



RHINOLOGY

Taimoor Asghar
taimoorasghar47@yahoo.com

Table of Rhinology Contents

Vasomotor Intrinsic Rhinitis:	2
Allergic Rhinitis:	4
Acute sinusitis:	6
Chronic sinusitis	9
Choanal atresia:	10
Epistaxis:	11
Foreign body nose	14
Boil nose/Enruncle/Vestibulitis	15
Nasal polyps:	16
Atrophic rhinitis (Ozaena):	18
Septal abscess:	20
Septal Hematoma:	21
Septal perforation:	22
Fracture of nose (Trauma of nose)	23
Deviated nasal septum/Deflected nasal septum/Septal deviation (DNS)	25
Rhinolith (Nasal calculous)	26
Septoplasty and Submucosal resection of the nose (SMR)	27
CSF Rhinorrhoea	28
Wegener's granulomatosis	29
Rhinoplasty:	30
Surgical options to reduce turbinates	31

Vasomotor Intrinsic Rhinitis:

Definition:

It is an inflammatory condition of nasal mucosa which is described as non-infective and non-allergic rhinitis. It represents as a diagnosis of exclusion.

Etiology:

Still unknown but here is strong suspicion of autonomic disturbance. Other theories of etiology are:

1. Unidentified allergen
2. Psychosomatic

Predisposing factors:

- I. Familial predisposition
- II. Environmental pollution
- III. Smoking
- IV. Alcoholism
- V. Endocrine disturbance
- VI. Beta blockers

Pathogenesis:

There will be sympathetic under activity and parasympathetic over activity which will cause:

- i) Glandular hyperplasia
- ii) Mucosal vascular dilation

Clinical features:

- **Symptoms**
 - i) Nasal obstruction
 - ii) Rhinorrhea
 - iii) Post nasal drip
 - iv) Itching and sneezing are less common symptoms
- **Signs/Examination:**
 - i) Hypertrophy of the inferior turbinate (all turbinates are also hypertrophied)
 - ii) Nasal polyps maybe present
 - iii) Inflamed and swollen mucosa
 - iv) There will be no sign of infection or allergy

Investigations:

To exclude we will do the following tests:

1. X-ray PNS
2. Bacteriology of nasal secretions
3. Allergy tests

Treatment:

- **Medical:**
 1. Local steroids
 2. Oral steroids
 3. Anti-histamines (Chlorphenaramine maleate)
 4. Local anticholinergics (Ipratropium bromide)
 5. Systemic sympathomimetics (Pseudoephedrine)
 6. Local decongestants
 7. Anti- depressants
- **Surgical:**
 1. Polyps → polypectomy
 2. Turbinate hypertrophy → different surgical procedures
 - Turbinectomy
 - Cryosurgery
 - Laser diathermy
 - Sub-mucosal diathermy
 - Galvano cauterization
 - Linear cauterization

Allergic Rhinitis:

It is type I hypersensitivity reaction (IgE mediated) of nasal mucosa, which is to an allergen and characterized by sneezing, itching, watering of nose and eyes, nasal obstruction

Types:

1. **Seasonal (cardinal)**
2. **Perennial**

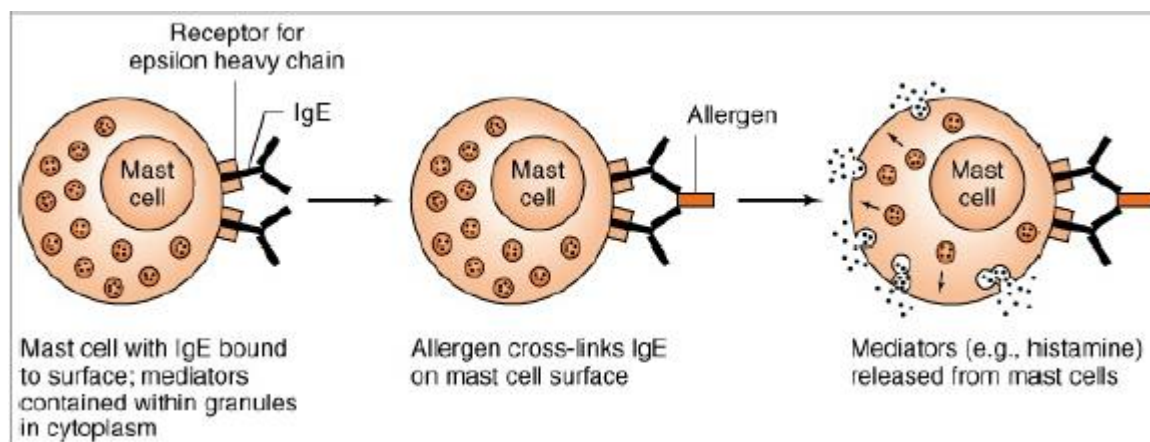
Difference between Cardinal and perennial:

Features	Seasonal	Perennial
1) Related to specific season	Yes	Throughout the year
2) Commonest causative agent	Pollens	House dust mite
3) Commonest clinical feature	Sneezing and rhinorrhea	Nasal congestion and post nasal discharge
4) Conjunctiva irritation	Common	Less common
5) Palatal irritation	common	Less common

Etiology:

- i) **Atopy** (genetic predisposition)
- ii) **Environmental allergy** (pollens, flowers, house dust mite)
- iii) **Food allergy** (milk, nuts, eggs, fish, cheese, citrous fruits)
- iv) **Drug allergy** (Aspirin, Panadol, ACE inhibitors)
- v) **Occupational allergy** (flour, lab animals e.g. rats, Wood dust)
- vi) **Pollution** (perfumes, tobacco, smoke, traffic fumes, domestic sprays, bleach)

Pathogenesis:



Clinical features:

Symptoms:

Seasonal (cardinal)	Perennial
<ul style="list-style-type: none"> • Paroxysmal sneezing • 10-20 sneezes at a time • Nasal obstruction • Watery nasal discharge • Itching in nose • Bronchospasm 	<ul style="list-style-type: none"> • Frequent cold • Stuffy nose • Loss of sense of smell • Oedema • Chronic cough • Hearing impairment

Management:

1. **History:** Allergy history, Family history and drug history
2. **Examination:**

