* The Pharynx

* Reference:
ENT 429 Team
DHINGRA Book
Wikipedia

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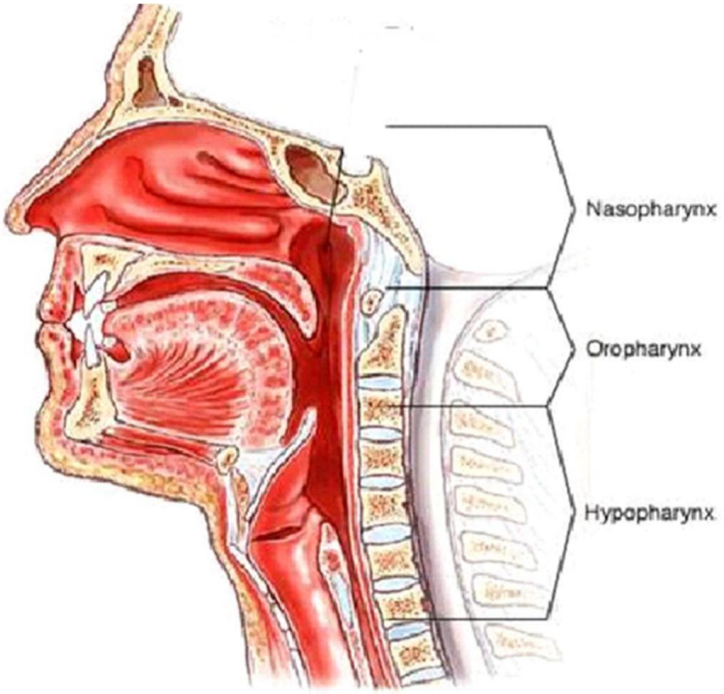
Pharynx in general: pharynx is a conical fibromuscular tube forming upper part of air and food passage. It is 12-14 cm long, extending from **base of the skull** (basiocciput and basisphenoid) to the lower border of **cricoids cartilage** where it become continuous with the oesophagus.

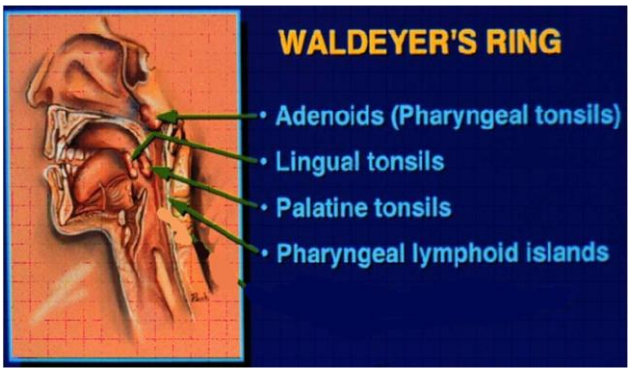
The widest of pharynx is 3.5 cm at Its base (hyoid)

And **the narrowest** is 1.5 cm at pharyngo-oesophageal junction (caudal end)



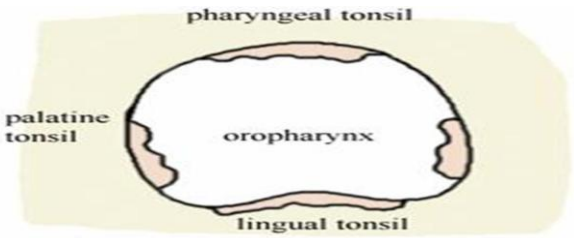
- **Divided into 3 parts:**
  - I. Nasopharynx
  - II. Oropharynx
  - III. Hypopharynx

- ***Pharyngeal Wall:***
  - ***Mucous membrane***
    - *Nasopharynx*
      Ciliated columnar epithelium
    - *Oro and hypopharynx*
      Stratified squamous epithelium
  - ***Submucosa***
    - *Nerves, blood vessels, and lymphatics*
    - *Mucous and salivary glands*



*Characteristics of **Waldeyer's Ring:***

- *No afferents*
- *Efferent to deep cervical nodes*
- *No capsule except the palatine tonsils*



Muscular layer

External circular and internal longitudinal (opposite in reminder of GI tract)

- **External** :

3 constrictors, constrict the wall of the pharynx during swallowing , and the inferior constrictor muscle has two parts (thyropharyngus – cricopharyngeus) . which all covered by Fibrous layer (Buccopharyngeal fascia) → pharyngeal plexus of nerves and veins.

