

## ANATOMY OF THE NOSE

The nose is divided into the external nose and the nasal cavity.

### External nose:

*The upper third* of the external nose is bony and consists of:

- The nasal bones which unite with each other in the midline.
- The nasal process of the frontal bone superiorly.
- The frontal process of the maxilla laterally.

*The inferior two thirds* are cartilaginous and consist of the upper lateral cartilage, lower lateral cartilages and alar cartilages. The skin over the cartilaginous part is closely adherent and contains multiple sebaceous glands.

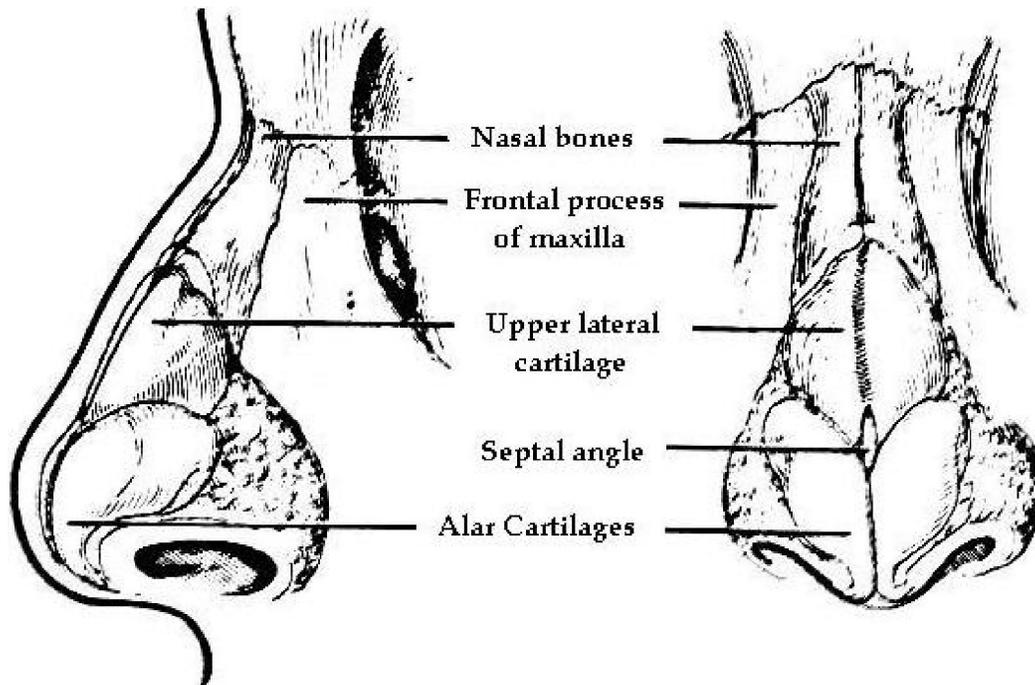


Fig.1. The external nasal skeleton.

### Nasal cavity:

The nasal cavity stretches from the nostrils (anterior nares) to the posterior nares (also called choana), which leads to the nasopharynx and is divided by a midline osteocartilaginous septum.

*The roof* of the nose is formed by the cribriform plate of the ethmoid bone separating it from the anterior cranial fossa

**The floor** constitutes the hard palate, and is formed by the horizontal plates of the maxillary and palatine bones.

**The lateral wall** of the nose supports three main ridges called the superior, middle and inferior turbinates or conchae. Beneath each concha there is a space, called superior, middle and inferior meatus respectively. The space between the superior concha and the nasal septum is called the sphenoidal recess. The sphenoid sinus opens into this recess and the posterior ethmoidal air cells open into the superior meatus. The nasolacrimal duct opens into the inferior meatus. The remaining paranasal sinuses drain into the middle meatus.

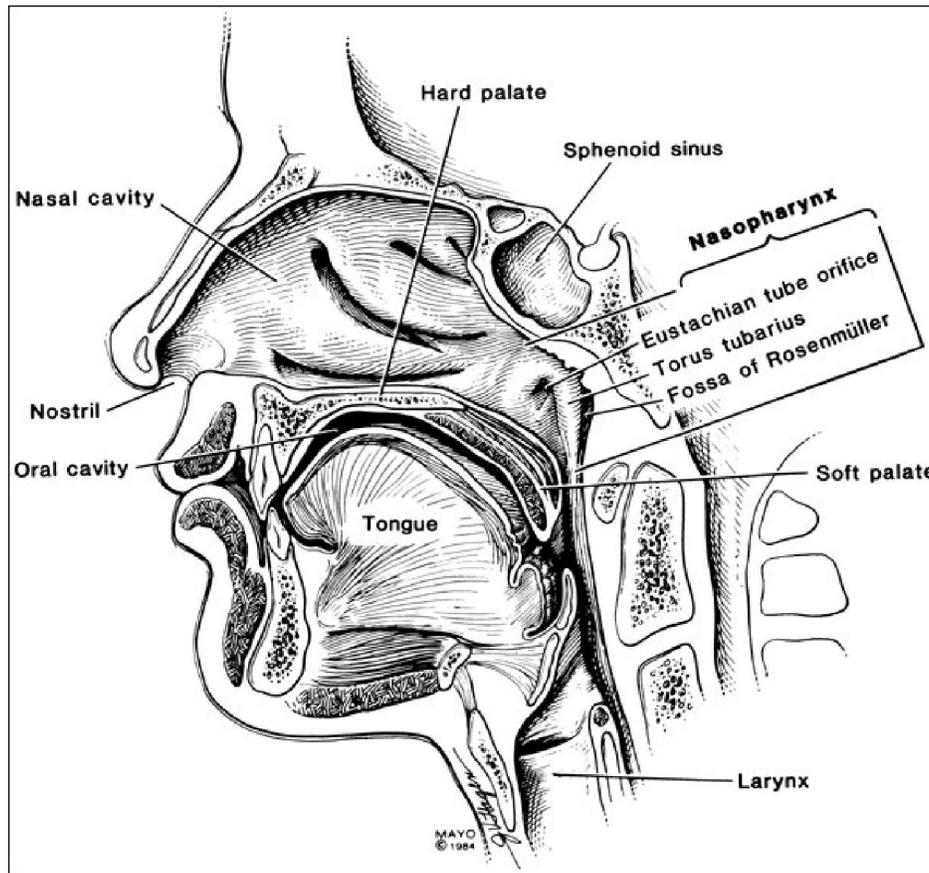


Fig.2. The nasal cavity and nasopharynx..

**The medial wall (nasal septum)** consists of a bony part (perpendicular plate of ethmoid and vomer) and a cartilaginous part (septal or quadrilateral cartilage). Inferiorly it is inserted into a groove in the maxillary crest. It is covered with mucoperichondrium and mucoperiosteum over the cartilage and bone, respectively.

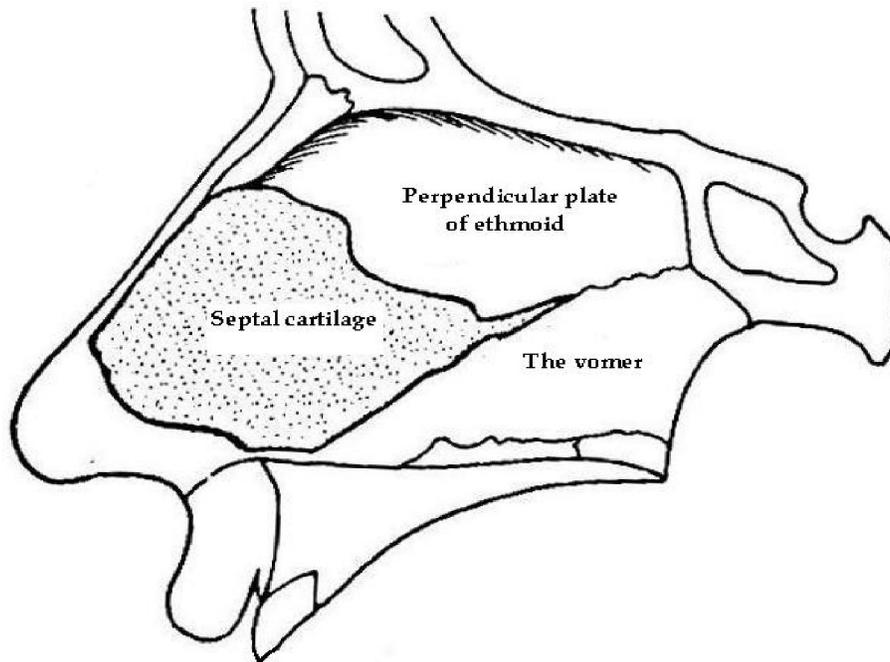


Fig.3. The nasal septum.

The nasal cavity is divided into three areas, vestibular, olfactory and respiratory. The vestibular area is the region just inside the nostril, lined by skin. The olfactory area contains the olfactory epithelium and occupies the roof and the uppermost parts of the septum and the lateral wall, above the superior concha. The respiratory area constitutes the rest of the nasal cavity and is lined by respiratory pseudostratified columnar ciliated epithelium.

#### **Blood supply:**

Both the external and internal carotid arteries supply the nose via their terminal branches. As a guideline, the region above the root of the middle turbinate is supplied by the anterior and posterior ethmoidal arteries, these are branches of the ophthalmic artery (internal carotid), with the remaining areas being supplied by the sphenopalatine, greater palatine and superior labial of facial arteries (external carotid). The sphenopalatine artery is considered to be the main arterial supply of the nasal cavity and originates from the maxillary artery (external carotis). The carotid systems anastomoses at the antero-inferior region of the septum which is called 'Little's area' or 'Kiesselbach's plexus'. This anastomosis includes the anterior ethmoidal, sphenopalatine, greater palatine and superior labial branch of facial artery.

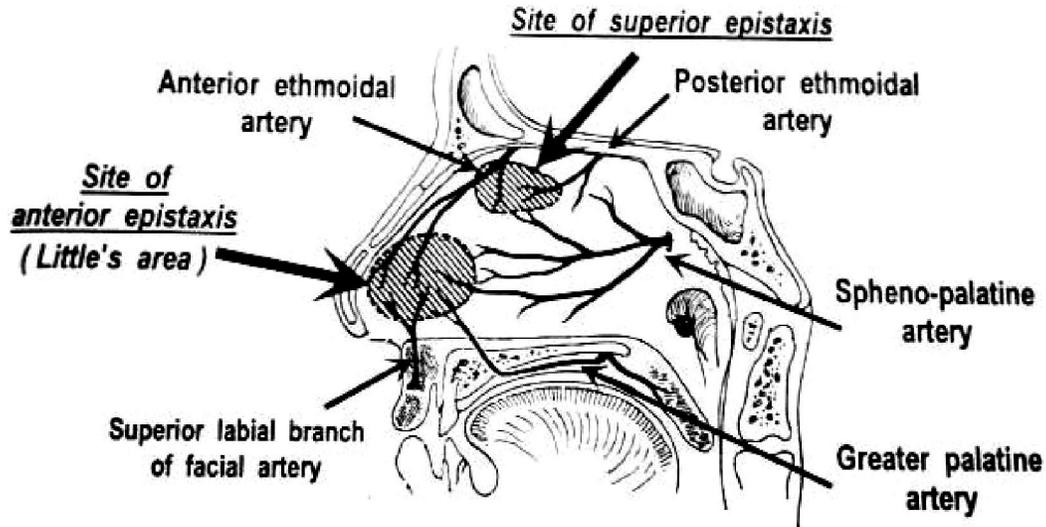


Fig.4. Arterial supply of the nose.

Venous drainage of the nose is of importance, as blood can drain via the pterygoid plexus, facial and ophthalmic veins to the cavernous sinus, as well as rarely (1%) to the superior sagittal sinus via the foramen caecum.

#### **Nerve supply:**

The main sensory supply is via the maxillary division of the trigeminal nerve. Secretory glands are under control of the autonomic nervous system by the vidian nerve (nerve of pterygoid canal). The nasal vascular supply is constricted by sympathetic nerve stimulation and dilated by parasympathetic nerve stimulation. The olfactory area is supplied by the 1<sup>st</sup> cranial nerve.

#### **Lymphatic drainage:**

The anterior part of the nose drains with the external nose to the submandibular nodes, while the posterior drainage is to the retropharyngeal and upper deep cervical lymph nodes.

## **ANATOMY OF THE PARANASAL SINUSES**

The paranasal sinuses are extensions of the nasal cavity as air-filled spaces into the skull bones. They are grouped as anterior (the frontal, anterior ethmoid and maxillary sinuses) and posterior (the posterior

ethmoidal and sphenoid sinuses). The anterior group drains into the middle meatus. The posterior ethmoid and sphenoid sinuses drain into the superior meatus and sphenoethmoidal recess respectively. The crucial drainage area of the anterior group of paranasal sinuses is called the ostiomeatal complex.

### **Maxillary sinus:**

The maxillary sinus is present in the body of the maxilla. Anatomical landmarks include the close relationship to the orbit superiorly, alveolus and hard palate inferiorly, and pterygopalatine fossa posteriorly. It is worth mentioning that the second premolar and first molar teeth are closely related to the floor of the sinus and the bone overlying their roots is occasionally deficient. Medially, it is related to the inferior and middle meati in the lateral nasal wall. Its ostium opens in its medial wall, high up and posteriorly to drain in the middle meatus.

### **Frontal sinus:**

The frontal sinus lies between the outer and inner tables of the frontal bone. It is not present at birth, but when fully developed, it may be extensively pneumatized. Its boundaries are the orbit inferiorly, the anterior cranial fossa posteriorly, the forehead anteriorly and separated from the other frontal sinus medially by the interfrontal septum. Its ostium locates at the medial part of its floor to drain in the middle meatus.

### **Ethmoid sinus:**

The ethmoid sinus describes a labyrinth of air-filled cavities located in the superior part of the lateral nasal wall. It is separated into anterior and posterior by the basal lamella of the middle turbinate. Important adjacent structures include the orbit laterally and anterior cranial fossa superiorly. It is separated from the orbit by a very thin plate of bone called lamina papyracea.

### **Sphenoid sinus:**

The sphenoid sinus is situated in the body of the sphenoid bone. It has a close lateral relationship to the internal carotid artery, the optic nerve and the cavernous sinus. The pituitary fossa lies posterosuperiorly.

