Conditions of Nose and Paranasal sinuses
Choanal atresia

- Results from persistence of buccopharyngeal membrane
- Severity of presentation depends on whether unilateral or bilateral
  - bilateral atresia: presents with immediate cyclical cyanosis (cyanosis interrupted by crying spells)
  - unilateral: atresia can remain hidden for years and present with unilateral nasal obstruction and rhinorrhea.
- The average rate of choanal atresia is 0.82 cases per 10,000 individuals.
- F:M 2:1
- Can be associated with other anomalies: CHARGE syndrome (coloboma, heart defects, atresia of nasal choana, retardation of growth, genital or renal anomalies, ear anomalies)
- Unilateral atresia occurs more frequently on the right side.
- 30% bony, 70% mixed bony-membranous
- Treatment: airway management, surgical
Choanal atresia

McGovern nipple
Epistaxis

• Bleeding usually arises from the nasal septum (little’s area) → Anterior Epistaxis.
• Bleeding is less common from the lateral nasal wall, but is more difficult to control.
<table>
<thead>
<tr>
<th>Type</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local</td>
<td>Idiopathic*</td>
</tr>
<tr>
<td></td>
<td>Infection</td>
</tr>
<tr>
<td></td>
<td>Trauma*</td>
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<tr>
<td></td>
<td>Neoplasia</td>
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<tr>
<td></td>
<td>Foreign body</td>
</tr>
<tr>
<td>General</td>
<td>Hypertension</td>
</tr>
<tr>
<td></td>
<td>Drugs (anticoagulants)</td>
</tr>
<tr>
<td></td>
<td>Blood diseases (leukaemia)</td>
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<tr>
<td></td>
<td>Hereditary haemorrhagic telangiectasia</td>
</tr>
<tr>
<td></td>
<td>Anterior epistaxis</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>Incidence Site</td>
<td>More common</td>
</tr>
<tr>
<td></td>
<td>Mostly from Little’s area or anterior part of lateral wall</td>
</tr>
<tr>
<td>Age</td>
<td>Mostly occurs in children or young adults</td>
</tr>
<tr>
<td>Cause</td>
<td>Mostly trauma</td>
</tr>
<tr>
<td>Bleeding</td>
<td>Usually mild, can be easily controlled by local pressure or anterior pack</td>
</tr>
</tbody>
</table>
Epistaxis

• Management:
  • Direct digital pressure on the lower nose compresses the vessel on the septum and leaning forward, and will arrest the bleeding (Hippocratic method).
  • Resuscitation
  • ABC
  • Blood tests: CBC, blood group, coagulation profile.
  • Cauterize the bleeding point. This can be done with silver nitrate (chemical) or electrical.
  • If the site of bleeding is unidentified, use nasal packing.
    • Anterior packing
    • Posterior packing
  • Surgical ligation
  • Embolization
The Nasal Septum

• **Septal deviation**
  • In 80% of population
  • Aetiology: trauma, developmental error...
  • Symptoms:
    • Nasal blockage: unilateral or bilateral
    • Recurrent sinusitis
    • Recurrent otitis media with effusion
    • Recurrent epistaxis
  • Signs:
    • Caudal dislocation
    • S shaped
    • C shaped
    • Spurs
    • Thickening
The Nasal Septum

• Treatment:
  • Submucous resection (SMR)
  • Septoplasty

• Complications of septal surgery
  • 1 Post-operative haemorrhage, which may be severe.
  • 2 Septal haematoma, which may require drainage.
  • 3 Septal perforation—see below.
  • 4 External deformity—owing to excessive removal of septal cartilage
  • 5 Anosmia—fortunately rare, but untreatable when it occurs.
The Nasal Septum

• Septal Perforation:
  • Aetiology:
    • Post operative: septa; surgery
    • Nose picking
    • Trauma
    • Wegener’s granulomatosis
    • cocaine addiction
    • rodent ulcer (basal cell carcinoma)
    • lupus;
    • Syphilis: perforation in bony septum
The Nasal Septum

• Septal Perforation:
  • Symptoms: epistaxis, crusting, obstruction, whistling on inspiration or expiration.

• Investigations:
  • In any case where the cause is not clear, the following should be carried out:
    • 1 full blood count and ESR to exclude Wegener’s granuloma;
    • 2 urinalysis, especially for haematuria;
    • 3 chest X-ray;
    • 4 serology for syphilis;
    • 5 if doubt remains, a biopsy from the edge of the perforation is taken.