Signs:**i) Nasal signs**

- Allergic salute
- Bluish or pale boggy mucosa
- Turbinates swollen
- Watery discharge

ii) Ocular signs

- Allergic shiners
- Cobblestone conjunctiva
- Oedema of lids

iii) Otologic signs

- Retracted tympanic membrane
- Eustachian tube blockage

iv) Pharyngeal signs

- Granular pharyngitis

v) Laryngeal signs

- Hoarseness
- Oedema

3. Investigation:

- i) Skin prick test
- ii) Serum IgE level
- iii) Radioallergosorbant test (RAST)
- iv) Nasal smear
- v) Provocation test
- vi) CBC

Treatment:

1. Avoidance of allergens
2. Medical treatment:
 - Oral anti-histamine
 - Topical steroidal spray
 - Oral steroids
 - Sodium cromoglycate
 - Immunotherapy
 - Anti IgE
3. Surgical treatment:
 - For DNS → Septoplasty
 - For polyps → polypectomy
 - For turbinate hypertrophy → turbinectomy

Differential Diagnosis:

- 1) Sinusitis
- 2) Hypertrophic rhinitis
- 3) Vasomotor rhinitis
- 4) Nasal polyps

Complications:

- 1) Nasal polyps
- 2) Sinusitis
- 3) Hypertrophic rhinitis (permanent)
- 4) Asthma (In 40% of patients)
- 5) Serous otitis media

Acute sinusitis:

Definition:

It is the acute inflammation of sinuses.

The most commonly affected sinuses include:

- Maxillary
- Frontal
- Ethmoidal
- Sphenoid

Predisposing factors:

1. Local factors:
 - DNS
 - Polyps
 - Upper respiratory tract infections
 - Allergy
 - Anatomical variations
 - Foreign body
 - Tumors
 - Dental extraction or infections
 - Swimming and diving
 - Fracture of sinuses
2. General factors:
 - Debilitation
 - Immunocompromised host
 - Mucociliary disorders
 - Atmospheric irritants

Pathology:

First of all there will be viral infection. Followed by

- 1) Hyperemia and edema of mucosa
- 2) Blockage of ostia
- 3) Cellular infiltration
- 4) Increased mucous production
- 5) Paralysis of cilia
- 6) Stasis of secretions
- 7) Secondary bacterial infection

Microbiology:

Most common organisms are Streptococcus pneumonia and H. influenza which make up 70% of the organisms causing acute sinusitis. H. influenza is most common in children and Streptococcus pneumonia is most common in adults.

Others include Moraxella catarrhalis, Streptococcus pyogenes, Staphylococcus aureus and Klebsiella pneumonia.

Clinical features:

- **Symptoms:**
 - 1) URTI
 - 2) Pain over infected sinus
 - 3) Maxilla = Pain over cheeks, teeth and upper jaw
 - 4) Ethmoid = In between eyes
 - 5) Frontal = Forehead
 - 6) Sphenoid = Retro-orbital
 - 7) Nasal congestion
 - 8) Fullness of face
 - 9) Malaise
 - 10) Pyrexia
 - 11) Pain exacerbation on stooping down
- **Signs:**
 - 1) Red edematous mucosa and turbinates
 - 2) Tender over the affected sinus
 - 3) Pus in middle meatus
 - 4) Tenderness over upper teeth

Investigations:

- Blood C.P (raised WBC and ESR)
- Pus for culture and sensitivity
- Transillumination test
- X-ray PNS
- CT-Scan (important when doing FESS and middle meatus antrostomy)

Treatment:

⇒ General:

- Bed rest
- Steam inhalation
- Plenty of fluids
- Vitamin C

⇒ Medical:

- Broad spectrum antibiotics which include Penicillin group, Macrolides and 1st/2nd generation cephalosporin
- Local and systemic decongestants
- Steam inhalation
- Analgesics
- Hot fomentation
- Anti-pyretic

⇒ Surgical:

Acute Maxillary sinusitis <ul style="list-style-type: none">• Antral Lavage	Acute Frontal sinusitis <ul style="list-style-type: none">• Trephination of frontal sinus	Acute Ethmoid sinusitis <ul style="list-style-type: none">• External ethmoidectomy incision
-------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------

Differential diagnosis:

- Migraine
- Dental pain
- Errors refraction
- Sino nasal tumors
- Trigeminal neuralgia

Complications:

Acute Maxillary Sinusitis	Acute Frontal Sinusitis
<ol style="list-style-type: none"> 1. Chronic sinusitis 2. Frontal sinusitis 3. Osteitis/Osteomyelitis of maxilla 4. Orbital cellulitis 	<ol style="list-style-type: none"> 1. Chronic Frontal sinusitis 2. Osteitis/Osteomyelitis of frontal bone 3. Fistula formation 4. Orbital cellulitis 5. Meningitis 6. Frontal lobe abscess 7. Extradural abscess
Acute Ethmoid Sinusitis	Acute Sphenoid Sinusitis
<ol style="list-style-type: none"> 1. Orbital cellulitis 2. Visual deterioration 3. Blindness 4. Cavernous sinus thrombosis 5. Extradural abscess 6. Meningitis 	

Cavernous sinus thrombosis

Source	Disease	Route
Nose and danger area of face	Furuncle and septal abscess	Pharyngeal plexus
Ethmoid sinuses	Orbital cellulites or abscess	Ophthalmic veins
Sphenoid sinus	Sinusitis	Direct
Frontal sinus	Sinusitis and osteomyelitis of frontal bone	Supraorbital and ophthalmic veins
Orbit	Cellulitis and abscess	Ophthalmic veins
Upper lid	Abscess	Angular vein and ophthalmic veins
Pharynx	Acute tonsillitis or peritonsillar abscess	Pharyngeal plexus
Ear	Petrositis	Petrosal venous sinuses

Chronic sinusitis

It is the chronic inflammation of the sinuses which usually follows recurrent acute sinusitis.

Etiology:

Same as that of acute sinusitis but (aerobes and anaerobes are also included.)

