</table>
(2) Nasal discharge

<table>
<thead>
<tr>
<th>Type</th>
<th>Bilateral</th>
<th>Unilateral</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Watery</td>
<td>- Allergic rhinitis</td>
<td>CSF rhinorrhea</td>
</tr>
<tr>
<td></td>
<td>- Hyperaemic acute rhinitis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Vasomotor rhinitis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Excessive lacrimation</td>
<td></td>
</tr>
<tr>
<td>2- Bloody</td>
<td>Causes of Epistaxis</td>
<td>Local causes of epistaxis</td>
</tr>
<tr>
<td>3- fluid &amp; food (nasal regurge)</td>
<td>- Cleft palate</td>
<td>Oroantral fistula</td>
</tr>
<tr>
<td></td>
<td>- Short palate due to trauma</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- paralyzed palate: diphtheria</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- perforated palate: syphilis</td>
<td></td>
</tr>
<tr>
<td>4- MP or P</td>
<td>Causes of obstruction</td>
<td>Causes of unil obstruction</td>
</tr>
<tr>
<td>5- Crusts</td>
<td>- Atrophic rhinitis</td>
<td>Unil atrophic rhinitis</td>
</tr>
<tr>
<td></td>
<td>- Nasal granulomas</td>
<td></td>
</tr>
</tbody>
</table>

NB: discharge is either nasal or post nasal

Post nasal → cough, pharyngitis, laryngitis, gastric troubles.

(2) Epistaxis

Def.: Bleeding from the nose

Aet.: 1- local:

1- Idiopathic

- Commonest cause 90%

- May be precipitated by minor trauma or hot atmosphere

- Bleeding from little’s area (Kiessel Bach’s plexus), which is the anterior part of the septum where septal branch of sphenopalatine, anterior ethmoidal, greater palatine & superior labial branch of facial anastomose, most likely to be uncovered by mucosa, exposed to cold dry air ………crustation

2- Traumatic

- F.B - Fracture nose

- Fracture skull base - Surgical trauma: after operations
3- **Inflammatory**
- Acute non specific rhinitis
- Chronic rhinitis
- Fungal infection
- Acute specific rhinitis
- Acute & chronic sinusitis
- Chronic rhinitis

4- **Neoplastic**
   a) Tumors of the nose & sinuses
      - Benign: haemangioma
      - Malignant
   b) Tumors of the nasopharynx
      - Benign: angiofibroma
      - Malignant: carcinoma & sarcoma

5- Deviated septum
   Convex side
   angulated vessels
   Concave side
   mucosal dryness

6- Hereditary haemorrhagic telangiectasia

**II- General Causes**

1- **Cardio vascular causes**
   a) High arterial pressure (hypertension)
      Commonest cause in elderly, usually it is posterior bleeding
      Hypertension does not initiate but maintain bleeding
   b) High venous pressure:
      Heart failure, mitral stenosis, emphysema, mediastinal masses.

2- **Blood diseases**
   e.g. purpara, haemophilia, leukaemia, thrombocytopenia.

3- **Drugs**
   - Anticoagulants, e.g. heparin
   - Antiplatelets e.g. asprin, NSAID

4- **Hepatic**
   Liver failure → hypoprothrombinaemia

5- **Fever**
   E.g. Exanthemata: rheumatic fever & infective endocarditis → vasculitis
**Management (4A)**

**I- First Aid**

1- Patient is managed in seated position with head slightly flexed and leaning forward unless shocked (supine with head down).

2- Pinch the nose between index & thumb.

3- Apply cold compresses to the forehead.

4- Patient is asked to spit blood not to swallow it.

5- Insert a piece of cotton soaked with a vasoconstrictor solution (Epinepherin 1/100, 1000) into nostrils for 5-10m. (avoided in hypertensive & cardiac patients)

**II- Assessment**

(A) History for cause

(B) Examination for (4S)

1- Site
   - Unilateral or bilateral. - Anterior or posterior.
   - Sites: - Little’s area 90%
   
   Upper part above middle turbinate: (ant, post ethmoidal → (ICA)
   
   Posterior part below middle turbinate: (Spheno palatine → ECA)
   
   NB rigid endoscope may be used.

2- Severity

3- Shock - Weak rapid pulse - Hypotension
   - Tachypnea - Pallor, cold sweating
   - Irritability - Low urine output

4- Cause

**III- Arrest (control) bleeding**

(A) Mild

1- General first aid

2- Cauterization:

   When bleeding stops or diminishes.
   