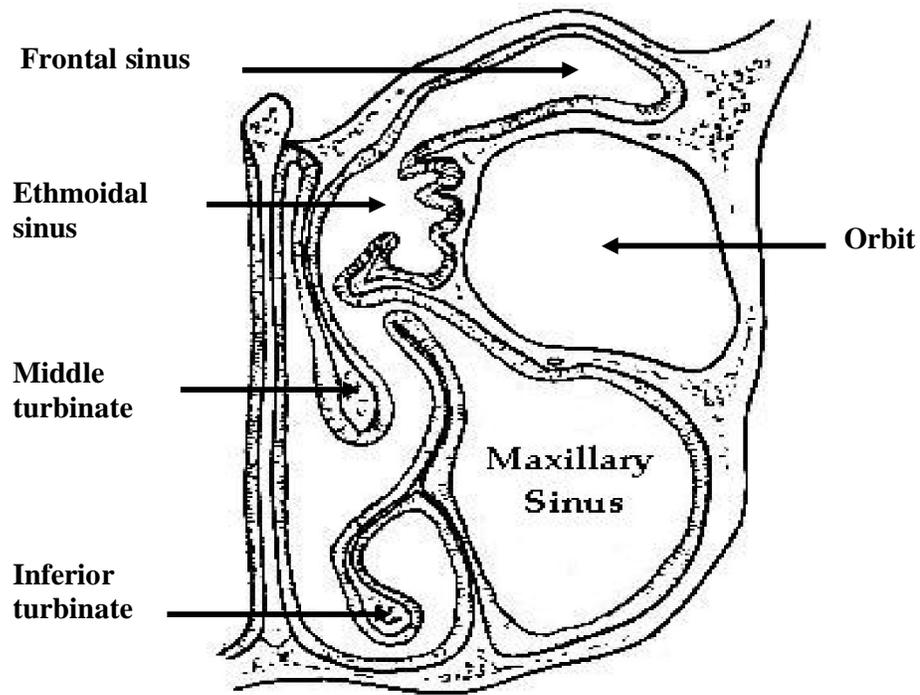


Fig.5. The maxillary sinus.

## PHYSIOLOGICAL FUNCTIONS OF THE NOSE AND PARANASAL SINUSES

1. Respiratory airway.
2. Olfaction.
3. Air conditioning of the inspired air.
4. Purification of the inspired air.
5. Immunological function.
6. Voice resonance.
7. Tears drainage.

### **1-Respiratory airway:**

The nose is the first station of breathing, which is the main function of the nose. The nose is the natural respiratory airway. The neonate cannot breathe except from his nose. One of the areas which affect normal nasal breathing is the nasal valve area, which is bounded by the junction of the caudal end of the upper lateral cartilage, the nasal septum and the anterior end of the inferior turbinate.

### **2-Olfaction:**

Olfaction is an important sense, which gives pleasure with pleasant odours and warns from toxic and dangerous ones. This sense depends on the integrity of the olfactory pathway from the olfactory mucosa to the olfactory center. The olfactory mucosa is located in the roof of the nasal cavity. It contains bipolar neurons with their dendrites and cilia. The axons of this neurons synapse with the olfactory bulb. Normal nasal breathing is essential to carry the odorous particles to the olfactory mucosa through turbulence of the inspired air. Any lesion affecting the nasal patency preventing the air current from reaching the olfactory area will hinder the sense of olfaction.

### **3-Air Conditioning:**

The inspired air must reach the lower respiratory system in a suitable temperature and humidity condition. The rich vascular nasal mucosa gives the suitable temperature to the air current, the mucous secretion of the nasal mucosa gives it humidity. The turbinal projection increases the surface area which helps the above functions.

#### **4-Purification:**

This is done through:

- vestibular hair mesh for the large dust particles
- Mucociliary clearance: the smaller ones stick to the mucus blanket and passed backwards by the ciliary movement of the mucous membrane to the nasopharynx to be expelled outside or go through the upper digestive system.
- Sneezing reflex: to expel excess inhaled pollutants by reflex forced expiration.

#### **5-Immunological Function:**

The mucus blanket is that mucus layer secreted by the nasal mucous glands. This layer is rich in lysozyme enzyme which has a defensive and phagocytic function against bacteria and gives part of the immunological function of the body respiratory infections.

#### **6-Voice Resonance:**

Every person has his own voice character. The nasal cavity and the paranasal sinuses share an important role in this character. Healthy paranasal sinuses contain air, so resonance of voice happens in a normal way. If the sinuses and the nasal cavities contain secretions or the nasal mucosa is congested, this will give the nasal tone of voice as in rhinosinusitis.

#### **7-Tear Drainage:**

Tears from the lacrimal glands are drained through the nasolacrimal duct, which opens at the inferior meatus. Nasal lesions obstructing this duct will lead to epiphora.

## **SYMPTOMATOLOGY OF THE NASAL DISEASES**

- |                       |                           |
|-----------------------|---------------------------|
| 1- Obstruction.       | 2- Discharge.             |
| 3- Epistaxis.         | 4- Olfactory disturbance. |
| 5- Pain and headache. | 6- Sneezing.              |
| 7- Snoring.           | 8- Nasal tone.            |
| 9- Regurgitation.     | 10-Deformities.           |

The above mentioned symptoms and complaints must be analyzed carefully with proper history taking. One can reach the exact diagnosis by enquiry about the duration (short or long-standing), unilateral or bilateral, continuous or episodic, acute or chronic.....etc.

### **1- Nasal Obstruction:**

#### 1. Congenital:

- Congenital choanal atresia.
- Congenital syphilis.

#### 2. Developmental:

- Deviated septum.

#### 3. Trauma:

- Foreign body.
- Casual trauma:
  - § Fracture nasal bones and associated fracture of septum.
  - § Septal haematoma.
- Operative trauma:
  - § Haematoma after operation.
  - § Forgotten pack or piece of cotton.

#### 4. Inflammatory:

- All inflammations (acute or chronic, specific or non specific) rhinosinusitis.

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5. Allergy:

- Allergic rhinitis and sinonasal polypi.

6. Tumours:

- All benign and malignant tumours..

7. Causes in the nasopharynx:

- Adenoids in children.
- Benign tumours (nasopharyngeal angiofibroma).
- Malignant tumours.
- Antrochoanal polyp.

**Causes of unilateral nasal obstruction:**

1. Congenital:

- Unilateral choanal atresia.
- Unilateral atresia of the anterior nares (rare)..

2. Trauma:

- Foreign body.

3. Inflammatory:

- Nasal diphtheria.
- Unilateral sinusitis.
- Antrochoanal polyp.

4. Deviated septum:

5. Cysts.

6. Tumours:

- Of the nose (benign and malignant).

**2- Nasal Discharge:**

**Types of nasal discharge:**

1. Mucopurulent and purulent discharge:

- The same causes as nasal obstruction.

2. Blood:

- Epistaxis.

3. Watery:

- CSF rhinorrhoea.
- Allergic rhinitis.
- Early acute rhinitis.
- Excessive secretions of lacrimal glands.

4. Water and food: (Regurgitations)

- Congenital: Short palate and cleft palate.
- Traumatic:
  - § After tonsillectomy (scarring of pillars).
  - § Oromaxillary and oronasal fistula.
- Inflammatory: Syphilitic perforation of the hard palate.
- Neurogenic: Post-diphtheritic, bulbar and pseudobulbar palsy.
- Neuromuscular: Myasthenia gravis.
- Malignant: Invasion of the palate.

5. Serous discharge:

- Cysts of the maxillary sinuses (containing cholesterol crystals).

**Causes of unilateral nasal discharge:**

1. Unilateral purulent or mucopurulent discharge:

- Same causes as unilateral nasal obstruction.

2. Unilateral watery discharge:

- CSF rhinorrhoea.

3. Unilateral regurgitation of water and food:

- Oromaxillary and oronasal fistula.

4. Unilateral blood:

- Epistaxis.

5. Unilateral yellow serous discharge:

- Cyst in sinus rupturing into nose (fluid contains cholesterol).

**3-Epistaxis:** Will be discussed in details.

#### **4-Olfactory Disturbance:**

This includes:

##### **1. Anosmia** (complete loss of the sense of smell):

- It must be bilateral.
- It is often described with loss of taste because flavour is largely perceived by olfaction.

##### **Causes:**

###### a) In the nose (Extracranial):

- Collapsed alae nasi.
- Polypi and hypertrophy of the turbinates.
- Atrophic rhinitis.
- Peripheral neuritis after influenza or exposure to gases.

###### b) Cranial causes:

- Fracture base injuring the olfactory area.

###### c) Intracranial:

- Compression of the nerve tract by brain tumours and abscess.

##### **2. Cacosmia** (Patient himself perceives bad smell):

##### **Causes:**

- Maxillary sinusitis of dental origin.
- Foreign body in the nose with foetid discharge.

##### **3. Parosmia:**

It is a perversion of the sense of smell (i.e. patient smells non-existing odours).

##### **Causes:**

###### a) Functional: Psychosis.

###### b) Organic:

- Influenzal neuritis.
- Epileptic aura.
- Uncinate fits.

### **5- Pain and Headache:**

These are characteristic of inflammatory conditions. They may be acute or chronic according to the nature of the inflammation. Their site depend on the affected area ( discussed with inflammation of nose and paranasal sinuses).

### **6-Sneezing:**

It is due to irritation of the mucous membrane and nerve endings. Sneezing is one of the major symptoms of allergic rhinitis, it may be also due to exposure to irritant gases, fumes, dust and sudden change of temperature.

### **7- Snoring:**

Snoring is that high tone sound breathing which occurs during sleep. It occurs also with semiconscious and comatosed patients. The aetiology of this social disturbing complaint is due to palatal vibration secondary to narrowing or obstruction of the upper airway passage, which includes nasal, nasopharyngeal and oral cavities.

### **8-Nasal tone:**

This is a character of voice with a nasal quality of tone, it is due to loss of sound resonance in the nasal cavities due to mucous membrane congestion and fluid content of the paranasal sinuses in sinusitis, also diminished palatal tone and nasal masses are causes of nasal tone.

### **9-Nasal Regurgitation:**

Regurge of fluids or foods through the nasopharyngeal isthmus to the nasal cavity is due to failure of closure of this isthmus. It may be traumatic, neurogenic, inflammatory, congenital as in cleft palate and oroantral fistula.

### **10-Nasal Deformity:**

Deformities of the nasal shape include soft, bony and cartilaginous components of the nasal framework. The aetiology may be traumatic, developmental or congenital. (Details in the subject of septorhinoplasty).

## NASAL EXAMINATION

Nasal examination must include external and internal examination of the whole nasal framework.

### 1-External nasal examination:

**A- Inspection:** includes inspection of the shape and position of the nose whether central or twisted, inspection of the nasal dorsum for height, if above the nasofrontal line it is hump, if below it is saddle, inspection of swellings as in tumours, .....etc., and skin inspection for redness, scars, excoriation of the nasal filtrum as in adenoid hypertrophy.

**B- Palpation of the nose:** for tenderness as in vestibular frunculosis and consistency of nasal masses and cysts.

### 2-Internal nasal examination:

#### A-Anterior rhinoscopy:

By head mirror or head light we comment on the following:

- **Patency of the nasal cavities:** whether normal, wide or narrow, and the presence of polyps or masses.
- **Mucous membrane:** for coloration, glistening or lusterless and dry, also for nodules, ulceration and granulomata.
- **Nasal discharge:** for nature watery, mucoid, mucopurulent, bloody .....etc., odour, and crustation as in atrophic rhinitis, rhinoscleroma.
- **Nasal septum:** for position, spurs, type of deviation (c or s shaped) and the presence of septal perforation (size, site).
- **Little's area:** for apparent congested vessels.
- **The turbinates:** for size atrophic or hypertrophic and the nature of the covering mucous membrane.
- **The meati:** for discharge, polyps and tumours.

#### B-Posterior rhinoscopy:

for examination of the nasopharynx, posterior part of the superior and middle turbinates and adjacent areas to them.

### **C-Oral examination:**

The hard palate for swelling in relation to the floor of the nose and maxillary sinuses and for palatal perforation, cleft palate and movement of the soft palate.

### **D-Endonasal endoscopy:**

This allows direct vision with excellent illumination for all the nasal compartments whether anterior or posterior. It is done by the nasal endoscopes with different angles of vision 0°, 30°. It is connected by fiberoptic light source cable. It allows proper examination of the sinus ostia, presence of small polyps in the middle meatus, starting inverted papilloma ....etc. It also visualizes the posterior nasal compartments, superior turbinate and meatus, posterior part of the nasal septum and inferior turbinate, patency of the posterior choana and examination of the nasopharynx and Eustachian tubes.

## **INVESTIGATIONS**

### **I. Radiological:**

#### **1- Plain X-ray:**

is widely replaced by CT scan. However, it still useful in diagnosis of acute sinusitis and in cases of osteomas.

#### **2-Computerized Tomography Scanning (C.T.):**

It gives imaging of the nasal cavities both in axial and coronal position. It shows in details the fine structures of the nasal cavities as sinus ostia, masses, and the state of the paranasal sinuses. Also it gives details of the important structures neighboring the nasal cavity as medial orbital wall, skull base, optic nerve, ocular muscles....etc.

C.T. is mandatory before every F.E.S.S., as it facilitates functional endoscopic sinus surgery (F.E.S.S.) to be done functionally and safely without serious complications.

#### **3-Magnetic Resonance Image (M.R.I):**

It is an advanced radiological image tool. It clarifies the soft tissue lesion as malignant tumors, cyst and swellings showing clearly its dimensions and relations to the nearby structures. It depends on using magnetic power during taking the radiological cuts of the examined area.

## **II. Laboratory:**

- 1) **Blood tests:** as renal and liver function tests in cases of epistaxis.
- 2) **Histopathological examination:** of biopsies taken from nasal granulomas and tumours.

## **III. Rhinometry:**

This apparatus measures the nasal resistance in relation to the cross sectional area of the nasal cavities. The standard rhinometry is mainly of academic purpose.

Acoustic rhinometry, which depends on reflection of sound waves, is of important clinical use as it shows the area of maximum resistance causing nasal obstruction.

## DISEASES OF THE NOSE AND PARANASAL SINUSES

### CHOANAL ATRESIA

Choanal atresia is a rare congenital abnormality due to failure of canalization of the primitive bucconasal membrane. This results in the persistence of a bony plate (most commonly), membrane or both, obstructing the posterior nares. The condition may be unilateral or bilateral. There is a familial tendency and about half of the affected infants display other abnormalities.