Pathology:

- ⇒ Increased vascular permeability
- ⇒ Oedema and hypertrophy of mucosa which becomes polypoidal
- ⇒ Goblet cell hyperplasia
- ⇒ Chronic cellular infiltrate
- ⇒ Ulceration of epithelium in some cases

Clinical Features:

Symptoms:

- I. Nasal congestion
- II. Nasal or post nasal discharge
- III. Pain over the sinus
- IV. Anosmia
- V. Cacosmia (Disorder of sense of smell)

Signs:

- ⇒ Sinuses will be tender
- ⇒ chronic pharyngitis
- ⇒ Nasal inflammation

Investigations:

- ⇒ X-ray PNS
- ⇒ CT scan
- ⇒ Pus for culture and sensitivity

Treatment:

1) Medical:

- ⇒ Broad spectrum antibiotics e.g. Ciprofloxacin or 3rd generation cephalosporin
- ⇒ Nasal decongestants
- ⇒ Steroids
- ⇒ Steam inhalation

2) Surgery:

a. Chronic maxillary sinusitis

- FESS
- Antral lavage
- Intra nasal inferior meatus antrostomy
- Caldwell luc procedure

b. Chronic ethmoidal sinusitis

- Intranasal ethmoidectomy
- External ethmoidectomy
- Trans-antral ethmoidectomy

c. Chronic frontal sinusitis

- External frontoethmoidectomy
- Osteoplastic flap procedure

Differential Diagnosis:

- 1) Migraine
- 2) Trigeminal neuralgia
- 3) Sino-nasal tumor
- 4) Errors of refraction
- 5) Dental pain

Choanal atresia:

It is a congenital anomaly in which there is an embryological failure of primitive bucconasal membrane to rupture before birth. This results in persistence of bony plate (90%) or membrane (10%) obstructing the posterior nasal aperture

Epidemiology:

Male : Female = 1:2

Mostly atresia is unilateral and bilateral is rare

Types:

1. Unilateral choanal atresia
2. Bilateral choanal atresia

Unilateral choanal atresia:

Symptoms:

Asymptomatic at birth

Unilateral Nasal obstruction

Bilateral nasal obstruction

Diagnosis:

1. Thick gelatinous secretions
2. Absence of air bubbles in discharge
3. Cold spatula test or mirror test will be negative
4. Posterior rhinoscopy in older children
5. Failure to pass soft rubber catheter
6. Failure of methylene blue dye in nose into pharynx
7. Fiber optic nasoendoscopy

Investigations:

1. Choanography
2. CT Scan → **Investigation of choice**

Treatment:

- ❖ **Membranous atresia:**
Perforation through Probe/LASER/Diathermy
- ❖ **Bony atresia:**
Perforation through Burr/LASER

Bilateral choanal atresia:

It is a medical emergency as child is born with cyanosis. When he cries cyanosis disappears

Treatment:

- Insert airway or feeding nipple with large hole (Mac Govern's technique)
- Tracheostomy
- Perforation of atresia
- ❖ **Membranous atresia:**
Perforation through Probe/LASER/Diathermy
- ❖ **Bony atresia:**
Perforation through Burr/LASER

Epistaxis:

Bleeding from the nose is called epistaxis

Causes:

1. Idiopathic

It is the commonest cause of the epistaxis

2. Local

- Trauma
 - Fracture nasal bone
 - Foreign body nose
 - Nose pricking
- Inflammatory
 - Rhinitis
 - Sinusitis
 - ◆ Neoplastic
 - Tumors of nose
 - Tumors of paranasal sinuses
 - Nasopharynx
 - ◆ Iatrogenic
 - Due to surgery

3. Systemic

- Environmental
 - High altitude
 - Air conditioning
- CVS disease
 - Hypertension
 - Mitral valve stenosis
 - Atherosclerosis
- Blood disease
 - Hemophilia
 - Thrombocytopenia purpura
 - Leukemia
 - Anemia
 - Vitamin K deficiency
- Respiratory system disorder
 - Pneumonia
 - Whooping cough
- Liver disease
 - Cirrhosis
- Renal disease
 - Chronic nephritis
- Endocrinal changes
 - Pregnancy
 - Menstruation
- Drugs
 - Warfarin
 - Heparin
 - Aspirin

Blood supply of nasal septum:

- ❖ Internal carotid artery
 - Anterior ethmoidal artery branch of ophthalmic artery
 - Posterior ethmoidal artery branch of ophthalmic artery
- ❖ External carotid artery
 - Sphenopalatine artery branch of maxillary artery
 - Greater palatine artery branch of maxillary artery
 - Septal branch of superior labial artery

Blood supply of lateral wall of nose:

- ❖ Internal carotid artery
 - Anterior ethmoidal artery branch of ophthalmic artery
 - Posterior ethmoidal artery branch of ophthalmic artery
- ❖ External carotid artery
 - Sphenopalatine artery branch of maxillary artery
 - Greater palatine artery branch of maxillary artery
 - Lesser palatine artery branch of maxillary artery
 - Facial artery

Sites of Epistaxis:

- ⇒ Little's area (common in children)
- ⇒ Retrocolumellar vein (adult below 35 years)
- ⇒ Woodruff plexus (posterior epistaxis site)
- ⇒ Above the level of middle turbinate
- ⇒ Below the level of middle turbinate
- ⇒ Nasopharynx
- ⇒ Diffuse → both nasal and septal wall

Classification of epistaxis:

	Anterior epistaxis	Posterior epistaxis
Incidence	more	Less
Site	Little's area or anterior part of lateral wall	Posterosuperior part of nasal cavity; difficult to localize the bleeding point
Age	Children and young adult	>40 years
Cause	Trauma	Spontaneous; often due to hypertension or arteriosclerosis
Bleeding	Mild bleeding, can be controlled by local pressure or anterior nasal pack	Severe bleeding; requires hospitalization and postnasal pack
Bleeding site	Bleeding from nose while sitting	Bleeding from throat while sitting

Management:

History

- Mode of onset
- Duration of bleeding
- Frequency of bleeding
- Site of bleeding
- Bleeding tendency
- RTI or hypertension
- H/O renal or liver disease
- Drug history

Examination

Nose:

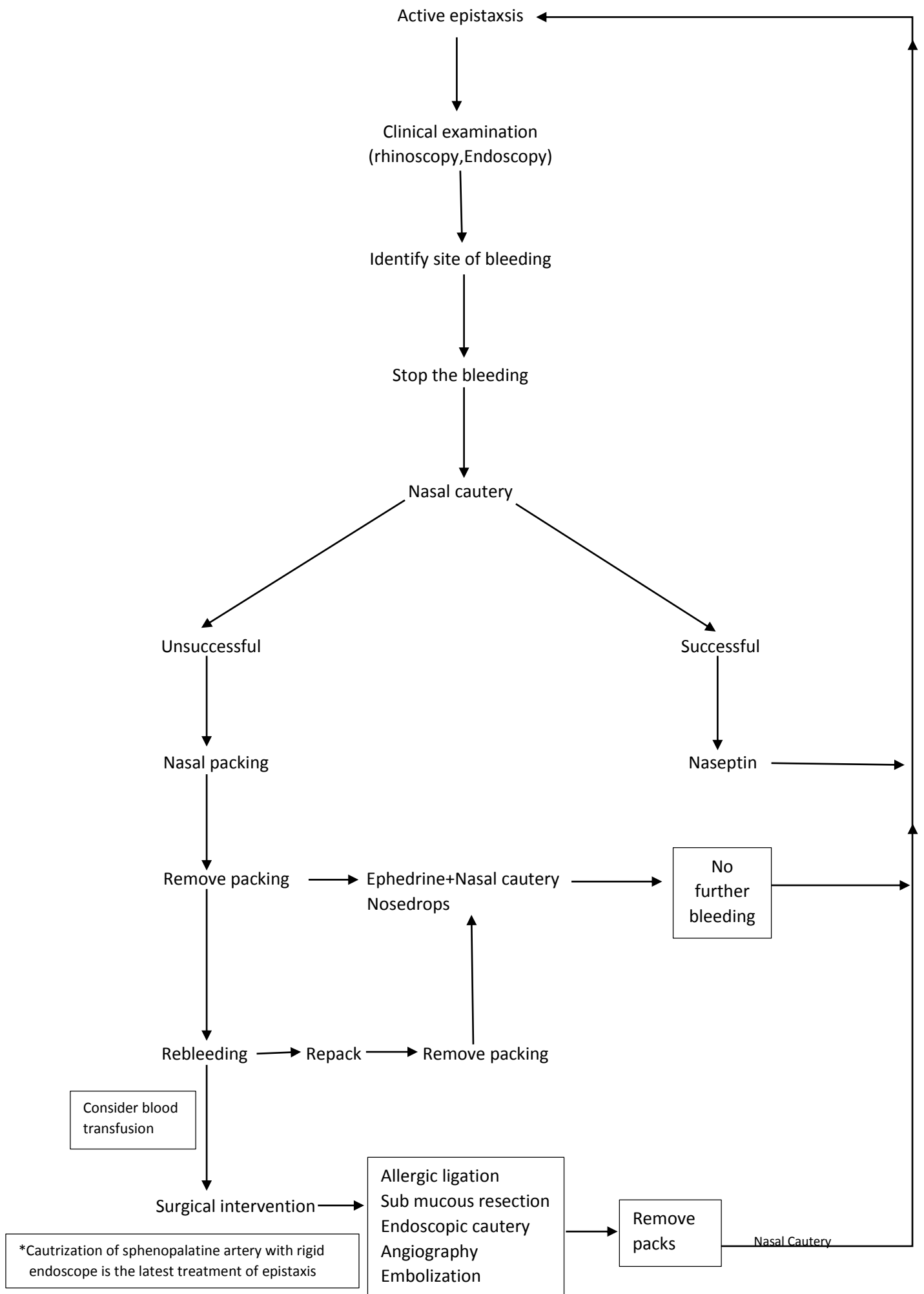
- Anterior rhinoscopy
- Posterior rhinoscopy
- Flexible endoscopy

Systemic examination:

- CVS examination
- Respiratory examination
- Liver examination
- Renal examination

Investigations:

- CP blood test
- Clotting time
- Bleeding time
- Prothrombin time
- Activated partial thromboplastin time
- Renal profile
- Liver profile
- TFT's



Foreign body nose

Most common age group 2-5 yrs age

Classification:

- 1) **Organic:** e.g. sponge, rubber, paper, wood, peas and nuts
They are symptomatic as they cause irritation and inflammation of the nasal mucosa.
- 2) **Inorganic:** e.g. button, beads, metal, stones, plastic objects
They are usually asymptomatic and discovered accidentally during examination of nose.

Clinical features:

- ⇒ **Symptoms:**
Unilateral nasal discharge → which is initially mucoid, later it becomes mucopurulent and finally foul smelling and blood stained
- ⇒ **Signs:**
Can be seen with
 - a) Anterior rhinoscopy
 - b) Posterior rhinoscopy
 - c) Nasoendoscopy

Investigations:

- ⇒ Usually not required
- ⇒ X-ray of nose anterior-posteriorly and lateral view (it is done when there is strong suspicion of foreign body)

Treatment:

- a) **For abounded foreign bodies:**
Removal with Eustachian tube catheter
- b) **For thin bodies (e.g. paper)**
Crocodile forceps or cup forceps is used.

Boil nose/Enruncle/Vestibulitis

It is an acute infection of hair follicle caused by staphylococcus aureus

Predisposing factors:

- 1) Nose pricking
- 2) Plucking of nasal vibrissae

Symptoms:

- 1) Pain in the nose
- 2) Redness of dorsum and tip of the nose
- 3) Fever

Signs:

- 1) Tenderness over tip of nose and dorsum
- 2) Redness and swelling of skin of dorsum and tip of nose
- 3) Furuncle may rupture spontaneously in nasal vestibule

Treatment

a) Medical:

1. Stop touching nose
2. Warm compression
3. Analgesics
4. Antibiotics (topical/systemic)

b) Surgical

1. Incision and drainage, if there is fluctuating abscess.

Complications:

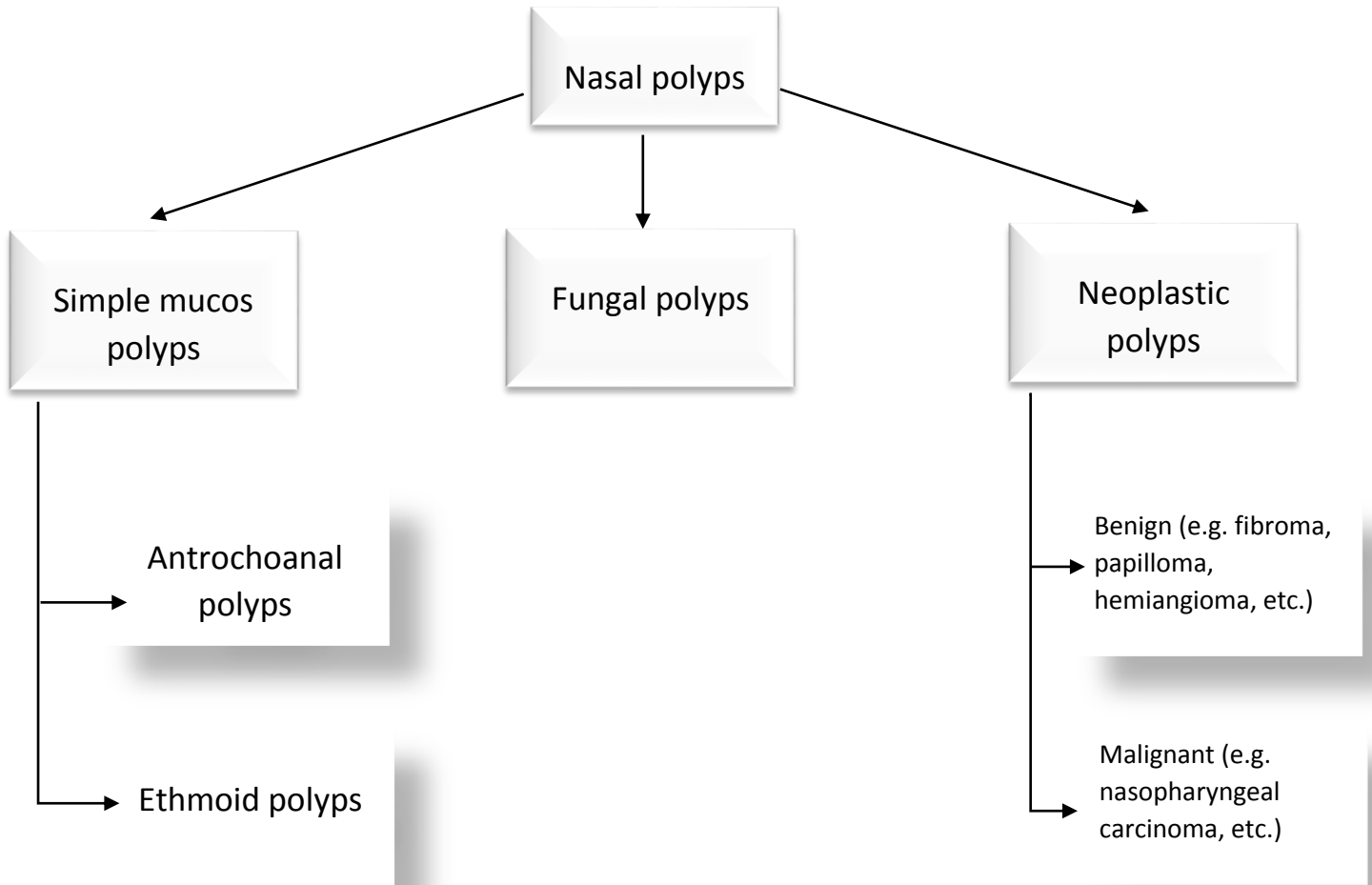
- 1) Cellulitis of upper lip
- 2) Septal abscess
- 3) Cavernous sinus thrombosis

Nasal polyps:

It is abnormal edematous hypertrophy of the mucosa
Or

It is abnormal protrusion of nasal mucosa which becomes polypoidal and edematous

Classification of nasal polyps:



Features	Ethmoidal polyps	Antro-choanal polyps (killian's polyps)
Site of origin	Ethmoidal sinus	Maxillary sinus
Occurrence	Common	Uncommon
Number	Multiple	Single
Nasal cavity involvement	Bilateral	Unilateral
Common age group	Middle age	Young age
Etiology	Allergy	Infection
Asthma/cystic fibrosis	Yes	No
Nasal obstruction	Bilateral and constant	Unilateral and worsen on expiration
Examination	Anterior rhinoscopy	Posterior rhinoscopy
Histological picture	Eosinophilia	Polymorphs infiltration
Recurrence	Mostly seen	Less common
Treatment	<p>⇒ Medical treatment:</p> <ul style="list-style-type: none"> ▪ Local and systemic steroids ▪ Antihistamines <p>⇒ Surgical treatment:</p> <ul style="list-style-type: none"> ▪ Intranasal polypectomy ▪ Ethmoidectomy ▪ Removal of polyps with FESS 	<p>⇒ Avulsion of the polyp through nasopharynx</p> <p>⇒ Caldwell luc procedure</p>
Differential diagnosis	<ul style="list-style-type: none"> ➤ Hypertrophied turbinates ➤ Thickened nasal secretions ➤ Septal hematoma ➤ Septal abscess 	<ul style="list-style-type: none"> ➤ Adenoid hypertrophy ➤ Angiofibroma ➤ Nasopharyngeal cyst ➤ Nasopharyngeal carcinoma
Investigations	<ul style="list-style-type: none"> ❖ Skin test ❖ X-ray PNS ❖ CT scan ❖ Biopsy 	<ul style="list-style-type: none"> ❖ X-ray PNS ❖ X-ray nasopharynx lateral view

Atrophic rhinitis (Ozaena):

Atrophic rhinitis is defined as a chronic nasal disease characterized by progressive atrophy of the nasal mucosa along with the underlying bones of turbinates.