   Under: local A. 4% cocaine or xylocaine.
By: electrical: more effective
chemical: silver nitrates or chromic acid.

Then: avoid manipulation, lubricant nasal drops for 1 week.

3- Nasal packing if bleeding continues after cautery.

(B) **Severe**

Stop bleeding by packing + control shock

1- **Ant. nasal packing**

- Strip of ribbon gauze 50 X 2.5cm, impregnated with vaseline, lignocaine & antibiotic ointment.

- Apply surface anesthesia, introduced in layers.

- Left for 24-48h. - Give antibiotics.

- Alternatively: inflatable rubber tampon, Mirocell

NB examine for post nasal bleeding

2- **Post nasal packing**

- If ant. packing fail to control bleeding

- Under general A.

- Piece of gauze with antiseptic ointment lodged firmly in the nasopharynx with 2 threads coming from the nostrils & tied together and a third one coming from the mouth

- Left for 24-48h. - Give antibiotics

- Alternatively: Foley’s catheter

3- **General measures**

Coagulants e.g. vit k, fresh plasma  Antibiotics

Sedation e.g. diazepam  Transfusion blood, fluids

Rest in bed supine position

Observation of vital signs, Hb% blood gases & urine
4- **Arterial ligation**

   If all previous measures failed, or recurrent epistaxis despite repeated packing
   a) Ethmoidal A ligation Via external frontoethmoidectomy approach (if bleeding coming from above middle turbinate).
   b) Maxillary artery ligation Via transantral approach (if bleeding coming from below middle turbinate) : more effective than ECA ligation.
   c) ECA ligation
   d) Diathermy of ant. ethmoidal or sphino palatine A. or LASER

5- **Arterial embolization**

   During angiography by gelfoam

**IV- Attack the cause**

   (A)  **Investigations**
       - Coagulation profile B.T, C.T, PT, PC, PTT.
       - Blood picture.
       - C.T & biopsy from a nasal mass.
   (B)  **Treatment: of the cause**
       Telangetasias: laser coagulation

**(3)  **Headache & facial pain**

Its pain perceived in the following areas: cranial vault, orbit, & nape of neck

Pain elsewhere in the face is considered as facial pain

Pathogenesis of headache

   Intracranial

   Dilatation & distention of cerebral arteries.

   Traction, displacement, or inflammation of cerebral vessels, meninges, 5, 7, 9 & 10 cranial nerves.

   Extra cranial sustained contraction of muscles of neck & shoulder.
**Causes**

**I- Extractanial**

**(A) Rhinological**

1- Sinusitis: only 5-10 % characters………………..
2- Inflammatory Acute rhinitis & vestibulitis
3- Tumors: benign or malignant.
4- Nasopharyngeal carcinoma.
5- Contact headache e.g. D.S

**(B) Otological**

1- Otitis externa
2- Acute otitis media
3- Complications of CSOM
4- Tumors

(C) **Ocular** frontal, supra orbital, with pain around the eye

1- Glaucoma 2- errors of refraction 3- tumors

**(D) Dental**

1- Dental caries 2- Dental infections
3- Post extraction neuralgia 4- Unerupted wisdom tooth

**(E) TMJ**

1- Arthritis 2- Malocclusion (costen syndrome) 3- dislocation

**(F) Cervical**

Spondylosis, cervical myalgia accompanied by reflex muscle spasm

**(G) Neuralgias**

- Paroxysmal attacks of intense unilateral pain.
- Brief duration seconds to minutes, felt along nerve distribution.
- Sudden onset & often triggered.
- Cause is unknown may be vascular compression
Nose

- ttt: medical tegretol, Phenytoin

Surgical: alcohol injection, division of sensory root, or vascular decompression

- Types
  - V Neuralgia (tic douloureuex)
    Usually old age, pain in second & third divisions, precipitated by shaving or teeth brushing
  - IX neuralgia Paroxysm of stabbing pain start in tongue base & faucial region on one side, & often radiates to the ear, provoked by swallowing.

(II) Vascular:
Episodic painful distention of facial vessels, site related to the artery

1- Migraine

**Def.:** paroxysmal attack of unilateral headache & hemifacial pain

**Aet:** spasm of intracranial arteries → dilatation of intra & extra cranial arteries more in young females, strong family history

**Types:** Classic migraine with aura Common migraine: no aura

- Aura: blurring of vision, scotomas, & paraesthesia.
- Attack: throbbing, lasting for hours (4-72h), associated with photophobia, nausea & vomiting
  
  ttt: Acute attack: ergot derivatives, analgesics, serotonin antagonists.