#### Clinical picture:

- **Bilateral cases** present as an emergency at birth because neonates are obligate nasal breathers. The neonate suffers severe respiratory difficulties and cyanosis until he cries and the mouth is opened. After a few quick breathes, the lips close again and this sequence of events continues. If not properly managed, the child commonly die from respiratory obstruction.
- **Unilateral cases** are usually asymptomatic at birth. It usually presents later in life with unilateral nasal obstruction and thick mucoid discharge. Holding a cold spatula below the anterior nares, only the clear side steams (mirror test). Older children can allow posterior rhinoscopy or diagnostic nasal endoscopy to visualize the occlusion.

#### Investigations:

- Inability to pass a catheter or coloured drops through the nose to the nasopharynx.
- X-ray after instillation of a radio-opaque dye.
- CT is the method of choice.
- Diagnostic endoscopy in older children and adults.

#### Treatment:

First aid: In bilateral cases the first priority is to insert and maintain an oral airway. An emergent perforation of the occluding plate by a probe or a wide-bore trocar may be tried.

#### Definitive treatment:

- **Transnasal:** The transnasal route entitles the use of burrs or laser to perforate and widen the occluding plate under microscopic or endoscopic visualization. A stent should be inserted for 6 weeks and a

series of dilatation of the choana will then be required to maintain the adequate lumen.

- Transpalatal: After elevation of a mucoperiosteal flap, the atretic plate and the posterior part of the nasal septum are resected followed by insertion of a stent.

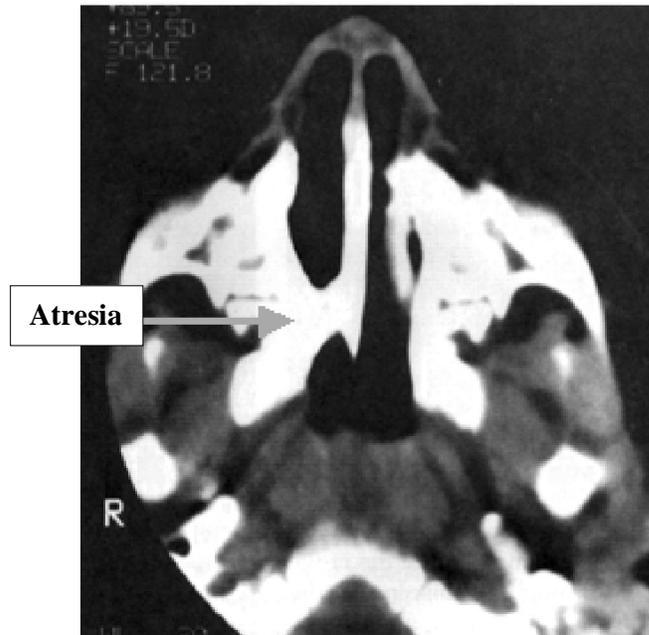


Fig.7. An axial CT scan showing right bony choanal atresia.

## INFLAMMATIONS OF THE NOSE

### Furunculosis of the vestibule

It is an infection of a hair follicle in the nasal vestibule caused mainly by staphylococcus aureus.

#### **Clinical picture:**

The nose shows a red, hot, very painful swelling. The extreme tenderness is due to the tight attachment of the skin to the underlying cartilage.

#### **Management:**

1. Systemic and topical antibiotics.
2. Incision is delayed unless the furuncle is pointing.
3. The patient is advised not to squeeze the furuncle as there is a potential risk of spreading infection to the cavernous sinus via the facial and ophthalmic veins (dangerous area of the face).
4. In recurrent cases,
  - a) A swab should be taken.
  - b) Blood glucose level should be tested to exclude diabetes mellitus.
  - c) Exclude the possibility of a nasal carrier and advise the patient that nose picking is a frequent initiator.
  - d) A staphylococcal vaccine may be considered.

## RHINITIS

Actually the nasal mucous membrane is continuous anatomically with the paranasal sinuses mucous membrane. So every case of rhinitis is accompanied by a degree of sinusitis, also every case of sinusitis is associated with a variable degree of rhinitis. So the term (rhinosinusitis) is commonly used for description of inflammations of the nose and paranasal sinuses. However for simplification of the subject we use the term (rhinitis) when the main lesion is in the nose while the term (sinusitis) is used when the main lesion is in the sinuses.

The term 'Rhinitis' implies an inflammatory response of the lining membrane of the nose.

It can be classified into:

**1. Acute rhinitis:**

- a) Acute non-specific rhinitis e.g. acute coryza (common cold) and influenzal rhinitis.
- b) Acute specific rhinitis e.g. Nasal diphtheria.

**2. Chronic rhinitis:**

- a) Chronic non-specific rhinitis e.g. hypertrophic (intrinsic) rhinitis and atrophic rhinitis.
- b) Chronic specific rhinitis e.g. rhinoscleroma, syphilis, tuberculosis, lupus vulgaris, leprosy, sarcoidosis and fungus.

## **Common cold (coryza)**

In the common cold, nasal mucosa is infected by a virus. Those particularly implicated are, adenovirus, rhinovirus, respiratory syncytial virus and parainfluenzae. A secondary bacterial infection usually supervenes.

**Predisposing factors:**

1. General factors:
  - Malnutrition and vitamin deficiency.
  - Low general resistance e.g. renal, hepatic, diabetic and immunodeficient patients.
  - Fatigue.
  - Bad ventilation.
2. Local factors:
  - Nasal obstruction.
  - Foci of chronic infection in the sinuses and nasopharynx.

**Clinical picture:**

The course of a cold may be described in four stages:

1. Prodromal or ischaemic stage: dryness, irritation and sneezing are the main manifestations.
2. Hyperaemic stage: patient suffers nasal obstruction, watery discharge and general symptoms of mild toxæmia and fever. The mucous membrane appears red and swollen.
3. Stage of secondary infection: the discharge thickens, diminishes and becomes mucopurulent. Nasal obstruction and toxæmia are at their maximum.
4. Resolution stage: the symptoms and signs gradually diminish and after 5-10 days recovery takes place.

**Complications:**

1. Sinusitis.
2. Otitis media and mastoiditis.
3. Tonsillitis and pharyngitis.
4. Laryngitis, tracheitis, bronchitis, pneumonia and asthma exacerbation.
5. Gastroenteritis especially in infants.

**Treatment:**

- Treatment is symptomatic as the disease is self-limiting.
- Steam inhalation and topical nasal decongestants may provide some relief from nasal obstruction.
- The constitutional symptoms of pyrexia and muscular pain are best controlled by an analgesic antipyretic such as aspirin or paracetamol.
- Antibiotics may be required if bacterial complications ensue.

## **Nasal Diphtheria**

Nasal diphtheria is an inflammation of the nasal mucous membrane caused by *Corynebacterium diphtheriae*. It is usually secondary to faucial diphtheria, but may be primary. Diphtheria is now extremely rare. The local symptoms are obstruction and nasal discharge which is watery at first and later becomes blood stained and mucopurulent. The inferior turbinate, the floor of the nose and sometimes the septum are covered with a greyish adherent membrane. Removing this membrane leaves a raw bleeding surface. Nasal swabs are essential for diagnosis. Treatment consists of systemic antibiotics, usually parenteral penicillin and nasal toilet. Systemic antitoxins are also indicated. In all cases, patients should be isolated until 3 successive nasal swabs are negative.

## **Chronic Hypertrophic Rhinitis** **Intrinsic rhinitis (vasomotor rhinitis)**

Intrinsic rhinitis is a combination of nasal obstruction and watery rhinorrhoea, which is probably better described by the title non-infective non-allergic rhinitis.

It accounts for 40-70% of all cases of perennial rhinitis. It can be divided into two types, eosinophilic and non-eosinophilic, on the basis of presence nasal eosinophilia.

**Aetiology:**

The exact aetiology is unknown. However, the strongest theory relies on the presence of an imbalance in the autonomic nerve supply. Underactivity of the sympathetic nerve supply leads to nasal obstruction, while overactivity of the parasympathetic leads to rhinorrhoea. Eosinophilic intrinsic rhinitis probably shows an additional intrinsic mucosal disorder of prostaglandin metabolism, which accounts for the presence of inflammatory cells in nasal mucosa.

**Predisposing factors:**

Some factors have been incriminated in the pathogenesis of intrinsic rhinitis. These include:

- Familial tendency.
- Psychological and emotional factors.
- Endocrinal factors (puberty, menstruation, pregnancy and hyperthyroidism).
- Drugs (antihypertensive agents e.g. beta blockers, non-steroidal anti-inflammatory drugs e.g. aspirin, oral contraceptives and local decongestants).
- Pollution.
- Alcohol and smoking.

**Clinical picture:**

All patients exhibit nasal obstruction and rhinorrhoea, but itching and sneezing are less common than allergic rhinitis. Characteristically, the eosinophilic type produces more nasal obstruction and less rhinorrhoea than the non-eosinophilic type and vice versa.

Nasal polyps, aspirin sensitivity and asthma are also more common in the eosinophilic type. Nasal mucosa, especially over the inferior turbinate, is red and swollen.

**Treatment:**

**1. Medical:**

- a) Topical ipratropium bromide is useful especially in reducing rhinorrhoea.
- b) Intranasal steroids are helpful in the eosinophilic type.
- c) Local and systemic decongestants can be helpful, but should not be used for long term. It should be mentioned here that long term use of topical decongestants can lead to a constant reactive vasodilatation of nasal mucosa, unresponsive to the decongestant, a situation known as rhinitis medica mentosa.

## **2. Surgical:**

To relieve nasal obstruction if medical treatment failed, reduction of turbinate size is indicated. It includes: partial inferior turbinectomy, surface cautery, submucosal diathermy, laser ablation.

## **Atrophic rhinitis**

Atrophic rhinitis is a chronic nasal disease characterized by progressive atrophy of the nasal mucosa and underlying bony turbinates. It usually commences at puberty and is much more common in females.

### **Aetiology:**

The aetiology of atrophic rhinitis is still unknown. However, some factors have been regarded as possible causes.

### **1. Primary atrophic rhinitis**

- Infection: cocobacillus ozaenae, klebsiella ozaenae and other gram negative organisms have been isolated from cultures.
- Endocrine imbalance: oestrogen deficiency has been suspected.
- Malnutrition: iron and vitamin A deficiency have been claimed.
- Autoimmune disease.
- Autonomic imbalance.
- Hereditary factors.

### **2. Secondary atrophic rhinitis**

- Excessive surgical destruction of the nasal mucous membranes e.g. radical turbinectomy and repeated cautery.
- Chronic specific rhinitis e.g. scleroma and syphilis.
- Severely deviated nasal septum (in the wider side).
- Irradiation.
- Longstanding purulent rhinitis or sinusitis during childhood.

### **Clinical picture:**

The presenting symptoms are nasal obstruction, epistaxis and viscid discharge which rapidly dries and forms crusts. These crusts emit a characteristic foul odour (Ozaena), which is not smelled by the patient due to atrophy of the olfactory mucosa. Clinical examination confirms the presence of fetor and green or black crusts in the capacious nasal cavities. Nasal musosa is thin and atrophic with atrophic inferior turbinates.

**Treatment:**

**1. Conservative:**

Regular nasal douching with an alkaline solution should be considered twice daily. Other measures include 25% glucose in glycerine, topical oestrogen, oral potassium iodide and human placental extracts. Antibiotics after culture and sensitivity tests can be used as well.

**2. Surgical:**

Different surgical procedures have been tried aiming at narrowing the nasal cavities or closing the nostrils.

## Rhinoscleroma

Rhinoscleroma is a chronic specific granulomatous disease caused by the gram -ve Frisch bacillus (*Klebsiella rhinoscleromatis*). It usually commences in the nose, but can extend into nasopharynx, oropharynx, larynx, trachea and bronchi. Spread to middle ear, nasolacrimal duct, lymph node and bone have also been reported.

**Pathology:**

The submucosa shows an accumulation of plasma cells, lymphocytes, fibroblasts and eosinophils. Mikulicz cells and Russel bodies are scattered among this granulomatous infiltrate. *Miculicz cells* are large foamy cells having a central nucleus and a vacuolated cytoplasm containing the Frisch bacilli. *Russell bodies* are transformed plasma cells having an eccentric nucleus and deep eosinophilic cytoplasm. Histochemical studies indicated a high content of mucopolysaccharides around the walls of Frisch bacilli, which may be responsible for the protection of the organism against antibodies and antibiotics.

**Clinical picture:**

**1. Catarrhal stage:** resemble acute rhinitis.

**2. Atrophic stage:**

Changes resemble atrophic rhinitis.

**3. Hypertrophic or granulation or nodular stage:**

Non-ulcerative hard submucosal nodules develop and extend to fill the nasal cavity. Patient suffers nasal obstruction and an external swelling may happen.

**4. Fibrotic or cicatrizing stage:**

Adhesions and stenosis distort the normal anatomy. An external nasal deformity may appear (a tapir nose).

## **Treatment:**

### **1. Medical:**

#### a) Systemic antibiotics:

Antibiotics should be given for a minimum of 4-6 weeks and are continued until two successive cultures from biopsy are negative. In fact, the most effective antibiotics are streptomycin and tetracycline. However, streptomycin is known to be ototoxic. Rifampicin also gives good results. Ciprofloxacin may be tried as well.

#### b) Local medications:

Local rifampicin and 2% acriflavin have been tried with successful results.

### **2. Surgical:**

a) Re-establishment of the airway: this can be done using conventional surgery, cautery or Laser.

b) Plastic reconstructive surgery: after complete eradication of the disease.

## **Nasal syphilis**

Nasal syphilis occurs secondary to infection with *Treponema Pallidum*.

### **I) The congenital form:**

- i- Early form: persistent nasal discharge and fissuring of the vestibule and anterior lip, and is labelled as 'Snuffles'.
- ii- The latent form of the disease commonly presents at puberty as gummatous lesions.

### **II) In acquired syphilis:**

- i- Primary (vestibular chancre).
- ii- Secondary syphilis (mucous patches) are rarely recognized in the nose.
- iii- Tertiary syphilis is the most commonly encountered stage with its gumma invading the mucous membrane, cartilage and bone of the nose. This stage may lead to perforation of the bony nasal septum and palate, collapse of the nasal bridge (saddle nose), scarring of the nasal passages, atrophic rhinitis and intracranial complications due to involvement of the roof of the nose. Serological tests for syphilis and biopsy are essential for diagnosis. Management is mainly through general antisyphilitic treatment (penicillin).

## **Lupus vulgaris**

Lupus vulgaris is an indolent and very slow form of tuberculous infection which affects the skin and mucous membranes. The typical early lesion is a reddish firm nodule at the mucocutaneous junction of the nasal septum.