• Treatment: nasal douching, septal button, surgical closure
Saddle Nose Deformity

• Depressed nasal dorsum.

• Aetiologies:
  • Nasal trauma causing depressed fracture
  • Excessive Removal of septum in submucous resection
  • Destruction of septal cartilage by, haematoma or abscess, leprosy, tuberculosis, syphilis.

• Treatment: Surgery (augmentation rhinoplasty)
Miscellaneous Nasal Infections

• Acute coryza: common cold, viral, self limiting

• Nasal Vestibulitis:
  • VESTIBULE is apart of the dangerous area of the face because of the presence of the retrograde venous drainage through ophthalmic vein (without valves) which can lead to complications like cavernous sinus thrombosis
  • Pyogenic staphylococci
  • Topical and systemic antibiotics, flucloxacillin

• Furunculosis: staph aureus, management: warm compressors, topical and systemic antibiotics, drainage, analgesia. Never squeeze
Rhinitis
Allergic Rhinitis

• Group of symptoms “nasal congestion, rhinorrhea, sneezing, itching and/or postnasal drainage” caused by IgE-mediated immunopathologic events
- **Pathophysiology**
  - Allergens contact nasal mucosa
  - Expose of IgE receptor over mast cell
  - Second exposure

  - **Early-phase response (IgE-mediated)**
    - Occurs within 5 minutes of allergen exposure with maximum effect at 15 minutes
    - Cross-linking of IgE receptors on mast cells causes degranulation:
      - Histamine
      - Leukotrienes (LTC4, LTD4, LTE4)
      - PGD2
      - Cytokines

  - **Late phase response**
    - Starts 5-7 h, cytokines recruit eosinophil, neutrophils, and basophil
History and Physical Exam

- nasal
  - sneezing, congestion, rhinorrhea

- ocular
  - redness, itchiness, watery, conjunctivitis, burning

- laryngeal
  - scratchiness, dry, irritated, cough

- other
  - seasonal pattern
  - food hypersensitivity
  - fatigue
• OE
  • clear rhinorrhea
  • congested or pale turbinates
  • periorbital puffiness, darkening of skin under eyes “allergic shinners” due to venous congestion, fine crease in the eyelid “dennies line”, conjunctivitis
  • allergic salute; nasal tip transverse creases, congested turbinate
  • open-mouthed breathing
  • prominent pharyngeal lymphoid tissue
Definitive Testing for Atopy

• In vivo test (Skin Testing)
  • scratch test (not widely used)
  • Skin prick test
    • series of allergens inserted by needle into skin
    • positive “wheal-and-flare” reactions compared to controls, risk of anaphylaxis
  • intradermal testing
    • similar to prick test except allergen is placed intradermally
    • more sensitive than prick test, risk of anaphylaxis

• In Vitro Testing
  • radioallergosorbent test (RAST)
RAST

- indications
  - equivocal skin tests results
  - high risk of anaphylaxis
  - skin disorders
  - failed immunotherapy
  - uncooperative patient

- advantages
  - highly specific
  - no risk of anaphylaxis
  - no effect from skin condition or medications

- disadvantages
  - less sensitive
  - requires up to 1-2 weeks for results
  - more expensive
Management of Allergic Rhinitis

**Level I: Avoidance, Symptomatic Relief**

- Prevention of Symptoms by Avoidance
  - clean for dust
  - avoidance of smoke
  - nasal saline to cleanse mucous membranes

- First-line Pharmacotherapy
  - antihistamines, decongestants, cromolyn

- Second-generation and Third-generation Antihistamines
  - lipid insoluble: do not cross BBB
  - loratadine
  - cetirizine
  - fexofenadine

- Topical Glucocorticoids
  - reduce local inflammation

- Cromolyn
Level II: Chronic Symptoms (Corticosteroids)

- adverse local effects:
  - candidiasis, nasal irritation, dryness, bleeding and crusting

- adverse systemic effects:
  - increased gastric acid production, hypertension, masks signs of infection, sodium retention, hypokalemia, posterior subcapsular cataracts, menstrual irregularities, aseptic necrosis of femoral head
Level III: Immunotherapy

- last resort treatment

- criteria
  - pts with symptoms not easily controlled with pharmacotherapy
  - sensitive to allergens that cannot be avoided
  - symptoms that span two or more allergy seasons or are severe
  - are willing to cooperate in program of immunotherapy