  Prophylactic  Ca channel blockers, B blockers.

2- Temporal arteritis

**Def:** acute inflammation of the temporal arteries

**Aet:** ? Autoimmune, usually old age.

**Characters:** tender cord like artery, overlying skin is red, hot, and tender

**ttt:** steroids( for at least 6 months), excision of the artery

If affect ophthalmic A → blindness

(I) Fatigue (Tension) headache

(J) General causes

1- Systemic infections  2- Toxic: renal & hepatic disorders, Hypoxia
3- Constipation 4- Hyper & hypo tension.
5- Anemia 6- Premenstrual
II- Intracranial causes

1- Hydrocephalus
2- After lumbar puncture, IC hemorrhage
3- Inflammations: meningitis, encephalitis, abscess
4- Space occupying lesion e.g. tumors, abscess, aneurysm.

(4) Smell disorders

Pathway: odor dissolve in mucus to reach olfactory nerve endings........nerve impulse......olfactory bulb....olfactory nucleus...thalamus & hypothalamus

(A) Anosmia (or hyposmia): Loss or diminished smell sensation

Causes

1- intra nasal: A: Misdirected air current e.g. syphilis, malignancy
   B: Prevention of air entry: nasal obstruction
   C: Atrophy of mm: atrophic rhinitis (too thick mucus).
   D: Excess secretion: allergic rhinitis; wash particles
   E: Peripheral neuritis e.g. diabetes, influenza lead, &atrophic rhinitis

2- Intracranial: a: congenital absence of olfactory bulbs & nerves
   b: Traumatic: fracture base
   c: basal meningitis
   d: compression of centers by tumors or granuloma.

3- Psychogenic

4- Malingering: deny irritant odours (5 nerve)

(B) Cacosmia: Perception of bad odor: F.B, dental sinusitis, atrophic rhinitis.

(C) Parosmia:
   Abnormal smell only by the patient: post influenza, epilepsy, hysteria

(D) Hyperosmia: Irritative lesions: hysteria & mania

Tests of smell: Subjective: minimal perceptible odor & identification test
               Objective: olfactory evoked response.
(5) **Proptosis**

**Def:** Displacement of the eye ball in relation to the skull

Direction: depends on the cause

**Causes:**
I- Nose & paranasal sinuses
   a) Frontal: mucocele, osteoma: downwards & lateral
   b) Ethmoid: mucocele, osteoma, malignancy: lateral
   c) Maxillary: malignancy: upwards
II- Lacrimal gland causes: Downwards & medial
III- Orbital causes: haematoma, abscess, and tumors……Forwards
IV- Nasopharyngeal causes: fibroma, carcinoma
V- Cavernous sinus thrombosis
VI- Endocrinal e.g. Toxic goiter

(6) **Mouth breathing**

**Aet:** all causes of nasal obstruction Habitant

**Complications**
- Nasal, aural, oral………………see adenoid
- Respiratory laryngitis, bronchitis, & chest infection
  - Reflex cough
  - Laryngismus stridulus
  - (Sudden nocturnal spasm due to post nasal discharge)
- CVS Pulmonary hypertension………………cor pulmonal
- Skeletal chronic air way obstruction early in childhood: pigeon chest.
- Nocturnal enuresis in children

(7) **Sneezing**

Involuntary rapid expulsion of air from the nose & mouth, as a reflex to nasal irritation

**Causes:** nasal irritants; dust & fumes
   - Allergic & vasomotor rhinitis
   - Ischemic stage of acute rhinitis
(8) **Disorders of nasal resonance**

a) Hypo nasal speech or rhinolalia clausa: in nasal obstruction & all waves pass via oral cavity hence no nasal resonance, most prominent on letters M & N

b) Hypernasal speech or rhinolalia aperta: too much nasal escape of air due to incompetent velopharyngeal closure as in: cleft palate, submucous cleft, congenital short palate, palatal paralysis, post tonsillectomy most prominent on letter K, treated by voice training & pharyngeal flap.

**Nasal surgeries**

**Requirements**
- Good illumination: head light, endoscope, microscope (lens 300)
- Suction: Zollenger sucker
- Hemostasis: Preoperative nasal pack with vasoconstrictor
- Subperiosteal & subperichondrial infiltration with V C
- Hypotensive anesthesia, with head up position.