Secretion which rapidly dries up forming foul smelling crusts. This fetid odour is also known as ozaena

Etiology: (HERNIA)

1. Hereditary factors
2. Endocrine disturbances
3. Racial (white is more effected)
4. Nutritional (e.g. Vitamin A, Vitamin D or Iron)
5. Infective (e.g. Klebsiella Ozaenae, E.coli)
6. Iatrogenic
7. Autoimmune

Age:

Usually Puberty

Female > Male

Immunologists have considered atrophic rhinitis to be an autoimmune disorder

Types:

Atrophic rhinitis can be divided in to two types:

1. Primary Atrophic Rhinitis

Diagnosis of exclusion, classical form, Causative is Klebsiella Ozaenae

2. Secondary Atrophic Rhinitis

Is the most common form seen in developed countries. The most common causes for this problem could be:

- Extensive destruction of nasal mucosa and turbinates during nasal surgery
- Irradiation
- Granulomatous infections like leprosy, syphilis, tuberculosis etc.

PATHOLOGY:

- 1) Metaplasia of ciliated columnar nasal epithelium into squamous epithelium.
- 2) There is a decrease in the number and size of compound alveolar glands
- 3) Dilated capillaries are also seen

Pathologically atrophic rhinitis has been divided into two types:

Type I:

is characterized by the presence of endarteritis and periarteritis of the terminal arterioles. This could be caused by chronic infections. These patients benefit from the vasodilator effects of estrogen therapy.

Type II:

is characterized by vasodilatation of the capillaries, these patients may worsen with estrogen therapy. The endothelial cells lining the dilated capillaries have been more cytoplasm than normal capillaries and the presence of active bone Resorption. Majority of patients with atrophic rhinitis belong to type I category.

CLINICAL FEATURES

1. Nasal Obstruction
2. Epistaxis
3. Merciful Anosmia
4. Atrophic changes in pharynx i.e. Pharyngitis Sicca
5. Can be seen in larynx also known as Atrophic Laryngitis
6. Nose may show saddle deformity, nasal perforation
7. ET obstruction (otological symptoms)
8. PNS may have thick walls and appear opaque

Clinical examination:

- Extremely roomy nasal cavity
- Foul smelling discharge
- Nasal crusting - greenish, yellow or black crusts
- When these crusts are removed bleeding starts to occur
- **BLOCKED NOSE:** These nerve endings are destroyed. In the absence of these sensation the nose feels blocked
- CT SCAN

MANAGEMENT:

Medical:

- i. Nasal irrigation and removal of crust with:
 - Sodium bicarbonate - 28.4 g (1part)
 - Sodium baborate - 28.4 g (1part)
 - Sodium chloride - 56.7 g (2part)
 - Mixed in 280 ml of Luke warm water
- ii. 25% glucose in glycerin drops to inhibit the growth of proteolytic organism and reducing foul smell
- iii. Oestradiol spray can be used as nasal drops for regeneration of nasal mucosa
- iv. Kemecetine antiozaena solution
- v. Potassium iodide to increase nasal secretions
- vi. Placental Extracts.
- vii. Systemic use of Streptomycin 1gm/day for 10 days

Surgical:

- i. **Lautenslauger's operation**
- ii. **Teflon strips, and autogenous** cartilages have been inserted
- iii. **Wilson's operation,**
- iv. **Young's operation** - This surgery aims at closure of one or both nasal cavities by plastic surgery. Young's method is to raise folds of skin inside the nostril and suturing these folds
- v. **Modified Young's operation** where a 3mm hole is left while closing the flaps in the nasal vestibule. This enables the patient to breath through the nasal cavities.
- vi. **Wittmack's Operation** – Salivary duct transposition
- vii. **Vestibuloplasty**

Septal abscess:

It is serious pus forming bacterial infection within nasal septum

Etiology:

- Infected hematoma
- Boil in nasal tip infection
- Compound fractures of nasal bones
- Infectious fever like measles

Risk factors:

- Hemophilia
- Chronic sinusitis
- Dental infections
- Nasal abscess

Microbiology:

Staphylococcus aureus

Pathology:

Bacterial proliferation and abscess formation may then result from the presence of stagnant blood. A hematoma may become infected within 3 days of trauma

Symptoms:

- 1) Fever
- 2) History of trauma
- 3) History of nasal blockage
- 4) Difficulty in breathing
- 5) Pain over nasal bridge and nasal tip
- 6) Tenderness over nasal bridge and nasal tip
- 7) Headache
- 8) Malaise

Signs:

1. Septal swelling
2. Dull purple looking
3. Tender

Investigations:

- 1) **CP Blood** → increase blood cell count
- 2) **Pus** → for culture and sensitivity

Treatment:

1. Incision and drainage of pus
2. Intravenous antibiotics
3. Rhinoplasty → if nose is deformed

Complications

1. Spread of infection to intracranial cavity
2. Thrombophlebitis of cavernous sinus
3. Nasal deformity
4. Perforation of nasal septum

Differential diagnosis:

- 1) Septal hematoma
- 2) Furunculosis (deep infection of hair follicle)
- 3) Ethmoidal polyp
- 4) DNS
- 5) Bilateral inferior turbinate hypertrophy

Septal Hematoma:

Bruise or bleeding from nasal septum or bilateral accumulation of blood between perichondrium and cartilage

Etiology:

Facial trauma and nasal fracture

Epidemiology: More in children

Pathology:

1. Anterior portion of nasal septum → thin cartilaginous plate with closely adherent perichondrium and mucosa
2. Submucosal blood vessels are torn as bulking forces pull perichondrium from cartilage
3. Blood may collect between perichondrium and septal cartilage
4. Septal cartilage has no blood supply and receives oxygen and nutrients from the perichondrium
5. An untreated septal hematoma may lead to destruction of septum

Symptoms:

- Blockage in breathing
- Nasal congestion
- Painful swelling of nasal septum

Signs:

- Anterior rhinoscopy
- Both nasal cavities bluish or reddish
- Swelling

Treatment:

1. Aspiration with wide bore needle under topical anesthesia can be performed using 18-20 gauge needle (if hematoma is very small)
2. Urgent incision and drainage should be done
3. Systemic antibiotics
4. Maximum fluctuants under local anesthesia are given incision → dilated → Drained
5. Bilateral nasal packing is done to prevent the reaccumulation of hematoma

Complications:

- ❖ Septal abscess
- ❖ Saddle nose deformity
- ❖ Septal perforation
- ❖ Meningitis
- ❖ Intracranial abscess
- ❖ Orbital cellulitis
- ❖ Cavernous sinus thrombosis