- disadvantages
  - patient must be reliable for multiple injections
  - requires a chronic regimen (3 years)
  - risk of worsening symptoms and anaphylactic shock

- contraindications
  - pregnancy
  - autoimmune disorders
  - immunological compromised patients
  - B-blockers (increases sensitivity to allergens)
  - easily avoidable allergens
  - noncompliant patients
Nonallergic Rhinitis

• Group of symptoms “nasal congestion, rhinorrhea, sneezing, itching and/or postnasal drainage” not caused by IgE-mediated immunopathologic events
Classification

• **Infectious Rhinitis**

  • **Viral**
    
    • common cold
    • Pathogens (rhinoviruses (most common), respiratory syncytial virus, parainfluenza virus)
    • watery clear rhinorrhea, anosmia, congestion, lacrimation, low-grade fever
    • Tx: antibiotics for suspected bacterial infections only, symptomatic therapy includes decongestants (topical and systemic), antihistamines, hydration, nasal saline irrigations, analgesics

  • **Bacterial**

    • Mainly; group A strep
    • Tx: antibiotic regimen, symptomatic therapy similar to viral rhinitis
Classification

• **Hormonal Rhinitis** (Hypothyroidism, pregnancy, OCP, menstrual cycle)

• **Vasomotor Rhinitis**
  - low nasal eosinophil counts and negative skin test results for allergy
  - theory: abnormal functioning of parasympathetic input to turbinate and septal mucosa
  - similar symptomatology to allergic rhinitis except with negative allergy evaluation
  - Triggers (cold air, high humidity, anxiety, stress, exercise)
  - Diagnosis of exclusion
  - Tx: anticholinergic sprays, corticosteroid sprays

• **Drug-induced Rhinitis**
  - caused by systemic drugs (antihypertensives most often implicated)
Classification

• **Gustatory Rhinitis** (Alcohol, spicy foods)

• **Occupational Rhinitis**
  - nasal discharge or congestion due to exposure to airborne substance at work
  - allergic or non-allergic

• **Nonallergic Rhinitis with Eosinophilia Syndrome (NARES)**
  - lacks IgE-mediated immunopathologic events
  - nasal smears contain eosinophil
  - symptoms of perennial rhinitis
  - dx: allergic symptoms with negative allergic tests
  - symptomatic relief similar to allergic rhinitis (nasal corticosteroids, antihistamines, decongestants)
Classification

- **Atrophic Rhinitis (Ozena)**
  - atrophic mucosa on septum, turbinates $\rightarrow$ wide nasal cavity
  - may be associated with ozena (thick, foul smelling, dry crust)
  - subjective nasal congestion and constant foul-smelling odour despite lack of objective evident of obstruction
  - primary form; may be caused by infection with Klebsiella ozaenae
  - secondary causes; over-aggressive nasal surgery
  - Tx; saline irrigations

- **Rhinitis medicamentosa**
  - from prolonged used of topical vasoconstricting agents (> 7 days)
  - Tx; cessation of topical vasoconstrictors, replacement with nasal saline, oral antihistamines and/or steroid sprays
Acute RhinoSinusitis

• Aetiology:
  • Common cold
  • Influenza
  • Measles, whooping cough
  • Dental
  • Trauma
  • Tumours
Acute Rhinosinusitis
Acute RhinoSinusitis

• Duration:
  • Acute, < 12 weeks with complete resolution of symptoms.
  • Chronic, ≥12 weeks symptoms without complete resolution of symptoms.

• Other authors depend on this classification:
  ✓ Acute sinusitis: 1 day to 4 weeks
  ✓ Subacute sinusitis: 4 weeks to 3 months
  ✓ Chronic sinusitis: > 3 months (sinusitis that is uncontrolled or inadequately managed and process irreversible without surgical intervention)
  ✓ Recurrent acute sinusitis: 4 or more episode of acute sinusitis that occur within 1 year and there is complete resolution of symptoms between the attacks
  ✓ Acute exacerbation of chronic rhinosinusitis (when the symptoms of chronic rhinosinusitis exacerbate but return to base line after treatment)
Acute RhinoSinusitis

Acute rhinosinusitis (ARS) in adults
Acute rhinosinusitis in adults is defined as:
sudden onset of two or more of the symptoms:
• nasal blockage/obstruction/congestion
• or nasal discharge (anterior/posterior nasal drip)
• ± facial pain / pressure
• + reduction or loss of smell
for < 12 weeks;