**Instrumentations**

**Submucous resection (SMR)**

**Def.:** operation done to correct septal deformity.

**Indication:** symptomatizing D.S.

**Contraindications:** before age of 16 & Septal dislocation.

**Anaesthesia:** local or general

**Technique:** (killian)
- Incision: vertical in the mucoperichondrium of one side just posterior to mucocutaneous junction.
- Elevate mucoperichondrium & periosteum on that side.
- Remove deviated cartilage & bone.
- Put a nasal pack for 24 48 h.
Complications:
- Septal haematoma & abscess.  - Septal perforation.
- Collapse of nose & supratip depression.  - Post operative Hge
- Poor correction: persistent obstruction  - Post operative infection

Septoplasty

Def.: operation to correct septal deformity without removing cartilage but straightening deflected part

Indication: CI of SMR.

Antral puncture and lavage

Indications:
1- Diagnostic: (proof puncture, when the plain x-ray shows sinus opacity)
2- Therapeutic: Subacute, and chronic sinusitis.

NB: Antral puncture and lavage is not widely used nowadays.

Contra indications:
1- Acute maxillary sinusitis for the fear of spreading infection.
2- Traumatic fracture of the maxilla.  3- Children.

Anaesthesia: Local surface anesthesia.

Technique:
- A trocar and cannula is introduced beneath the inferior turbinate in the inferior meatus, one inch behind the anterior end of the inferior turbinate. Then, the medial wall of the maxillary sinus is pierced with the trocar directed upwards and laterally towards the outer canthus, and the trocar is then removed.
- The sinus is then washed by warm sterile saline solution, (antibiotics solution can be used). In case of fungal infections we can wash with amphotericin B solution.

Complications:
1- Injury of anterior wall of the sinus, with swelling of the cheek.
2- Injury of the orbital floor.  3- Mild hemorrhage.

Intranasal (inferior meatal) antrostomy
**Principle:**

Creation of a permanent opening in the inferior part of the medial wall of the maxillary sinus in the inferior meatus which is more dependent than the natural ostium, but this is proved to be wrong because the mucociliary clearance wave always beats towards the natural ostium.

**Indication:**

This operation has been traditionally used in the treatment of recurrent and chronic maxillary sinusitis, it is not done nowadays being replaced by endoscopic middle meatal antrostomy.

**Contraindications**

Acute sinusitis, bleeding tendency

**Complications:**

- Epistaxis from sphenopalatine artery
- Nasolacrimal duct injury
- Infraorbital nerve injury
- Early closure

**Radical antrum operation (Caldwell – Luc’s procedure)**

This entails total removal of the irreversibly damaged mucosa of the maxillary sinus, with an inferior meatal antrostomy.

**Indications:**

It has predominantly been used for persistent chronic maxillary sinusitis, when medical treatment, antral puncture lavage and inferior meatal antrostomy are ineffective. This is obsolete now but is indicated in special situations:

1- Removal of recurrent antrochoanal polyp.
2- Removal of a foreign body within the sinus e.g. retained dental root.
3- Removal of benign tumors.
4- Removal of dental and dentigerous cysts of the maxillary sinus.
5- As a step in closure of oroantral fistula.
6- Access to elevate and stabilize orbital floor fractures.
7- A route for taking biopsy in antral malignancies.
8- Access to the pterygopalatine fossa as in ligation of the maxillary artery.
**Contraindications:**

1- Acute sinusitis.

2- Children & hypoplastic maxilla.

**Anaesthesia:** local or general.

**Technique:**

- Through a sublabial incision 3mm above and parallel to the gingivo labial fold, the mucoperiosteal flap over the anterior wall of the maxillary sinus is elevated.

- A rounded opening is made in the anterior wall of the maxillary sinus using a gouge and hammer, or drill.

- The mucosa of the sinus is removed by a curette.

- Intranasal inferior meatal antrostomy is performed.

- The sinus is packed with vaseline gauze impregnated with garamycin ointment, to be removed from the nose after 48 hours.

**Complications:**

- Injury to infraorbital nerve, nasolacrimal duct, or dentition

- OAF - Epistaxis - Early closure

- Failure to relieve symptoms

**External frontoethmoidectomy**

**Indications:**

1- Chronic sinusitis, complicated ethmoiditis as orbital cellulitis (now replaced by endoscopic procedures).

2- Extensive recurrent nasal polyposis when previous nasal surgery has destroyed useful landmarks.

3- Frontoethmoidal mucoceles.

4- An access to ligate the ethmoidal arteries in epistaxis.

5- Dacryocystorhinostomy operation.

6- Repair of CSF leaks.

7- Decompression of the orbit for malignant exophthalmos.