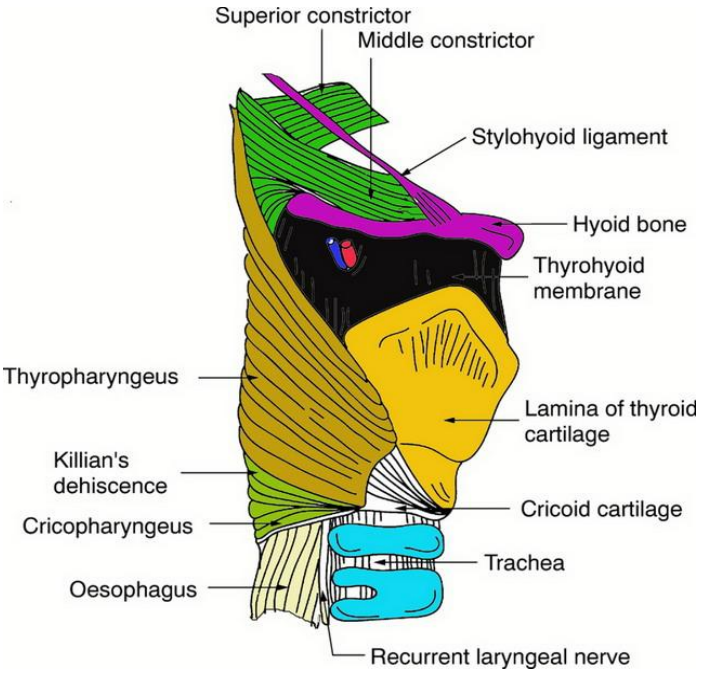
- **Internal**:

- Elevate pharynx and larynx during speech /swallow

1. Palatopharyngeus
2. Salpingopharyngeus
3. Stylopharngeus
4. Levator yell palatine

There is a weak area in the wall of the pharynx covered by mucosa only called **Killian's triangle.** between the **thyropharyngeus** part of the inferior constrictor and the **cricopharyngeus muscle**.

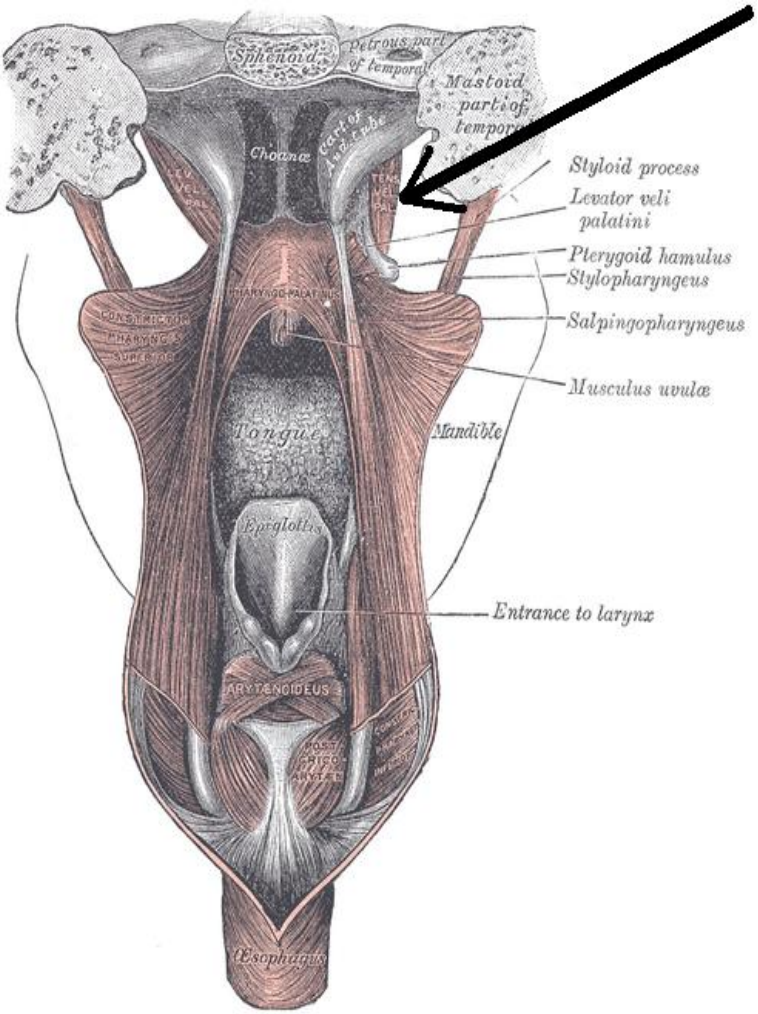
It is the area for **Zenker's diverticulum**: when there is excessive pressure within the lower pharynx, the weakest portion of the pharyngeal wall balloons out, forming a diverticulum which may reach several centimetres in diameter. mainly affects older adults.



♣ Tensor veli palatini muscle :

is found anterior-lateral to the levator veli palatini muscle.The tensor veli palatini **tenses the soft palate** and by doing so, assists the levator veli palatini in elevating the palate to occlude and **prevent entry of food** into the nasopharynx during swallowing. Since it is also attached to the lateral cartilaginous lamina of the **Eustachian tube**, it assists in its opening during swallowing or yawning to allow air pressure to equalize between the tympanic cavity and the outside air.