Acute rhinosinusitis (ARS) in children
Acute rhinosinusitis in children is defined as:
sudden onset of two or more of the symptoms:
• nasal blockage/obstruction/congestion
• or discoloured nasal discharge
• or cough (daytime and night-time)
for < 12 weeks;
Acute Bacterial Rhinosinusitis

- The causative organisms are usually *streptococcus pneumoniae*, *Haemophilus influenzae* or *Staphylococcus pyogenes*. In dental infections, anaerobes may be present.
- The mucous membrane of the sinuses becomes inflamed and oedematous and pus forms. If the ostia are obstructed by oedema, the antrum becomes filled with pus under pressure—empyema of the antrum.

**Acute bacterial rhinosinusitis (ABRS)**

Acute bacterial rhinosinusitis is suggested by the presence of at least 3 symptoms/signs of:
- Discoloured discharge (with unilateral predominance) and purulent secretion in the nasal cavity
- Severe local pain (with unilateral predominance)
- Fever (>38°C)
- Elevated ESR/CRP
- ‘Double sickening’ (i.e. a deterioration after an initial milder phase of illness).
Acute Bacterial RhinoSinusitis

• Treatment:
  • Rest
  • Antiobiotic: amoxicillin
  • Vasoconstrictor nasal sprays
  • Anagesics
Chronic Rhinosinusitis (with or without NP) in adults is defined as:
presence of two or more symptoms one of which should be either nasal blockage/obstruction/congestion or nasal discharge (anterior/posterior nasal drip):
± Facial pain/pressure;
± reduction or loss of smell;
for ≥12 weeks;
with validation by telephone or interview.
Questions on allergic symptoms (i.e. sneezing, watery rhinorrhea, nasal itching, and itchy watery eyes) should be included.

Chronic Rhinosinusitis with nasal polyps (CRSwNP): Chronic rhinosinusitis as defined above and bilateral, endoscopically visualised polyps in middle meatus.
Chronic Rhinosinusitis without nasal polyps (CRSsNP): Chronic Rhinosinusitis as defined above and no visible polyps in middle meatus, if necessary following decongestant.
Chronic Rhinosinusitis

Figure 37.1 Causative factors and pathophysiology of chronic sinusitis.
Chronic Rhinosinusitis

- CRS with nasal polyposis
- CRS without nasal polyposis
- Microbiology: Mixed aerobes, anaerobes

SYMPTOMS
- 1 Patients with chronic maxillary sinusitis usually have very few symptoms.
- 2 There is usually nasal obstruction and anosmia.
- 3 There is usually nasal or postnasal discharge of mucopus.
- 4 Cacosmia may occur in infections of dental origin.
Chronic Rhinosinusitis

• SIGNS
  • 1 Mucopus in the middle meatus under the middle turbinate.
  • 2 Nasal mucosa congested.
  • 3 Imaging shows opacity, or mucosal thickening within the sinus.

• Treatment
  • Medical
  • FESS: functional endoscopic sinus surgery.
# Complications of Rhinosinusitis

<table>
<thead>
<tr>
<th>Orbital (60-75%)</th>
<th>Intracranial (15-20%)</th>
<th>Bony (5-10%)</th>
<th>Chronic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Preseptal cellulitis</td>
<td>1. Meningitis</td>
<td>Osteomyelitis (Pott's puffy tumour)</td>
<td>Mucocele/pyocele</td>
</tr>
<tr>
<td>2. Orbital cellulitis</td>
<td>2. Epidural abscess</td>
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<td></td>
</tr>
<tr>
<td>4. Orbital abscess</td>
<td>4. Intracerebral abscess</td>
<td></td>
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</tr>
<tr>
<td>5. Cavernous sinus thrombosis</td>
<td>5. Cavernous or sagittal sinus thrombosis</td>
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</tbody>
</table>
Complications of Rhinosinusitis

• Ophthalmological
  • Most common
  • Intraorbital pathways:
    o direct extension (especially through thin walled lamina papyracea)
    o thrombophlebitis (valveless veins)
    o congenital dehiscence
    o trauma
    o direct lymphatics
Orbital septum