Differential diagnosis:

- Septal abscess
- Furunculosis
- Ethmoidal polyps
- DNS
- Bilateral inferior turbinate hypertrophy

Septal perforation:

AETIOLOGY

1. **Traumatic perforations:** Trauma is the most common cause
2. **Pathological perforations:** They can be caused by:
 - Septal abscess.
 - Nasal myiasis.
 - Rhinolith
 - Chronic granulomatous conditions like lupus
 - Wegener's granuloma
3. **Drugs and chemicals:**
 - Prolong use of steroids spray
 - Cocaine addicts
 - Arsenic
 - Workers in chromium plating factories
4. **Idiopathic**

Clinical features

- ⇒ **Small anterior perforation** cause whistling sound during respiration
- ⇒ **Large perforation** develop crust which obstruct the nose on removal cause epistaxis

Treatment:

- ⇒ **Small anterior perforation** close by the plastic flaps
- ⇒ **Large perforation** difficult to close. The aim of treatment is:
 - Keep the nose crust free
 - Ointment
 - Thin silastic button can be worn to get relief from symptoms

Fracture of nose (Trauma of nose)

Fractures of nasal bones are the most common because of the projection of nose on the face.

CAUSES OF NASAL TRAUMA:

- Assault
- Road traffic accident
- Sports injuries

CLASSIFICATION OF FRACTURE NOSE:

1. Class I Chevallet fracture
2. Class II Jarjavy fracture
3. Class II Fronto-orbito-ethmoidal

1) CHEVALLET FRACTURE:

- Due to frontal or frontolateral blow to nose
- Vertical fracture of septum
- Depressed or displaced nasal bone
- Normal force is required

2) JARJAVY FRACTURE:

- Always due to lateral trauma
- Horizontal or C shaped fracture of septum
- Fracture of frontal process of maxilla and nasal bone
- Velocity of trauma > greater than previous

3) FRONTO-ORBITO-ETHMOIDAL:

- Velocity of trauma > greater than previous
- Fracture of nasal bone ethmoidal labyrinth + orbit

MANAGEMENT:

HISTORY:

- ⇒ Ask about force and directions of trauma
- ⇒ Forces may act from the front or-side.
- ⇒ Magnitude of force
- ⇒ Bleeding nose
- ⇒ External nasal deformity
- ⇒ Nasal obstruction
- ⇒ Diplopia
- ⇒ Loss of vision
- ⇒ Unconsciousness
- ⇒ Injuries to head and neck

EXAMINATION:

- Look for external nasal deformity
- Crepitus
- Nasal cavity for septal hematoma
- Nasal septum
- Oedema of nose
- Epistaxis
- Eyes → infra orbital margin, sub-conjunctival hemorrhage, periorbital oedema, eye movements and vision
- Dental occlusion
- Injury to face

INVESTIGATIONS

- Not required
- X-ray nasal bone lateral view → only for Medico legal purpose
- X-ray PNS at 45 degrees → To see other fractures

TREATMENT:

- Resuscitate
- Reassure if there is no external deformity or nasal obstruction

TREATMENT OF PATIENT WITH EXTERNAL DEFORMITY

- a) Case I
- b) Case II
- c) Case III

CASE I: If patient comes immediately after trauma before the development of edema

- Immediately manipulate the external deformity by applying manual pressure without anesthesia.

CASE II: If patient come with development of oedema

- Give antibiotics and anti-inflammatory drugs for its settlement and send the patient home.
- After 1 week, under general anesthesia straighten the fracture nasal bone with external pressure/ Walsham forceps

CASE III: If the patient has come after 3 weeks of trauma

- Admit the patient
- Rhinoplasty under General Anesthesia
- Septorhinoplasty → if septum is also deflected

TREATMENT OF CLASS I FRACTURE

Closed reduction

TREATMENT OF CLASS II FRACTURE:

Closed reduction

TREATMENT OF CLASS III FRACTURE:

Open reduction

Deviated nasal septum/Deflected nasal septum/Septal deviation (DNS)

It is the symptomatic deviation of the nasal septum from its center/midline

Causes:

- Congenital
- Acquired

Congenital:

1. Hereditary
2. Developmental anomalies
3. Birth trauma

Acquired:

1. Trauma
2. Racial factors (e.g. in mongoloids)
3. Diseases of palate and teeth

Types of DNS:

- 1) C-shape
- 2) S-shape
- 3) Spur (Acutely deflected part of the nasal septum. It impinges on the inferior turbinate. Trigeminal nerve will be compressed so causes referred headache on the forehead)
- 4) Thickened septum (again and again trauma causes fibrosis → thickened septum)
- 5) Caudal end dislocation

Clinical Features:

Symptoms:

- ⇒ Nasal obstruction → most predominant
- ⇒ Snoring
- ⇒ Anosmia (when olfactory cleft is being disturbed or area above it)
- ⇒ Headache
- ⇒ Bleeding (DNS → causes dryness → formation of crusts when touched causes)
- ⇒ Sinusitis symptoms
- ⇒ External nasal deformity

Signs:

- ⇒ Anterior rhinoscopy(with/without speculum)
- ⇒ Posterior rhinoscopy
- ⇒ Cottle's test (pulling the cheek of the patient outwards will relieve nasal obstruction)
- ⇒ Naso-endoscopy (latest technique)
- ⇒ Examination of external nose, teeth and palate

Investigations:

1. **Routine Investigations** e.g. Blood CP, Urine R/E, Urea, Creatinine, Blood sugar etc.
2. **Specific investigations** e.g. X-ray PNS (Water's view) at 45 degree, CT scan

Treatment:

Medical treatment:

When mild DNS and very mild symptoms are present. Local and systemic decongestants can be used.

Surgical treatment:

1. SMR (Submucous Resection/Submucous perichondrial periosteal resection)
2. Septoplasty
3. Septo-rhinoplasty (if DNS and external deformity are present)

Rhinolith (Nasal calculus)

Most common age group: Adults

It is the formation of stone or concretions around a foreign body, blood or mucous acting as a nucleus.