Later on, ulcerations, perforation of the cartilaginous septum, crustations, scarring and atrophic rhinitis may be shown. Blanching of the adjoining tissue by adrenaline or a glass slide to show the apple-jelly nodules, bacteriological examination and biopsy are of use in diagnosis. Treatment consists of antituberculous therapy and calciferol (vitamin D2).

## SINUSITIS

Sinusitis is an inflammatory response involving the mucous membranes of the paranasal sinuses, fluids within these cavities and or underlying bone.

### **Classification:**

Sinusitis is classified according to the duration of symptoms into acute ( $\leq 4$  weeks), subacute (4 –12 weeks) and chronic ( $\geq 12$  weeks).

## Acute sinusitis

### **Aetiology:**

#### Rhinogenic:

- Acute viral rhinitis: This is the most common predisposing factor.
- Swimming and diving.
- Foreign body.
- Nasal pack.

#### Dental:

- Dental infection usually leads to maxillary sinusitis and is characterized by cacosmia due to foetid nasal discharge caused by anaerobic organisms. This may be due to: (Tooth infection, Tooth extraction that may lead to oroantral fistula).

#### Traumatic:

- Foreign body in the sinuses.
- Fracture of the walls of the sinuses.

### **Microbiology:**

The most common organisms include: (Streptococcus pneumonia.B. Haemophilus influenzae. Moraxella catarrhalis).

### **Clinical picture:**

#### Symptoms:

Clinical diagnosis of sinusitis depends on the presence of the following factors:

<b>major</b>	<b>minor</b>
* Thick and colored nasal discharge.	* Nasal obstruction.
* Facial pain / pressure	* Headache
* Postnasal drip	* Hyposmia / anosmia
* Fever.	* Cough.
* Fatigue.	* Ear fullness / pressure

The presence of two major factors or one major and two minor factors at least is strongly suggestive for sinusitis. (N.B. fever is a factor of acute sinusitis only)

Acute sinusitis is diagnosed if these factors are present for more than 7 days, but less than 4 weeks.

Subacute sinusitis is diagnosed if symptoms present for more than 4 weeks, but less than 3 months.

Chronic sinusitis is diagnosed if symptoms persist for more than three months.

**The facial pain:** is usually focused in the region of the diseased sinus group as following:

- a. Acute maxillary sinusitis: The pain is felt over the cheeks and may be referred to the teeth and ears.
- b. Acute frontal sinusitis: The pain is in the area of the forehead.
- c. Acute ethmoidal sinusitis: pain is felt between both eyes in the area of the inner canthus.
- d. Acute sphenoidal sinusitis: There is usually retrobulbar pain referred to the occiput and vertex.

Signs:

- a. Oedema and congestion of the nasal mucosa.
- b. Mucopurulent / purulent nasal discharge.
- c. Tenderness can be elicited by pressure on the affected sinus:
  - The maxillary sinus by pressure on the anterior wall of the maxilla.
  - The frontal sinus by pressure on the floor of the sinus or by tapping on its anterior wall.
  - The anterior ethmoidal sinuses by pressure on the area of the nasal bones medial to the inner canthus.
- d. Erythema and oedema localized over the involved cheekbone or periorbital area may be immediately recognized in the severely acute forms of the disease.
- e. Plain X-ray in acute bacterial rhinosinusitis may show opacification of variable degrees or fluid level in the maxillary and frontal sinuses.

**Treatment:**

**Systemic:**

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- a. Antibiotics: Should be used for 10 to 14 days
- b. Analgesics antipyretics.
- c. Oral nasal decongestant.
- d. Bed rest.

**Local:**

- a. Nasal decongestant and steam inhalation.
- b. Surgery is only indicated for treatment of complicated acute sinusitis with failure of medical treatment. Functional endoscopic sinus surgery (FESS) in the form of ethmoidectomy and widening of the natural ostia of the maxillary and frontal sinuses are carried out.

***Alternating traditional surgical treatment used for treatment of acute sinusitis are:***

- 1- Puncture and lavage of the maxillary sinusitis.
- 2- Trephine of the frontal sinus.
- 3- External frontoethmoidectomy may be also indicated for management of acute bacterial rhinosinusitis with complications (see complications of sinusitis).

## **Chronic Sinusitis**

**Aetiology:**

Cause:

Prolonged obstruction of the natural ostium of one or more of the paranasal sinuses à

- Inadequate ventilation & drainage of the sinus
- Overgrowth of organisms & infection of the mucous membrane.
- Oedema and damage of the cilia à more defective ventilation & damage à a cycle of chronic sinusitis.

Predisposing factors to chronic sinusitis

- 1- Systemic:
  - a. poor immunity e.g. DM or prolonged corticosteroid therapy.
  - b. environmental factors e.g. smoking or pollution.
- 2- Inadequate treatment of acute sinusitis:
  - a. virulent or atypical organisms.
  - b. inappropriate selection or short course of antibiotics.
- 3- Local predisposing factors:
  - a. Anatomic variations that narrows the ostium area e.g. deviated septum or large middle turbinate.
  - b. Mucosal disease e.g. allergy, polyposis or mucosal transport disease.

### **Diagnosis:**

The diagnosis of chronic rhinosinusitis depends upon three factors: history, physical examination (mainly diagnostic nasal endoscopy) and radiological findings (mainly CT scan).

Chronic sinusitis is suspected clinically if symptoms present for more than 3 months. (At least 2 major factors or one major and 2 minor factors) Fever is not a feature of chronic sinusitis.

**Vacuum headache:** is characteristic for frontal sinusitis. This pain is maximal in the morning and decreases gradually over the day. The cause may be due to closure of the sinus ostium helped by congestion of the head due to lying position with absorption of the air from within the sinus cavity. Erect position during the daytime gradually relieves the ostial obstruction leads to headache release.

Clinical diagnosis (based on history) should be confirmed by diagnostic nasal endoscopy and radiological CT examination.

**Diagnostic nasal endoscopy:** This should be performed routinely for examination of all patients with symptoms suspecting chronic rhinosinusitis. This is done via transnasal route using the rigid telescopes (preferably the 30 degree) to examine all the nasal recesses mainly the inferior meatus, the middle meatus, the sphenoethmoidal recess, and the nasopharynx. The aim is to detect signs of sinusitis e.g. purulent discharge from the sinus ostium, oedematous mucosa and polyps and also to identify anatomical or pathological abnormalities in the middle meatus that may contribute in sinusitis.

**Radiological examination:** Plain x-ray is no longer performed for diagnosis of chronic sinusitis as it poorly demonstrates the anterior ethmoid, upper two thirds of the nasal cavity and frontal recess.

Computed tomography (CT) scanning is the main step for diagnosis of chronic sinusitis. The aim is to exhibit the extent of pathology and to delineate the anatomy in patients undergoing surgery.

### **Treatment of Chronic Rhinosinusitis:**

#### **Medical treatment:**

##### **Systemic:**

- a. Antibiotics: this should be given for at least 2 weeks
- b. Antihistamines: when there is underlying allergic rhinitis.
- c. Mucolytics
- d. Analgesics.

**Local:**

- a. Nasal decongestant: should not be used for more than 5 to 7 days to avoid rhinitis medicamentosa
- b. Saline nasal irrigation
- c. Local steroids: to reduce mucosal oedema and treat associated allergic rhinitis.

**Surgical Lines of Treatment of Chronic Sinusitis  
Functional Endoscopic Sinus Surgery (FESS)**

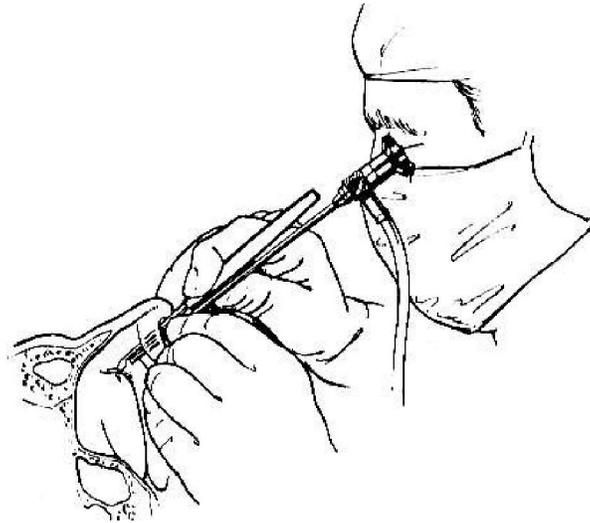


Fig.8. Functional endoscopic sinus surgery.

**Indications:**

- 1- failure of adequate maximal medical treatment which is manifested as persistent disease in CT or frequent recurrent acute sinusitis.
- 2- If complications occur or impending.

**Types of surgery:**

There are 2 concepts:

- A- **Modern Functional endoscopic sinus surgery (FESS):** The aim of this type of surgery is to restore function and patency of the natural ostium of the sinus to provide normal ventilation and drainage. This will allow diseased intra-sinus mucosa to return to its normal functioning state. This is achieved by doing
- a. endoscopic removal of the predisposing cause of ostium obstruction e.g. septoplasty, polyp removal
  - b. endoscopic widening of the natural ostium of the involved sinus by doing:

- 1- endoscopic ethmoidectomy for ethmoiditis
- 2- endoscopic middle meatus antrostomy for maxillary sinus.
- 3- Endoscopic frontal sinusotomy for frontal sinus.
- 4- Endoscopic sphenoidotomy for sphenoid sinus.

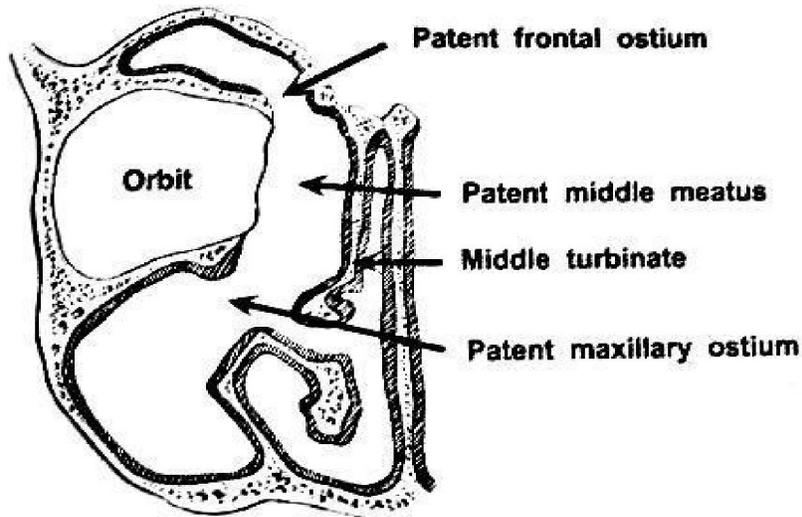


Fig.9. The sinuses after FESS.

### ***B-. conventional surgery***

The aim of this surgery is to remove all diseased mucosa and to promote drainage and ventilation of the sinus through artificial opening through the most dependent part of the sinus.

### **Indications of Endoscopic surgery of the nose and paranasal sinuses:**

1. Chronic rhinosinusitis.
2. Sinonasal polyps.
3. Acute or chronic sinusitis with certain complication (see the complications of sinusitis).
4. Mucoceles of the paranasal sinuses
5. Choanal atresia.
6. Endoscopic resection of benign nasal tumours when feasible (e.g. inverted papilloma and angiofibroma)
7. It can be used in epistaxis for identification and cauterization of the bleeding vessel or ligation of the sphenopalatine artery transnasally when indicated.
8. Endoscopic closure of CSF rhinorrhea.

## **Conventional surgery of treatment of maxillary sinusitis:**

### **1- Puncture and lavage of the maxillary sinus:**

A trocar & cannula are passed under the inferior turbinate to pierce the thinnest part of the wall of the sinus. Sterile fluid is irrigated into the sinus cavity to wash out pus and mucous plugs, it may be helpful in subacute sinusitis or on obtaining pus sample for culture and sensitivity. In the past, it was used to release pus tension in cases of maxillary sinusitis with impending complications.

### **2. Inferior meatal antrostomy:**

The aim is to create a wide opening in the medial wall of the maxillary sinus in the area of the inferior meatus. However, this opening is not physiologically functional when compared with the middle meatal antrostomy (widening of the natural ostium of the sinus endoscopically). The sinus secretion is directed towards the natural ostium and does not pass through the inferior meatal antrostomy opening. It is indicated only if there is congenital permanent defect of the mucociliary transport mechanism.

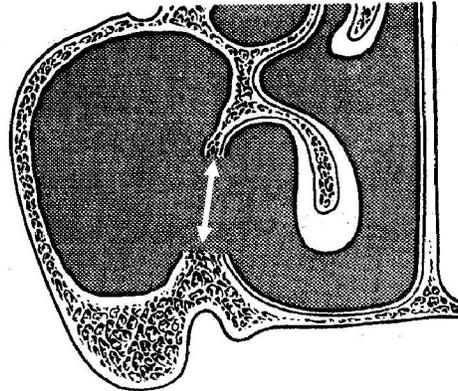


Fig.10. Inferior meatal antrostomy.

### **3. Caldwell – Luc operation (Radical antrum):**

The concept of this procedure is to expose the anterior wall of the sinus followed by creating a window in this wall through which the mucosal lining of the antrum is removed and an inferior meatal antrostomy is performed. This operation was designed originally to remove the irreversibly damaged mucous membrane (e.g. in presence of empyema). However, the new regenerated mucosa after this procedure is diseased (not normal ciliated respiratory epithelium) and the cavity of the sinus becomes partially obliterated with fibrous tissues with new bone formation.

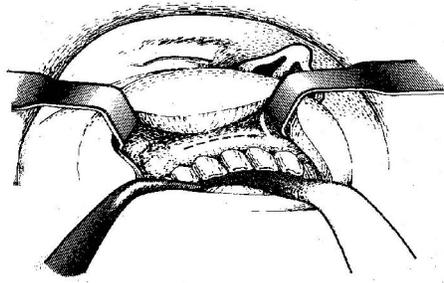


Fig.11. Caldwell-Luc operation: The sublabial incision.

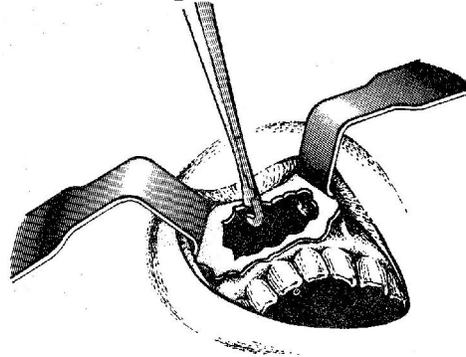


Fig.12. Caldwell-Luc operation: Fenestration of the anterior wall of maxilla.