- Deep to the palpebral part of the orbicularis oculi is an extension of periosteum into both the upper and lower eyelids from the margin of the orbit.
- This is the orbital septum (1), which extends downward into the upper eyelid and upward into the lower eyelid and is continuous with the periosteum outside and inside the orbit.
- The orbital septum attaches to the tendon of the levator palpebrae superioris (2) muscle in the upper eyelid and attaches to the tarsus in the lower eyelid (3).
II. ORBITAL COMPLICATIONS

- Most of the orbital complications follow infection of ethmoids as they are separated from the orbit only by a thin lamina of bone - lamina papyracea.
- Infection travels from these sinuses either by osteitis or as thrombophlebitic process of ethmoidal veins.
Ophthalmological

• Chandler classification:
  • **Periorbital/Preseptal Cellulitis**
    • eyelid edema, erythema, tenderness
    • No vision changes, chemosis, proptosis (exophthalmos), or restriction of ocular muscles
  • **Orbital Cellulitis**
    • proptosis, chemosis
    • may cause vision changes (afferent pupillary defect)
    • children initially may lose the ability to distinguish green and/or red colors (colour vision)
    • may limit extraocular muscles
Periorbital/Preseptal Cellulitis
Chemosis is the swelling (or edema) of the conjunctiva. It is due to the oozing of exudate from abnormally permeable capillaries.
Ophthalmological

• Subperiosteal abscess
  • collection of pus between periorbita and lamina papyracea (under lamina papyracea)
  • chemosis, proptosis
  • restricted extraocular motion, decreased vision
  • most common strep. viridins

• Orbital Abscess
  • collection of pus in orbital soft tissue
  • proptosis, chemosis, restricted extraocular motion
  • decreased vision
Ophthalmological

- **Cavernous sinus thrombosis**
  - pathogens
    - S. aureus (most common)
    - hemolytic Streptococcus
  - SSx
    - spiking fevers, toxaemia
    - Signs in cavernous sinus thrombosis
      - Exophthalmos
      - Paresis III/IV/VI
      - Bilateral signs
      - Reduced conscious level/cerebral irritation.
  - Tx
    - IV ABx
    - may require ligation of IJV if septic emboli
    - anticoagulants (controversial)
    - sinus surgery
Neurologic

• meningitis (most common intracranial complication)
• epidural or subdural abscesses
• brain abscess, cavernous sinus thrombosis
• venous sinus thrombosis

• consider MRI when suspected intracranial or intraorbital complication
Pott’s puffy tumour

- osteomyelitis or subperiosteal abscess of frontal bone with overlying soft tissue swelling by invasion of diplopic vein
- most often seen in adolescents and young adults
- most common offending organism: S. aureu
- The infection erodes through the wall of the obstructed infected sinus to form a subperiosteal abscess.
- As expected it can be associated with extension intracranially with epidural abscess, subdural empyema, meningitis, and cerebral abscess formation.
- Dural sinus thrombosis is another possible complication
- Tx: IV Abx, trephination, may require surgical debridement
Pott’s puffy tumour
Nasal polyposis

- Bilateral
- Samter’s triad
- Symptoms
- Treatment: medical, surgical
Olfactory disorders

• Anosmia is defined as loss or absence of the sense of smell. It is a common condition and affects approximately 1% of the population under age 60 years. Olfactory function also decreases with aging.

• Abnormalities of olfaction include:
  • (i) anosmia (inability to detect odours)
  • (ii) hyposmia (diminished olfactory sensitivity)
  • (iii) dysosmia (distorted identification of smell)
    • (a) parosmia (altered perception of smell)
    • (b) Phantosmia (smelling non-existent odours).
Olfactory disorders

- The three most common causes of olfactory disorders are
  - sinonasal disease
    - Most commonly polyp disease, chronic rhinosinusitis or allergic rhinitis.
    - Sinonasal disease is the most treatable aetiology of anosmia.
  - postviral anosmia
  - head trauma
    - (Shearing force on olfactory filaments, olfactory bulb contusion and frontal lobe injury are proposed potential causative mechanisms.)
Olfactory disorders

• other causes
  o congenital
  o iatrogenic: Septoplasty, Rhinoplasty, turbinectomy, FESS
  o intranasal neoplasms
  o intracranial tumours (meningioma, frontal lobe glioma, pituitary adenoma, craniopharyngioma)
  o neurological disease (epilepsy, MS, Alzheimer, Parkinson)
  o psychiatric disorders
  o Systemic disease such as endocrine disturbances (e.g. hypothyroidism, diabetes mellitus)
  o aging
  o exposure to environmental chemicals
Nasal trauma