Etiology:

- I) Exogenous: i.e. Foreign body
- II) Endogenous: i.e. mucous or blood

Pathology:

Foreign material acts as a nucleus around which Ca^{++} or magnesium carbonate or phosphate is deposited. They are usually hard but may be friable occurring usually as a single mass in the nasal cavity.

Clinical Features:

Symptoms:

- ⇒ Unilateral nasal obstruction
- ⇒ Unilateral nasal discharge
- ⇒ Blood stained discharge

Signs:

A hard mass on probing.

Investigations:

X-ray nose (Anterior Posterior and Lateral view. (Because Ca^{++} and Mg^{++} are present)

Treatment:

Removal under General Anesthesia through anterior nares as a single mass or in small pieces; rarely if enlarged (very much) can be removed by lateral Rhinotomy.

Septoplasty and Submucosal resection of the nose (SMR)

Features	Septoplasty	Submucosal resection of the nose (SMR)
Type of procedure	Conservative	Destructive
Suitable age	Any age	Adults
Ideal for	Anterior deviation	Posterior deviation
Incision	Freer's incision	Killian's incision
Mucoperichondrial flap	One side	Both side
Risk of tearing the flap	Low	Higher
Elevation of flap	Easy	Harder
Risk of septal perforation	Low	High
Risk of septal hematoma	Low	High
Cosmetic deformity and complications	Uncommon	Common
Rhinoplasty	Can be combined with rhinoplasty by extending the Freer's incision.	Can't be combined with rhinoplasty
Revision surgery	Easy	Difficult

CSF Rhinorrhoea

Leakage of CSF into the nose is called CSF rhinorrhoea. It may be clear fluid or mixed with blood as in head injuries.

PHYSIOLOGY

CSF forms a jacket of fluid round the brain and spinal cord acting as a buffer against sudden jerks. It is secreted by choroid plexuses in the ventricles and is absorbed into the arachnoid villi. Villi have one-way valve mechanism allowing CSF of the subarachnoid space to be absorbed into the blood but not vice versa.

AETIOLOGY

- ⇒ Trauma: (It can be accidental or surgical)
- ⇒ Inflammations: (fungal infection of sinuses and osteomyelitis)
- ⇒ Neoplasms: (Tumors, both benign and malignant)
- ⇒ Congenital lesions: (Meningocele, gliomas)
- ⇒ Idiopathic: (cause is unknown and patient has spontaneous leak.)

SITES OF LEAKAGE

I) Anterior cranial fossa:

- ⇒ Cribriform plate.
- ⇒ Root of ethmoidal cells.
- ⇒ Frontal sinus

II) Middle cranial fossa:

- ⇒ Injuries to sphenoid sinus

III) Fracture Temporal bone:

- ⇒ CSF reaches middle ear and then escapes through the eustachian tube into the nose (CSF otorrhoea)

DIAGNOSIS

- History of clear watery discharge from nose on bending the head or straining.
- Reservoir sign – fluid which had collected in the sinuses
- Nasal discharge, stiffens the handkerchief because of its mucus content.
- Double target sign: CSF rhinorrhoea after head trauma is mixed with blood shows this sign.
- Diagnostic endoscopy

LABORATORY TESTS

- Beta-2 transferrin: a protein seen in CSF and not in nasal discharge
- Beta trace protein: also specific for CSF, secreted by meninges and choroid plexus.

Investigations:

1. MRI
2. High resolution CT scan
3. Intrathecal fluorescein study
4. CT cisternogram

Treatment:

- **Early cases** of post-traumatic CSF leak
 - Bed rest
 - Elevation of the head of the bed
 - Stool softeners
 - Avoidance of nose blowing,
 - Sneezing
 - Straining.
- Prophylactic antibiotics can be used to prevent meningitis.
- These measures can be combined with lumbar drainage.

- **Surgery:**
 - ⇒ Neurosurgical intracranial approach
 - ⇒ Extradural approach
 - ⇒ Transnasal endoscopic approach

Wegener's granulomatosis

It is a midline destructive lesion which may cause total septal destruction.

Etiology: Unknown

Clinical features:

- ⇒ **Early symptoms:**
 - Clear or blood stained nasal discharge
 - Persistent cold
- ⇒ **Nasal findings:**
 - Crusting
 - Granulations
 - Septal perforation
 - Saddle nose
- ⇒ **General systemic symptoms:**
 - Anemia
 - Fatigue
 - Night sweats
 - Migratory arthralgias
- ⇒ **Lungs:**
 - Cough
 - Hemoptysis
- ⇒ **Renal:**
 - Red cells in urine
 - Casts in urine
 - Albumin in urine

INVESTIGATIONS

1. **Laboratory:**
 - c-ANCA
 - ESR
 - CRP
 - TLC
 - Platelets
2. **Urine:**
 - Hematuria
 - proteinuria.
3. **CT chest**
4. **Biopsy from the nose**

Treatment:

1. Systemic steroids
2. Cytotoxic drugs (e.g. cyclophosphamide)

Rhinoplasty:

It is procedure use to reshape nose to change its size, symmetry and shape.

Steps of Operation for Rhinoplasty:

1. The procedure can be performed done under local or general anaesthesia.
2. An intercartilaginous incision is made between the cartilages on the inner aspect.
3. Deskeletonisation: Elevation of the skin and soft tissues from the cartilaginous and bony framework of the nose, using sharp dissectors and Knapp scissors.
4. The nasal hump should be removed reduction rhinoplasty before osteotomy is done. The excessive bone of hump is chiselled off.
5. The nasal bones are separated from the ascending process of maxilla (lateral osteotomy) on both sides and from each other (median osteotomy). The nasal bones then become free and can be kept in the desired position.
6. In case of the depressed nasal bridge, the nasal bridge is elevated by using either autograft or homograft bone or cartilage. Silastic sheets are also used. The procedure is known as augmentation rhinoplasty.

Surgical options to reduce turbinates

Also known as hypertrophic rhinitis/Chronic rhinitis

1. Polyps → polypectomy
2. Turbinate hypertrophy → different surgical procedures
 - Total Turbinectomy
 - Partial turbinectomy
 - Cryosurgery
 - Laser diathermy
 - Sub-mucosal diathermy
 - Sub-mucosal resection
 - Galvano cauterization
 - Linear cauterization
 - Electrocautery