**Other Surgical Lines of Treatment of Ethmoidal and Frontal Sinusitis:**

**1. Intranasal ethmoidectomy:**

This is performed nowadays under proper visualization using either the telescope or microscope.

**2. External frontoethmoidectomy (Lynch – Howarth procedure):**

Through an incision in the medial part of the eyebrow and around the inner canthus, the periosteum of the orbit (periorbita) is dissected from the floor of the frontal sinus and the medial thin bony orbital wall (lamina papyracea). Then the floor of the frontal sinus is fenestrated and the diseased ethmoid air cells are resected.

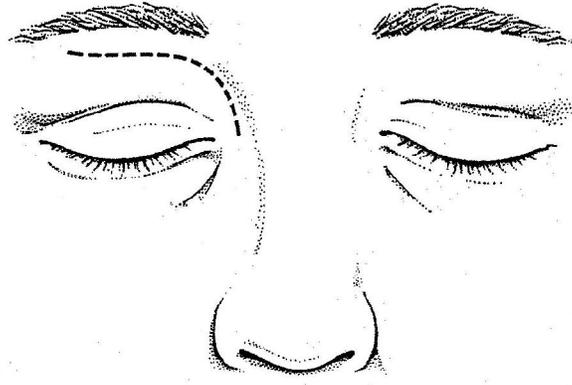


Fig.13. External fronto-ethmoidectomy: The eyebrow incision.

### 3. Frontal sinus trephination:

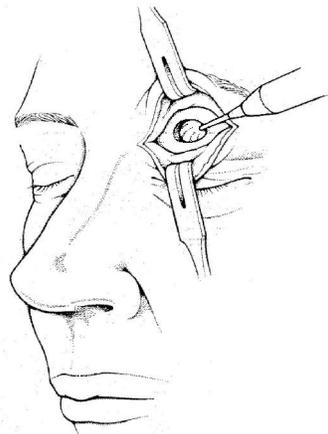


Fig.14. Trephination of the floor of the frontal sinus.

This is indicated for management of acute suppurative frontal sinusitis when there is pus under pressure not responding to medical treatment. The medial portion of the floor of the frontal sinus is trephined and draining tube is inserted within the sinus cavity.

### 4. Osteoplastic flap procedure:

This is indicated as the last surgical line for treatment of chronic frontal sinusitis after failure of other surgical modalities. Also, it is indicated if there is huge osteoma within the sinus cavity or for repair of trauma to the sinus wall.

The concept depends upon creation of an osteoplastic flap from the anterior wall of the frontal sinus with its overlying periosteum that can be elevated to expose the frontal sinus cavity. The mucosal lining of the cavity is removed thoroughly and completely. The ostium of the sinus is occluded by curettage. The sinus can then be obliterated by abdominal fat. The osteoplastic flap can be returned back to its position.

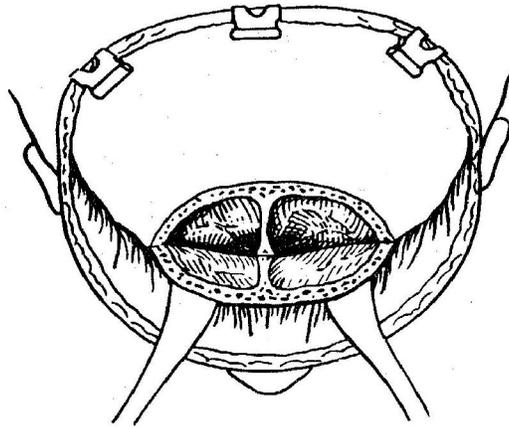


Fig.15. The osteoplastic flap after being elevated.

### **Complications of Sinusitis:**

#### **A- Orbital complications:**

The sinus infection most commonly causing orbital complications is ethmoid sinusitis. The extension of infection can occur either by direct extension from the ethmoid through the medial orbital wall (lamina papyracea) or by retrograde thrombophlebitis via valveless veins.

1. Eyelid oedema (preseptal cellulitis)
2. Orbital cellulitis (postseptal cellulitis) is inflammation of the orbital contents. It is manifested by axial proptosis, chemosis and ophthalmoplegia. It may progress to orbital abscess and blindness
3. Subperiosteal abscess: collection of pus between periorbita (periostium of orbit) and the bony orbital well. The clinical picture is pain, lateral proptosis and limitation of eye movements.
4. Orbital abscess: collection of pus in the orbit. It has the same clinical presentation of orbital cellulitis. CT scan with contrast on paranasal sinuses and orbit can distinguish between orbital cellulitis, subperiosteal and orbital abscess.
5. Cavernous sinus thrombosis: proptosis, ophthalmoplegia, chemosis, lid edema and visual loss with development of contralateral ocular signs if the case is neglected.

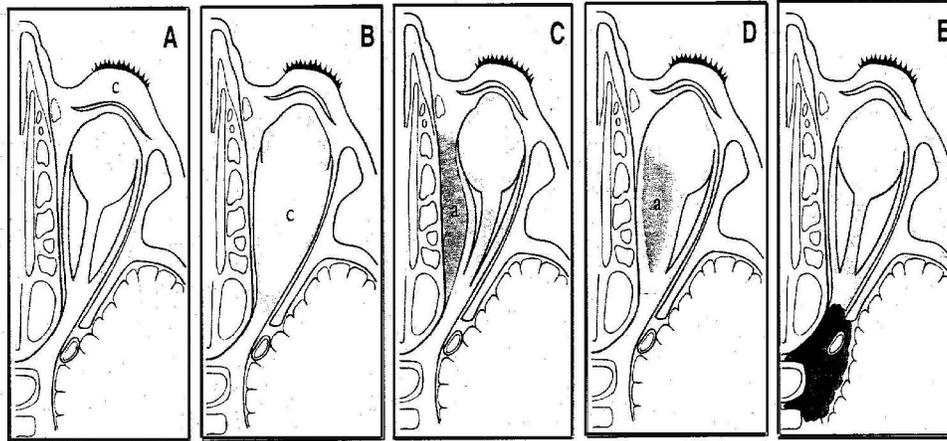


Fig.16. Orbital complications of sinusitis: (A) Preseptal cellulitis (B) Orbital cellulitis (C) Subperiosteal abscess (D) Orbital abscess (E) Cavernous sinus thrombosis.

### **B- Cranial complications:**

The most common sinus source is the frontal sinus

- 3- Osteomyelitis: osteomyelitis of the anterior wall of the frontal sinus can progress to subperiosteal abscess (pott's puffy tumour) in the forehead and even to fistula formation.
- 4- Mucocele and pyocele.

### **C- Intracranial complications:**

1. Extradural abscess.
2. Meningitis.
3. Subdural empyema
4. Brain abscess: this most commonly involves the frontal lobe.

### **D- Descending infections:**

- Otitis media, pharyngitis, laryngitis and bronchitis / asthma.
- Symptoms of septic focus: As arthritis and nephritis.

### **Treatment of complications of sinusitis:**

**Medical:** aggressive broad spectrum antibiotics should be given.

**Surgical:** surgery in the form of FESS or external fronto-ethmoidectomy is indicated in the following conditions:

- Orbital cellulitis not responding to medical treatment or associated with deterioration of vision.
- Subperiosteal abscess.
- Intraorbital abscess.
- Cavernous sinus thrombosis.
- Intracranial complications.



## NASAL TRAUMA

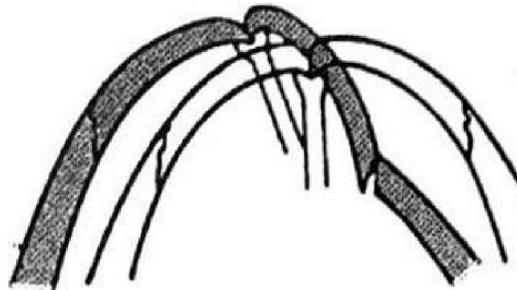
### 1- Fracture nasal bone:

#### Aetiology:

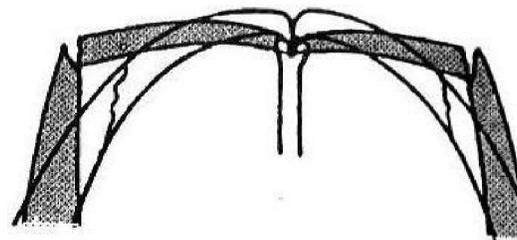
- Road traffic accidents, sport accidents, personal assault.
- Males are more common than females because they are more liable to trauma and the nose is more prominent.
- Adults are more common than children because :
  - The nasal skeleton in children is predominantly cartilaginous
  - The periostium is thick, so fractures happened are subperiosteal and passed unnoticed.

#### Clinical picture:

1. Nasal obstruction.
2. Epistaxis.
3. Deformity: deviation or saddling.
4. Swelling.
5. Ecchymosis.
6. Tenderness: over the fracture line.
7. Crepitus: click sound felt or heard on pressure.



A. Lateral Trauma.



B. Frontal trauma.

Fig.17. Fracture nasal bones due to lateral and frontal trauma.

**Investigations:**

1. Plain X-ray: of medicolegal importance.
2. Investigations to exclude associated ocular, orbital or neurosurgical injuries.

**Management:**

- Reduction under general anesthesia, using Walsham and Ash forceps. Fixation of reduced bones by nasal pack (2 days) and external splint (7-10 days). Open reduction may be indicated in some cases.
- If there is edema in the skin and soft tissue over the nose, anti-inflammatory drugs are taken for 5 – 7 days till edema subsides and then reduction is carried out.
- Patients presented later than 3 weeks, reduction is impractical as the bones have already united. So, septorhinoplasty after 6 months is the proper treatment.

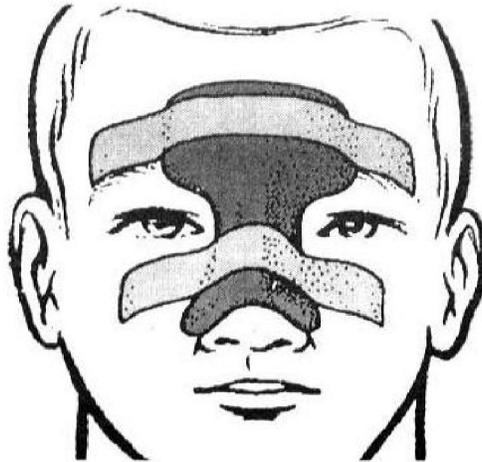


Fig.18. Fixation of fracture nasal bone with a splint.

**2- Foreign body nose:**

**Aetiology:**

- Children and mentally retarded adults are the classic patients.
- Types of F.B.:
  - 1) Animate: myasis.
  - 2) Inanimate: either metallic, vegetable or non-vegetable F.B. introduced by the patient.

**Clinical picture:**

- Fresh F.B is discovered if patient tells his parents.
- If passed undetected early, a unilateral fetid purulent and blood stained discharge is characteristic.

**Treatment:**

Extraction without anesthesia:

- 1) Using a hooked instrument ( to avoid backward displacement of the F.B. if a forceps is used).
- 2) Under vision with good illumination.
- 3) Steady head.

General anaesthesia is indicated in:

- 1) Uncooperative uncontrollable patient.
- 2) Posteriorly located F.B.
- 3) Associated granulation in neglected F.B. with possibility of bleeding.

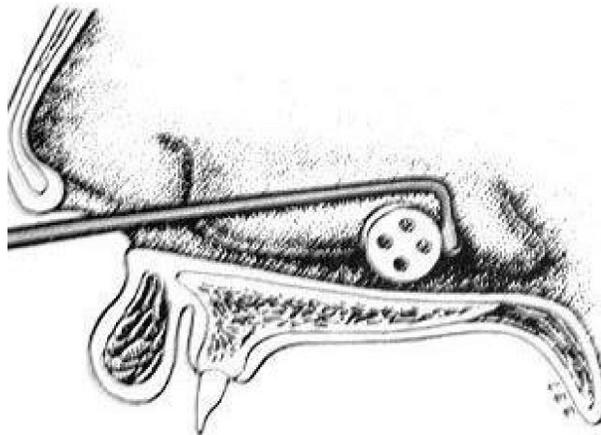


Fig.19. Extraction of a F.B. nose using a hook.

**3- Cerebrospinal Fluid (CSF) Rhinorrhea:**

It is escape of CSF from the subarachnoid space to the nose.

**Aetiology:**

I – Traumatic: (80%)

- 1) Casual trauma: car accident, personal assault..etc.
- 2) Surgical trauma (Iatrogenic): after neurosurgical operations, hypophysectomy or endoscopic sinus surgery.

II – Non-tumatic (spontaneous): (20%)

- 1) Hydrocephalus.
- 2) Brain tumours particularly pituitary tumours.
- 3) Syphilis.
- 4) Meningocele or meningoencephalocele.

**Clinical picture:**

- Unilateral clear watery discharge which is:
- Effortless.
- Commonly positional on leaning forwards.
- Not reduced by antihistamines or local vasoconstrictors.

- Does not stiffen in the handkerchief.

In fresh traumatic cases, it is usually mixed with blood and so passed unnoticed but it can be detected by “halo test”.

### **Investigations:**

Complete diagnosis of a case of CSF rhinorrhea should include the answer for three questions:

1. Is this fluid a CSF ?
2. Why does it leak? In spontaneous cases.
3. Where does it leak? There are 4 possible sites: The ethmoid roof, cribriform plate of ethmoid, the sphenoid sinus and the posterior table of the frontal sinus.

- 1) Fluid analysis: presence of glucose or reducing substances in the fluid is not diagnostic, but detection of 30 mg/dl glucose or more in the leaking fluid is diagnostic.
- 2) CT scan: with intrathecal contrast may demonstrate the dye leaking to the nose, defining the site and detect any underlying cause.
- 3) MRI: is more sensitive than CT with contrast.
- 4) Intrathecal fluorescein injection: followed by endoscopic examination to detect the yellowish green colour of the dye. This will ensure the diagnosis and define the site of leak.
- 5) Beta transferrin detection in the fluid is diagnostic as this substance is present only in CSF as well as the perilymph and aqueous humor.

### **Management:**

Closure of the CSF fistula is indicated to avoid spread of infection through it (Meningitis) or air on blowing of the nose (Pneumocephalus).

- 1) In fresh traumatic cases: Conservative management as most fistula close by spontaneous healing. It includes:
  - a) Rest in bed better in semi-sitting position.
  - b) Avoid straining, treat any cough and give a mild laxative.
  - c) Sulphonamides, rifampicin or third generation cephalosporins antibiotic.
- 2) In spontaneous cases and persistent traumatic cases: surgical closure of the fistula either through:
  - a) Transcranial approach (by a neurosurgeon)
  - b) Extracranial or endonasal endoscopic approach (by an otolaryngologist).