**Complications:** Orbital injury, hematoma, or diplopia.
**Submucous diathermy of the inferior turbinate**

**Principle:** To create submucosal fibrosis…….shrinkage.

**Indications:** Chronic hypertrophic rhinitis -Allergic & vasomotor rhinitis.

**Complications:** Adhesions, epistaxis, & recurrence.

**Method:** An insulated electrode except for 5 mm at its tip, introduced in 3 points

**Turbinectomy**

**Principle:** Partial resection of inferior turbinate to reduce its bulk

**Indications:** As before  
**Contraindications:** Bleeding tendency

**Complications:** Bleeding, atrophic rhinitis

**Rhinoplasty**

**Principle:** correction of nasal deformity with or without septal correction

**Indications:**
- *Nasal skeleton deformity:*
  Osseocartilagenous deformity, nasal hump, deviated nose, large nose
- *Tip deformity:*
  large nose, large tip, depressed tip, & flare ala

**Contraindications:** Psychic patients

**Complications:** Adhesions, infection, and poor correction

**Preparations:** Realistic expectation, colored photographs.

**Methods:** General anesthesia, with midline tube, & throat pack
Two techniques: closed, or open.

**Nasal endoscopy**

It is a recent modality, which has been introduced to rhinology after the invention of the hopkin’s rod lens system.

**I-Diagnostic endoscopy of the nose and sinuses**

It allows a detailed examination of the nose and sinuses.

Endoscopes used are 0° and 30° rigid endoscopes, 4 or 2.7 mm in diameter.
**Technique:**

- The nose is sprayed with a surface anesthetic and vasoconstrictor, or it may be applied as a soaked cotton pledget.

- The endoscope is introduced to examine the vestibule, floor of the nose, inferior meatus, the nasopharynx and the pharyngeal orifice of the E.T., medial to the middle turbinate to visualize the superior meatus and the sphenoethmoidal recess, the middle turbinate itself, then the middle meatus.

**Indications:**

- Persistent nasal obstruction.
- Foreign body in a hidden area.
- CSF rhinorrhea.
- Chronic sinusitis.
- Nasal polypi and adhesions.
- Neoplasms of the nose, and NPX.
- Recurrent epistaxis.
- E.T. dysfunction.
- Nasopharyngeal examination.
- Postoperative assessment and care.

Diagnostic nasal endoscopy can be used routinely as a part of nasal examination, for accurate detailed examination and also for documentation.

**II. Endoscopic sinus surgery**

(A) **Functional endoscopic sinus surgery (FESS)**

**Theory:** Obstruction of any sinus ostium........accumulation of secretions........inflammation of the MM with damage of epithelium and cilia, inflammation usually starts in the ethmoid and then extends to other sinuses.

The idea of FESS is to restore normal ventilation and drainage of the affected sinus via its natural ostium.

The FESS may include:

1- Anterior ethmoidectomy
2- Posterior ethmoidectomy
3- Middle meatal antrostomy
4- Sphenoidotomy
5- Frontal recess clearance.

Nowadays FESS is the standard surgery for chronic sinusitis.

**Advantages:**

1- Preservation of the sinus mucosa
2- Preservation of natural anatomy and physiology
3- Excellent visualization.
(B) **Other Indications:**

1. Choanal atresia.
2. Repair of CSF leaks.
3. Orbital and optic nerve decompression in selected cases of trauma.
4. Repair of blowout fractures.
5. Chronic and recurrent acute sinusitis (FESS).
6. Frontoethmoidal mucoceles.
7. Drainage of periorbital abscess.
8. Nasal polyposis (endoscopic ethmoidectomy).
10. Allergic fungal sinusitis and mycetoma.
11. Septal and turbinate surgery.
12. Excision of limited nasal and sinus benign tumors.
13. Control of epistaxis in recurrent cases.
15. Trans-sphenoidal pituitary hypophysectomy.

**Contraindications:**

1. Malignant tumours.
2. Fungal infections (except allergic fungal sinusitis).
3. Complicated sinusitis (e.g. brain abscess).

**Complications:**

1. **Major complications**
   1. CSF leakage and brain trauma.
   2. Meningitis, brain abscess, carotid artery injury or intracranial hemorrhage.
   3. Severe hemorrhage that may need transfusion.
   4. Orbital hematoma.
   5. Diplopia and loss of vision.
   6. Anesthetic complications.
II. **Minor complications**

1. Recurrent sinus infections.
2. Adhesions.
3. Postoperative epistaxis.
4. Anosmia due to injury of the medial wall of the middle turbinate or the cribriform plate.
5. Periorbital oedema and ecchymosis.