#### **4- Oro-Maxillary Fistula (Oro-antral fistula):**

It is an abnormal communication between the maxillary sinus cavity and the oral cavity.

##### **Aetiology:**

1- Odontogenic: The most common type

1. Following dental extraction of the upper second premolar or first and second molar teeth.
2. Resection of a dental cyst.
3. Incision of a dental abscess.

2- Non- Odontogenic:

1. Maxillary osteomyelitis.
2. Syphilis.
3. Maxillary cancer.
4. Following Caldwell-Luc operation if the sublabial incision failed to close.

##### **Clinical picture:**

- a. It may be discovered immediately by the dentist during the dental extraction.
- b. If not discovered immediately:
  1. The patient may feel air escaping from the fistula on blowing of the nose.
  2. Nasal regurgitation of fluid or sometimes food.
  3. Manifestation of sinusitis if infection starts.
  4. The fistula site can be seen in the site of tooth socket and can be assured by probing (This manouvere is contraindicated in recent cases as it will disturb healing).

**Investigations:** CT scan in coronal direction is helpful.

##### **Management:**

1. In fresh cases: primary sutures of the mucosa of the alveolar margin or flap closure of the defect.
2. In chronic cases: surgical intervention including Caldwell-Luc operation+ fistulectomy+ closure of the defect by a buccal or palatal mucosal flap.

#### **5- Septal Hematoma:**

Will be discussed later.

## NASAL ALLERGY

It is an Ig-E mediated hypersensitivity of the mucous membrane of the nose ending in edema, vasodilatation and hypersecretion.

**Aetiology:** Genetic predisposition is the basic factor. The relative may have any atopic manifestation (nasal allergy, bronchial asthma or atopic dermatitis).

**Precipitating factors:**

- 1) Inhalants: are the most important precipitating factors e.g., pollens, fungi, house dust mites .. etc
- 2) Ingestants: strawberry, bananas, fish and drugs ... etc.
- 3) Injectants: drugs, plasma.
- 4) Contacts: face powders, eyelashes cosmetics

**Clinical picture:**

Symptoms: Paroxysmal attacks of sneezing, itching and rhinorrhea are diagnostic. Nasal obstruction is common.

Signs:

- 1) Edematous pale or violet coloured mucosa of the nose.
- 2) Watery or mucoid discharge.
- 3) Hypertrophy of the turbinates
- 4) In children allergic rhinitis can be with the following stigmata:
  - a. allergic salute
  - b. supratip crease
  - c. allergic shiners

**Investigations:**

- 1) Allergic skin tests: to define the suspected antigen if immunotherapy is planned.
- 2) Nasal provocation tests: may substitute the skin tests.

**Treatment:**

- 1) Avoidance: to avoid exposure or intake of the offending antigen.
- 2) Oral antihistamines: the recent non-sedating antihistamines are tolerable by the patient.
- 3) Local antihistamines: levocabastine nasal spray.
- 4) Local and oral chromoglycates: which are mast cell stabilizers. They are only of prophylactic value and require frequent applications (4-6 times / day)
- 5) Local corticosteroids (sprays or drops): very effective in most of the cases.

- 6) Systemic corticosteroids: a short course may be given in selected cases.
- 7) Immunotherapy: if medical treatment fails.

## NASAL POLYPI

A term sinonasal polypi is commonly used nowadays as they originate from the sinuses. A polyp is a pedunculated edematous mucosal swelling, soft in consistency and smooth in surface. There are two main types:

- 1) Ethmoidal polypi
- 2) Antrochoanal polyp

They must be differentiated from other polypoid lesions in the nose as:

- 1) Neoplastic polypoid masses: bleeding polypus of the septum, inverted papilloma and malignant masses
- 2) Meningocele and meningoencephalocele.

### 1. Ethmoidal polypi:

#### **Aetiology:**

Exactly not known

- 1) Allergic rhinitis
- 2) Drugs: idiosyncrasy to aspirin and other anti-inflammatory drugs, this is usually associated with bronchial asthma.

#### **Clinical picture:**

- 1) Bilateral nasal obstruction and watery or mucoid nasal discharge.
- 2) Anosmia.
- 3) Bilateral multiple polypi “grape-like” arising mainly from the middle meatus.

#### **Investigations:**

CT scan will demonstrate the sinuses involved by the polypoid disease.

#### **Management:**

- 1) Early cases: with small polypi and mild symptoms can be controlled by medical treatment. It includes local corticosteroids with or without short course of systemic corticosteroids.
- 2) Established cases: the proper line of treatment includes functional endoscopic sinus surgery followed by long term local corticosteroid therapy. Short courses of systemic corticosteroids may be required in some cases. The old trend of polypectomy alone is followed by recurrence in 100% of cases.

## 2. Antrochoanal polyp:

**Aetiology:** Unknown. It is not related to infection or allergy. It is common in children and young adults.

**Pathology:** It is a single unilateral polyp arises from the maxillary sinus (so the term antro) and passes through the middle meatus then backwards to the choana (so the term choanal).

### **Clinical picture:**

- 1) Nasal obstruction: which is unilateral then it may become bilateral due to either deviation of the nasal septum to the other side and/or complete obstruction of the nasopharynx when the polyp attains a large size.
- 2) Nasal discharge
- 3) Anterior rhinoscopy: will show the polyp as a single polyp coming from the middle meatus and goes backwards to the choana.
- 4) Posterior rhinoscopy: in cooperative patient it will show the polyp.

**Investigation:** CT scan

### **Management:**

- 1) Endoscopic sinus surgery is the best treatment. It includes polypectomy and wide opening of the natural ostium of the maxillary sinus with removal of the antral part of the polyp.
- 2) Caldwell-Luc operation is an alternative to the first line in adult patients.

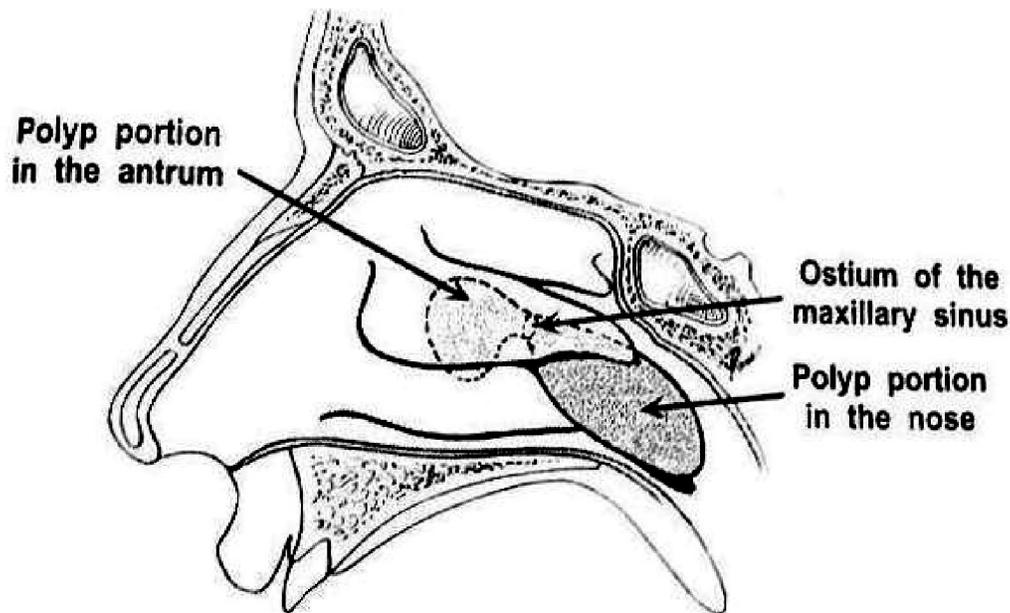


Fig.20. Antrochoanal polyp.

## CYSTS OF THE NOSE AND PARANASAL SINUSES

### 1. Congenital

- Dermoid cyst.
- Glioma.
- Meningoencephalocele.

### 2. Inflammatory

- Mucocele.
- Pyocele.

### 3. Retention

- Sebaceous cyst.
- Rhinophyma.

### 4. Developmental

- Nasoalveolar.
- Nasopalatine.

### 5. Cysts of dental origin

- Dentigerous.
- Dental.

### 6. Neoplastic

- Ameloblastoma.

### Nasal dermoids:

- Ectodermal lesion that may have only a cyst, a cyst with sinus tract, or connection with central nervous system.
- Excision. If there is an intracranial connection, combined neurosurgical excision should be carried out.

### Glioma:

- Heterotopic glial tissue.
- Non-pulsatile, does not enlarge with straining, and does not transilluminate.
- Treated by transnasal excision or combined neurosurgical excision if there is intracranial connection.

### Meningoencephalocele:

- Similar to gliomas but contain meninges (meningocele) or brain and meninges (meningoencephalocele).
- Pulsatile, enlarges with straining, and transilluminates.
- Treated by either extracranial transnasal or neurosurgical approach.

## **Mucocele:**

### Definition:

Cystic expansion of a sinus due to accumulation of mucus. Most commonly occurs in the frontal and ethmoid sinuses.

### Aetiology:

- 1- Obstruction of the sinus ostium (due to chronic sinusitis, polypi or benign tumours) with accumulation of mucus within the sinus.
- 2- Obstruction of a mucus gland in the mucosal lining of the sinus.

### Clinical picture :

Painless slowly growing bony swelling. When the bone is thinned out, it gives an egg shell cracking sensation. Frontal mucocele in the medial part of the roof of the orbit. Ethmoidal mucocele at the medial canthus. Large mucocele produces proptosis and diplopia.

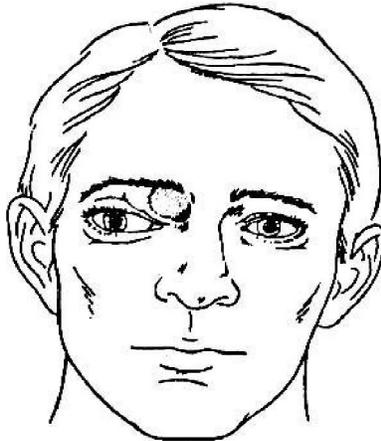


Fig.21. Mucocele.

### Investigations:

CT scan: shows the opacification and expansion of the sinus.

### Treatment:

Surgical drainage and marsipulization of the mucocele by endoscopic sinus surgery.

## **Pyocele:**

### Definition:

Cystic expansion of a sinus due to accumulation of pus.

### Aetiology:

Secondary infection of a mucocele.

### Clinical picture:

Similar to mucocele, but the swelling is painful and tender.

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CT scan:

Similar to mucocele.

Treatment:

Similar to mucocele plus antibiotics.

**Nasolabial cyst (Nasoalveolar cyst):**

Aetiology:

A developmental cyst, arises from entrapped epithelium from nasolacrimal duct.

Clinical picture:

Slowly growing swelling in the anterior part of the floor of the nose beneath nasal ala.

Treatment:

Excision.

**Nasopalatine cyst:**

Aetiology:

A developmental cyst which arises from the epithelial remnants of the naso-palatine duct that connects the oral and nasal cavities in the embryo.

Clinical picture:

Slowly growing midline swelling just behind the incisor teeth.

Treatment: Excision.

**Dentigerous Cyst:**

Incidence:

Occurs in children and adolescents.

Aetiology:

Cystic degeneration of the follicle (crown) of an unerupted tooth. Common in mandibular third molar or maxillary cuspid.

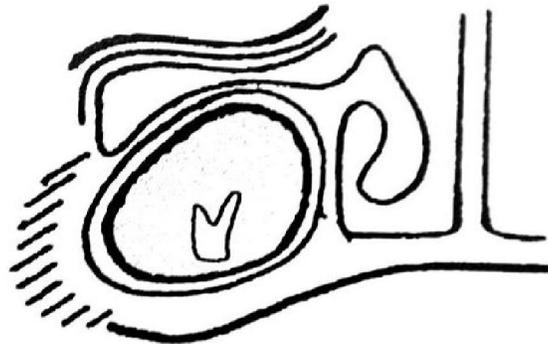


Fig.22. Dentigerous cyst.

Clinical picture:

Slow expansion of the maxilla.

X-ray:

The offending tooth appears inside the cyst.

Treatment:

Surgical excision of the cyst with the offending tooth, by a sublabial approach.

**Dental Cyst:**

Incidence:

Occurs in adults :

Aetiology:

Cystic degeneration of granulations around a chronically infected tooth.

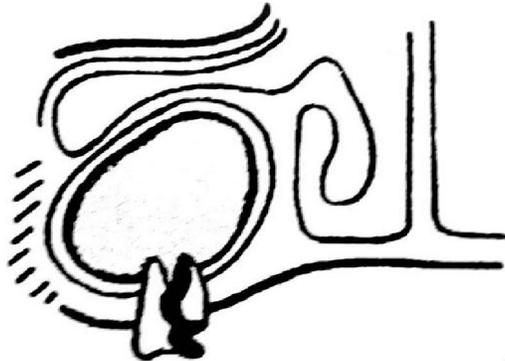


Fig.23. Dental cyst.

Clinical picture:

Slow expansion of the maxilla.

X-ray:

Appears as radiolucent area with the offending tooth appears outside the cyst.

Treatment:

Surgical excision of the cyst with the offending tooth by a sublabial approach.

**Fibrous dysplasia**

Definition:

Replacement of the normal bone by fibrous tissue and poorly formed bony trabeculae in different proportions.

Incidence:

Commonly in the maxilla of teen-aged females.

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Aetiology:

Unknown.

Types:

- Monostotic: affects a single bone as the mandible or maxilla.
- Polystotic : affects several cranial and facial bone on one side.

Clinical picture:

Unilateral slowly growing facial bony swelling with ill defined edges.

X-ray:

Ill defined heterogenous bony shadow i.e ground glass appearance.

Treatment:

Limited shaving of the bony swelling if disfiguring. Recurrence is common, however it tends to stabilize at the age of sexual maturity .

## TUMOURS OF THE NOSE AND PARANASAL SINUSES

### Tumours of the skin of the external nose and the vestibule

#### Benign tumours:

- The commonest is squamous cell papilloma. It appears as a warty lesion usually in the vestibule.
- Treatment: Excision and cauterization of its base to prevent recurrence.

#### Malignant tumours:

- Basal cell carcinoma: it appears as rodent ulcer. Treatment is by excision with safety margin and reconstruction with regional flap.
- Squamous cell carcinoma: it appears as an ulcerating mass. Treatment is by Radical excision.

### Tumours of the nasal cavity and sinuses

#### Benign tumours:

- Haemangioma.
- Inverted papilloma.

#### Malignant tumours:

- The commonest is squamous cell carcinoma.

## HAEMANGIOMA

### Capillary haemangioma:

**Incidence:** Commonly in adults. The common site is the septum (bleeding polypus of the septum.).

**Pathology:** Consists of capillary vascular channels.

**Symptoms:** Recurrent epistaxis.

**Signs:** Sessile or pedunculated soft reddish polyp, which bleeds easily on touch.

**Treatment:** Surgical excision with cauterization of its base or excision by laser.

### **Cavernous haemangioma:**

**Incidence:** Commonly in children. Commonly on the lateral wall.

**Pathology:** Consists of dilated vascular channels.

**Symptoms:** Recurrent epistaxis.

**Signs:** Soft reddish mass which bleeds easily on touch.

**Treatment:** Surgical excision with cauterization of its base or excision by laser.

### **Hereditary haemorrhagic multiple telangiectasia:**

**Incidence:** A hereditary vascular malformation which involves the nose, mouth and skin.

**Pathology:** Consists of groups of dilated thin walled venules. It is not a true neoplasm.

**Symptoms:** Recurrent epistaxis.

**Signs:** Multiple reddish areas which bleed easily on touch.

**Treatment:** Septo-demoplasty or laser photo-coagulation.

## **INVERTED PAOILLOMA**

A locally destructive tumour which arises from the epithelial lining of the nose.

### **Sites:**

- 1- Lateral wall of the nose.
- 2- Ethmoidal and maxillary sinuses.

### **Pathology:**

The proliferating epithelial cells grow into the underlying stroma, instead of growing outwards (inverting). The surface epithelium consists of alternating layers of ciliated columnar or stratified squamous but with intact basement membrane (DD from malignancy).

### **Clinical picture:**

Unilateral fleshy reddish mass.

### **Investigations:**

- 1- CT scan: Shows the extent of the tumour.
- 2- Biopsy: Confirms the diagnosis.

**Treatment:** Surgical excision through lateral rhinotomy or mid-facial degloving or endoscopic excision according to the size and extent of the tumour.

**Prognosis:** The recurrence rate is common, and malignant transformation may occur.

## OSTEOMA

### **Site:**

Commonly the frontal sinus, followed by ethmoid.

### **Types:**

- Compact: formed of dense irregular bone trabeculae, separated by scanty fibrous tissue Usually in the frontal sinus.
- Cancellous: formed of loose irregular bone trabeculae, separated by excess fibrous tissue. Usually in the ethmoid.

### **Clinical picture:**

- Commonly asymptomatic. Or presented by swelling:
- Frontal osteoma in the medial part of the roof of the orbit.
- Ethmoidal osteoma at the medial canthus.

### **Complications:**

- Mucocele, when it obstructs the sinus ostium.
- Proptosis, when it spreads to the orbit.

### **Investigations:**

- Plain x – ray: well defined dense bony shadow.
- CT scan: shows the extent of the tumour.

### **Treatment:**

Surgical excision by an external approach; in frontal osteoma using osteoplastic flap technique, and in ethmoidal osteoma using external ethmoidectomy approach.

## SQUAMOUS CELL CARCINOMA

### **Incidence:**

The commonest malignant tumour of the sinuses. And it presents about 3% of all head and neck malignancies.

**Sex and age:** most commonly males above 40 years.

**Site:** most commonly the lateral nasal wall, the maxillary and the ethmoidal sinuses.

**Predisposing factors:** Exposure to formaldehyde, nickel and wood dust

### **Clinical picture:**

The manifestations are due to spread of the tumour beyond the sinus. They are usually unilateral.

#### **1. Nasal manifestations:**

- Nasal obstruction.
- Offensive nasal discharge.

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- Epistaxis.
- Ulcerating friable nasal mass.
- 2- Oral manifestations:
  - Persistent dental pain in the upper premolar and molar teeth.
  - Loose teeth.
  - Palatal swelling and ulceration.
  - Oro-antral fistula.
- 3- Orbital manifestations:
  - Proptosis.
  - Diplopia or vision loss.
  - Epiphora (invasion of the naso-lacrimal duct).
  - Swelling at the medial canthus.
- 4- Facial manifestations:
  - Cheek swelling.
  - Facial paraesthesia ( invasion of the maxillary nerve).
- 5- Neck mass:
  - Enlarged upper deep cervical lymph nodes.
- 6- Intra-cranial manifestations:
  - Cerebro-spinal rhinorrhoea.

### **Investigations:**

**CT scan:** shows the extent of the tumour and evaluate the changes in the bony architecture of the cranial and facial structures.

**MRI:** define soft tissue extent of the disease.

**Biopsy:** confirms the diagnosis. It is obtained from the nasal mass or endoscopically from the sinus.

### **Treatment:**

#### **1.Surgical excision:**

through the following surgical options:

- Cancer maxillary sinus → partial maxillectomy via Lateral rhinotomy or mid-facial degloving or total maxillectomy through Weber-ferguson's incision. Total maxillectomy entails total removal of the maxilla, including the hard palate. The palate is reconstructed by dental prosthesis.
- Cancer ethmoid sinus → Cranio- facial resection for tumours extending to ethmoid cavity.
- Orbit excenteration: if the tumor invades the orbit.
- Radical neck dissection: in presence of lymph nodes involvement.

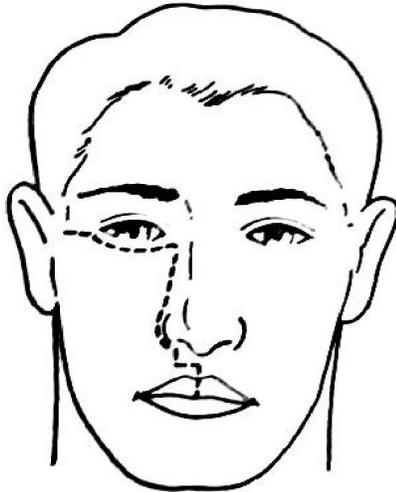


Fig.24. Weber-Ferguson's incision for maxillectomy.

**2. Combined irradiation and surgery.**

**3. Radiation therapy alone** with special care to shield the eye and frontal lobe.

**Prognosis:**

Poor because of late diagnosis as a result of lack of early symptoms.

## DISEASES OF THE NASAL SEPTUM

### Deviated nasal septum (D.S.)

The nasal septum is the bony-cartilagenous wall separating the two nasal cavities. The anterior part is cartilaginous and formed by quadrangular septal cartilage. It gives the dorsal nasal support as well as it shares in the shape of the lower 2/3 of the nasal dorsum. It articulates superiorly with the caudal end of the upper lateral cartilage, inferiorly with the maxillary crest in the maxillary tunnel of the maxilla. Posteroinferiorly with the vomer bone and posterosuperior with the perpendicular plate of ethmoid bone which forms the bony component of the nasal septum. These bony and cartilaginous components articulate with each other through a fibrocartilagenous bands and not true joints. This allows elasticity of the nasal septum to absorb and minimize nasal trauma as much as possible. The anterior free margin of the cartilaginous septum is called the caudal end.

The nasal septum is usually deviated to one or the other side and this is of no clinical value if there is no complaint by the patient. Severe septal deviation presenting itself clinically and needs surgical interference for reposition of the septum to more or less middle position.

#### **Aetiology of the nasal septal deviation D.S.:**

- **Traumatic:** the deviation may be either dislocation or fracture or fracture dislocation.
- **Developmental:** as in high arched palate which narrow the sagittal axis of the nasal cavity preventing free growth of the nasal cavity.

#### **Types of D.S.:**

- **C shaped:** to one side.
- **S shaped:** i.e. bilateral deviation.
- **Spure or sharp angulation:** usually at the inferior part of the septum.

#### **Clinical Picture:**

- **Nasal obstruction:** unilateral or bilateral according to the type of deviation.
- **Nasal discharge.**
- **Mouth breathing:** and its sequelae of oromaxillary and dental deformity.
- **Secondary sinusitis:** due to bad aeration of the nasal cavity.

- **Snoring.**
- **Headache:** especially if contacting the middle turbinate i.e. contact headache.
- **Epistaxis:** due to stretch of the nasal mucosa and vessels covering the septum.
- **External deformity:** as twisted nose.

**Management of symptomatising D.S.:**

This is corrected by surgical interference in the form of:-

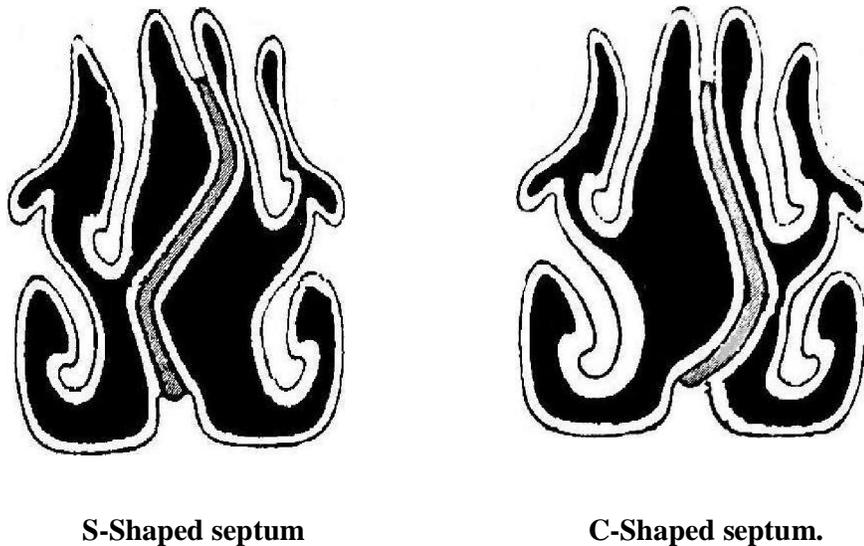
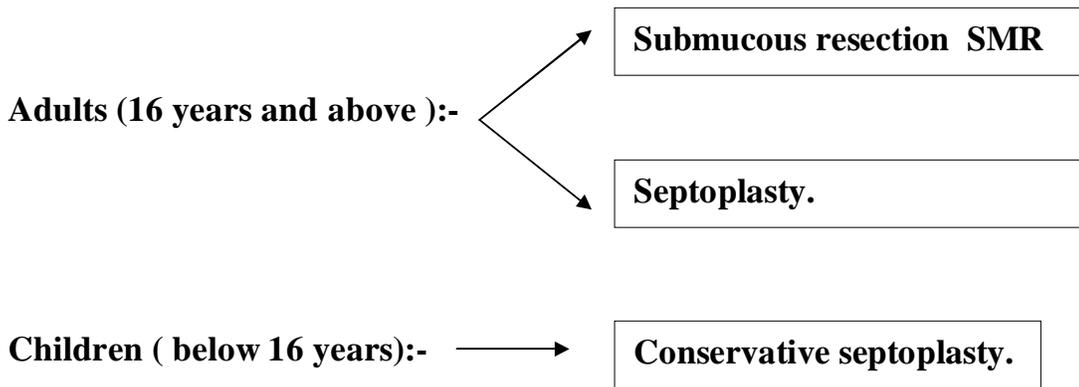


Fig.25. Deviation of the nasal septum.

**S.M.R.:**

General or local anesthesia. Hemitransfixation incision 1.5 cm behind the mucocutaneous junction. Separation of the mucoperichondrial flap of one side. Incision of the septal cartilage reaching the other flap without

trauma to this flap. Resection of the bony and cartilaginous compartments of the septum keeping the dorsal part to avoid nose saddling and the caudal margin to prevent nasal tip drop. Suturing of the mucous membrane incision. Nasal packing for 48 hours. Antibiotics and analgesics for 4 days. The disadvantage of S.M.R. is postoperative flail mucous membrane, as there is no cartilaginous support as well as it is not suitable for cases with caudal dislocation.

### **Septoplasty in adults:**

The idea of this surgery is to remove the deviated parts only, also a possibility to put this parts in a new central position. General or local anesthesia. Marginal hemitransfixation incision at the free end of the septal cartilage. Same flap dissection and postoperative management as S.M.R.

### **Conservative septoplasty in children:**

It is conservative surgical correction of the severely deviated nasal septum in children causing severe nasal obstruction leading to chronic mouth breathing with its harmful effect on development of the midface, repeated chest infection and chronic paranasal sinus infection, dental deformities, recurrent suppurative otitis media ...etc.

**Age:** 8-12 years.

**Indications:** severe nasal obstruction with its sequence and complications.

**Surgical points:** general anesthesia, hemitransfixation incision with removal of the deviated part only (so it is conservative). Light nasal packing 24-48. Covered by postoperative antibiotics, analgesics and vitamins.

### **Points of considerations:**

1. Minimal removal of the cartilage to allow normal development of the nasal septum and nose. In some cases just reposition of the septum in proper place without removal of the cartilage.
2. Avoid removal of the areas which contains growing centers which are responsible about nasal septal growth.
3. Avoid injury of the nerves and vascular supply of the nasal septum at the incisive foramen at the anteroinferior end of the septal cartilage.
4. The surgical manipulations must be gentle and smooth avoiding rough manipulations.

### **Complications of septal surgery:**

- a. **Septal perforation:** due to bilateral trauma of the mucoperchondrial flaps opposite each other.

- b. **Septal haematoma and septal abscess:** (discussed later).
- c. **Adhesions and synachiae:** between septal mucosa and lateral nasal wall.
- d. **Saddle nose:** due to over resection of the dorsal border of the septal cartilage.
- e. **Dropped nasal tip:** due to resection of the caudal margin.

## Septal haematoma

It is collection of blood between the mucoperichondrial layer and the septal cartilage. It may be unilateral or bilateral and must be evacuated by flap incision to prevent its transformation to septal abscess.

### Aetiology:

#### Trumatic:

- Direct nasal trauma.
- Post septal surgeries.

**Spontaneous:** as in hypertension, blood diseases and fever.

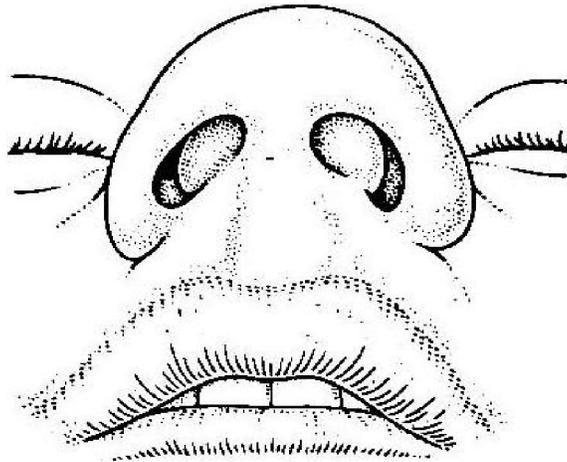


Fig.26. Septal haematoma.

### Clinical Picture:

- Complete nasal obstruction.
- Headache
- Associated sinusitis in long standing cases.
- Smooth swelling of the septal mucosa obstructing the nasal cavity with cystic boggy sensation, it may be unilateral or bilateral.

**Management:**

- Evacuation is mandatory as no spontaneous resolution.
- General or local anesthesia.
- Mucosal incision and aspiration of haematoma.
- Anterior nasal packing for 48 hours.
- Antibiotics, anti-inflammatory and analgesics.

## Septal abscess

It is pus and purulent secretion between the mucoperichondrial flap and the septum.

**Aetiology:**

- Infected septal haematoma.
- Febrile abscess.

**Clinical picture:**

- Signs and symptoms of acute inflammation.
- Redness, tenderness, edema of the nose.
- Fever, general malaise, pain and headache.
- Swelling of the septal mucosa with cystic consistency and tenderness.
- Lusterless nasal mucosa.

**Complications:**

- Septal necrosis in neglected cases with saddling of the nasal septum or septal perforation.
- Thrombophlebitis and possibility of cavernous sinus thrombosis.

**Treatment:**

- Incisional drainage.
- Antibiotics passing blood brain barrier.
- Analgesics and anti-inflammatory.
- Observation for signs of cavernous sinus thrombosis.

## Septal perforation

Septal perforation is a hole in the nasal septum connecting the two nasal cavities. It may be anterior or posterior. Its size varies from small to big perforation.

**Aetiology:**

- Traumatic mainly due to deep cautery to stop epistaxis.
  - Septal surgery with bilateral opposing mucous membrane tear.
  - Direct nasal trauma.
  - Nasal picking.
  - Toxic and narcotic powder sniffing (cocaine) with necrosis of the septum.
  - Some types of nasal granulomata as T.B.(anterior), syphilis(posterior), mid line granuloma.
- N:B; rhinoscleroma does not cause septal perforation.

**Clinical Picture:**

- Anterior perforation: whistle in small one. Nasal obstruction, crustations and epistaxis.
- Posterior perforation: usually asymptomatic.

**Treatment:**

- If symptomless no interference.
- If symptomatising plastic repair and mucosal flaps.

## **SEPTORHINOPLASTY**

**RHINOPLASTY:** is the art of plastic surgery of the nose to correct cosmetic deformities. In many cases, the cosmetic deformities are associated with nasal obstruction due to deviated septum, in this condition cosmetic and functional interference is needed which is called SEPTORHINOPLASTY.

Nasal deformities are usually a source of psychological troubles. It depends on the patient personality. The deformities are usually multiple, they may affect the bone, cartilaginous part and or soft tissue of the nose or an association of more than one. In dealing with nasal deformities, one must consider the different nasal angles and the ratios of the nose to the face.

**Aetiology:**

- Developmental.
- Traumatic.

**Deformities of the nasal dorsum:**

**Twisted nose:** to one or other site and usually of traumatic origin.



Fig.27. Twisted nose.

**Height of nasal dorsum:**

Hump nose: which may be bony, cartilaginous or both. It is projection of the nasal dorsum above the naso-frontal line.

Saddle nose: it is lowering of the nasal dorsum below the naso-frontal line. It may be bony, cartilaginous or both. Its aetiology may be direct trauma or as a complication of septal surgery, inflammatory as septal abscess or specific types of granuloma as leprosy and syphilis.

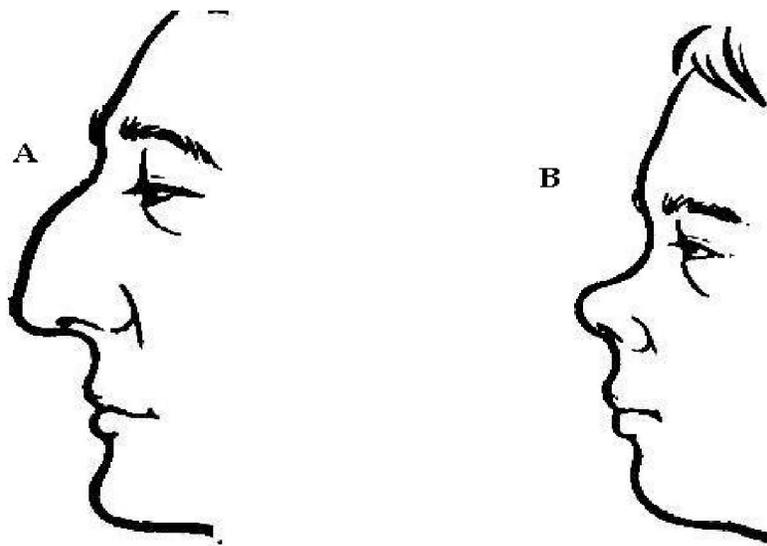


Fig.28. Deformities of the height of nasal dorsum

(A) Hump nose (B) Saddle nose.

**Broad nasal septum:** what we call open nasal roof, i.e. the superior edges of the nasal bone are separated from each other.

**Nasal tip deformities:** the normal nasal tip is pyramidal or pyriform in shape with its base above the upper tip.

Bulbous tip: it is rounding in contour with excessive subcutaneous fibrofatty tissue with loss of pyriform shape of the nasal tip.

Dropped tip: the most projecting part of the triangular tip shape is below the naso-frontal line with short collumela.

Over projecting tip: the tip projection is above the naso-frontal line with long collumela.

**Indications of septorhinoplasty:**

- **Cosmetic only:** Rhinoplasty.
- **Cosmetic and functional:** Septorhinoplasty.

**Technique:**

- **General or local anesthesia.**

- **Approaches:**

**External rhinoplasty:** through an inverted V columellar incision extending bilaterally above the free edge of lower lateral cartilage at the vestibular margin and then reflecting the skin over the nasal dorsum exposing all the nasal skeleton.

**Closed rhinoplasty:** no external incision. All the incisions are inside the nasal cavities i.e. intercartilagenous incision. The choice of surgeon depend on the lesion and the preference of the surgeon.

- **Types:**

**1. Reduction rhinoplasty:** as in hump removal, shortening of the length of the nose and reduction of the nasal tip size.

**2. Augmentation rhinoplasty:** increase the nasal dimensions as in saddle nose which is corrected by natural cartilaginous or bony graft or by synthetic graft.

- Nasal packing for 24-48 hours.
- External nasal splint for 7-10 days.
- Antibiotics, analgesics, anti-inflammatory and vitamins medications.

**3. Reconstructive rhinoplasty:** to reconstruct tissues lost in the nose by grafts or flaps.

## EPISTAXIS

### **Definition:**

Epistaxis means bleeding from the nose, it is a common ENT emergency and may at times be life-threatening.

### **Vascular anatomy:**

The nasal cavity is a rich vascular bed, with the blood supply originating from the internal and external carotid arteries.

#### **1- Antero-inferior part of the septum ( Little's area):**

The commonest site of epistaxis ( about 90%). The source of bleeding is kisselbach's plexus which is formed by anastomosis of the septal branches from the

- a) Anterior ethmoidal artery .
- b) Spheno-palatine artery.
- c) Greater palatine artery .
- d) Superior labial branch of the facial artery.

#### **2- Posterior part of the nose:**

The source of bleeding is the spheno-palatine artery.

#### **3- Superior part of the nose ( Brown-Kelly's area):**

The source of bleeding is the anterior and posterior ethmoidal arteries.

### **Causes:**

#### **I- Local causes :**

##### **1-Idiopathic:**

- The commonest cause of epistaxis in children and adolescents.

##### **2-Traumatic :**

- Nose picking.
- Nasal foreign body.
- Nasal surgery: turbinate reduction, SMR, septorhinoplasty and endoscopic sinus surgery.
- Fracture nasal bones and fracture skull base.

##### **3- Inflammatory:**

- Acute rhinitis.
- Atrophic rhinitis.
- Acute sinusitis.
- Chronic specific rhinitis.

##### **4- Neoplastic:**

- Benign nasal tumours as haemangioma.
- Malignant nasal tumours as carcinoma.
- Benign nasopharyngeal tumours as nasopharyngeal angiofibroma.
- Malignant nasopharyngeal tumors as carcinoma.

**5- Septal deviation:**

Due to angulation of blood vessels over a spur or secondary to nasal dryness, crusting with subsequent epistaxis.

**6-Septal perforation:**

The edges of perforation are subject to drying and crusting.

**II- General causes:**

**1- High arterial blood pressure( hypertension) :**

Due to atherosclerosis or renal disease. Bleeding is mostly from the posterior part of the nose ( sphenopalatine artery).

**2- High venous blood pressure:**

Due to heart failure and mediastinal tumour.

**3- Fevers:**

As rheumatic fever and exanthemata due to toxic capillaritis and vasodilatation.

**4- Haemorrhagic blood diseases:**

As purpura, haemophilia, leukaemia and vitamin C and K deficiency.

**5- Drugs:**

As anti-coagulants and salicylates.

**6. Hereditary haemorrhagic telangiectasia (Osler's disease)**

Is an autosomal dominant disease manifested by diffuse mucocutaneous telangiectasis and arterovenous malformations.

**Management:**

After taking a careful history to establish that bleeding is not secondary to systemic disease, the nose is examined for local abnormalities. Observations of the patient's pulse, blood pressure, and general conditions are made in order to judge the extent of blood loss

**I- If the patient is shocked, it should be managed.**

**II- Control of bleeding:**

• **Cauterization of the bleeding vessel:**

If the bleeding vessel is visible at nasal examination it must be cauterized.

- **Chemical cautery** can be used if patient is not actively bleeding at the time of evaluation by using silver nitrate or chromic acid with a cotton tipped applicator.
- **Electrical cautery**, using an insulated cautery unit, under local or general anaesthesia and the patient is advised to use topical antibiotic ointment for one week after cautery.
- **Endoscopic cauterization of the bleeding vessel:** nasal endoscopes have facilitated a more precise definition of the bleeding sites.

- **Anterior nasal packing:**

If the bleeding vessels are not identified, anterior nasal pack is inserted.

**Types:**

- A gauze ribbon ( about one inch in width) soaked with Vaseline. It is arranged in layers (accordion-like) from the nasal floor upwards. Administration of oral antibiotic should be considered to avoid sinusitis. The pack is left for 24-48 hours.
- A merocel sponge tampon that expands when inserted into the nose is another technique.

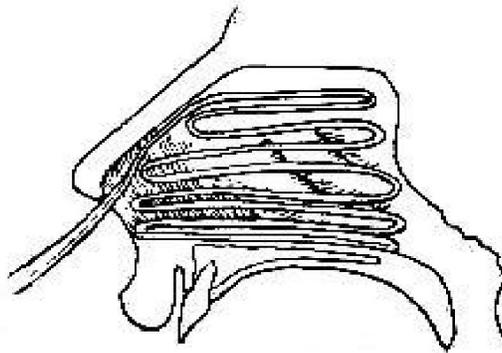


Fig.29. Anterior nasal pack with vaseline gauze.

- **Posterior nasal packing:**

**Indications:**

- Failure of the anterior nasal packing to stop bleeding.
- Epistaxis from the posterior part of the nasal cavity.

**Types:**

- A gauze pack ( about 5 x 3 cm) with two threads secured around it.
- An inflatable balloon pack.

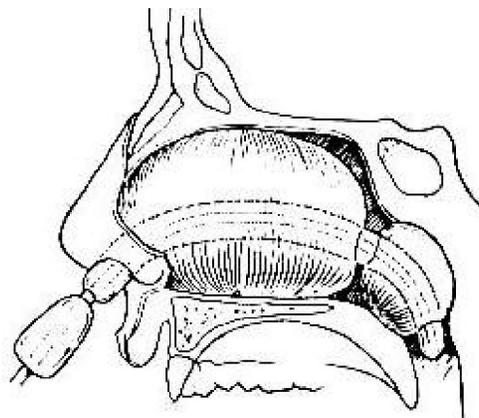


Fig.30. Anterior and posterior nasal packing with an inflatable balloon.

**Method of application:**

- 1- A rubber catheter introduced through each nostril till it appears in the oro-pharynx and then pulled from the mouth.
- 2- The oral end of each catheter is tied to one thread of the prepared pack.
- 3- The nasal end of the catheters is pulled till the pack lodges firmly into the naso-pharynx. and then an anterior nasal pack is inserted. Patients with posterior nasal pack must be admitted to the hospital and treated with antibiotics to prevent sinusitis and otitis media. The pack is left for 24-48 hours.

• **Arterial ligation:**

Arterial ligation is indicated for the patient who continues to bleed every time the pack is removed or who keeps on bleeding with the pack in situ.

**The internal carotid system:**

- When bleeding arises superior to the middle turbinate.
- Ligation of the ethmoidal arteries (through external ethmoidectomy approach with a curved incision about 2 cm in length and is placed approximately midway between the dorsum of the nose and the medial canthus ).

**The external carotid system:**

- When bleeding arises from the lower part of the nasal fossa or the lateral wall of the nose.
- Ligation of the sphenopalatine artery intranasally as it exists its foramen using nasal endoscopy.
- Ligation of the maxillary artery in the pterygopalatinefossa (through transantral approach)
- Ligation of the external carotid artery in the neck.

The former two approaches, although slightly more technically demanding, has the advantage of being more specific and achieves better results.

• **Arterial embolization:**

Arterial embolization is an option for primary treatment of epistaxis and for surgical failures. Potential major complications include stroke, facial paralysis and skin necrosis.

**II- Treatment of known causes (to prevent recurrence of epistaxia)**

Investigations to diagnose the cause of epistaxis should follow the control of bleeding with subsequent management of such cause, for example:

- Hematological studies as coagulation profile ( for blood diseases) and blood picture ( for leukaemia).

- Radiological studies as CT scan of the sinuses, naso-pharynx and chest.
- Biopsy from suspected tumours and granulations.
- Anti-hemophilic globulin for hemophilia, platelet transfusion for thrombocytopenic purpura...etc
- Hereditary haemorrhagic telangiectasia can be treated by septodermoplasty which consists of the removal of the affected septal mucosa and resurfacing of the area with a graft, another treatment option is Laser photocoagulation.
- Control of blood pressure in hypertensive epistaxis ...etc.