Innervated by the medial pterygoid nerve, a branch of mandibular nerve, the third branch of the trigeminal nerve (CN V) - **the only muscle of the palate not innervated by the vagus nerve.**



♣ Nerve Supply:

Motor Muscles of Pharynx & palate : **Acessory nerve (cranial) via Vagus nerve**

Except:

- **tensor palatini muscle** by mandibular division of trigeminal nerve (CN V)
- **Stylopharyngeusmuscle** by glossopharyngeal nerve (CN IX)

Secretomotor, Sensory & Taste sensation through **Vagus & Glossopharyngeal nerve**

♣ Blood Supply Of Pharynx :

Arterial :

All from External Carotid Artery.

-Ascending Pharyngeal artery (Ext Carotid)
-Tonsilar Artery (Facial Art) **imp!.**
-Descending Palatine artery (Maxillary Art)
- Ascending Palatine artery (Facial Art)
-Branch of Lingual Artery

Venous :

Pharyngeal & Pterygoid plexus Common Facial Internal Jugular Vein.

♣ Pharyngeal Lymphatic Drainage :-

•**Nasopharynx :** retropharyngeal space

• **Oropharynx** : parapharyngeal space

• **Hypopharynx** : neck

• Deep cervical (jugular) nodes

✹ **Physiology of the Pharynx-:**

- Breathing (inspiration and expiration)
- Speech (expiration)
- Deglutition
- Swallowing (expration) 2000/day
- Ventilation (ME)
- immunity→ Production of immunoglobulins, plasma cells and lymphocytes

♣ **-Side Notes :** when a patient comes with **Unilatera cervical lymphadenopathy** with **sudden conductive hearing loss** and **middle ear effusion**..

- Think of Nasopharyngeal carcinoma unless proven otherwise.

- How to confirm ? CT, FNA

- First presentation of nasopharvngeal carcinoma is streaks of blood in oropharvnx.

	Nasopharynx	**Oropharynx**	**hypopharynx**
Function	*Respiratory*	*Respiratoy and digestive*	*Digestive*
Anatomy	•**Anterior:**choana (posterior nasal aperture) •**Posterior:** superior constrictor muscle • **Superior:** basilar portion of occipital bone •**Inferior:** soft palate	•**Anterior**: anterior tonsillar pillar •**Posterior**: superior and middle constrictor muscles. •**Superior**: soft palate •**Inferior**: base of tongue , superior epiglpottis •**Laterally**: - palatoglossal - palatopharyngeal arches - parapharyngeal space	"Lies posterior to the larynx" •**Anterior**: laryngeal inlet •**Posterior/ lateral :** middle and inferior constrictors , bodies of C4-C6 •**Superior** :superior border of epiglottis and pharyngoepiglottic folds •**Inferior** : inferior border of the cricoid

Diseases

♣ DISEASES OF THE NASOPHARYNX:

1- ACUTE INFECTION OF NASOPHARYNX

•Pathologically:
is a part of acute rhinitis (common cold)

•Clinically:
has no specific clinical features

2- ADENOIDS

- Lymphoid tissue in nasopharynx
- Enlarged during childhood
- Adenoid face

-Mickey Mouse
-Overbite
-Long face
-Crowded incisors

♣ **CLINICAL FEATURES**

• Nasal obstruction
-Mouth breathing
-Snoring, sleep disturbance, apnea etc
• Ear symptoms due to Eustachian tube obstruction
• Nasal tone (because of hyopnasality)
• Bilateral OME (because Hperatrophy of adenoid + the tubal lymph nod)

♣ **PREOP EVALUATION OF ADENOID DISEASE:**

• Triad of :
- Hyponasality
- Snoring
- Mouth breathing
- Rhinorrhea
- Nocturnal cough
- Post nasal drip

♣ DISEASES OF THE OROPHARYNX:

1. Acute tonsillitis :

Down ☺ !

2. CHRONIC TONSILLITIS

- Persistent or recurrent sore throat
- Persistent cervical adenitis
- Halitosis
- Congested tonsils

♣ **TREATMENT** →Tonsillectomy

3. Acute non-specific pharyngitis

(None specific infection)

♣ **CAUSES:**

-Viral (very common) , Bacteria & Fungal
-None infective : GERD, smoking ,any irritants

♣ **SIGNS AND SYMPTOMS :**

-fever
- sore throat
- Odynophagia "painful swallowing" & dysphagia.
- drilling of saliva
- Abscess in the area of the muscle cause spasm, Painful opening of the mouth
"tresmus", Lock jaw w/o pain
- snoring.

♣ **TREATMENT:**

treat the underlying cause , symptomatic, antibiotic

4. CHRONIC NON-SPECIFIC PHAYNGITIS

- Primary
- Secondary:
  - Sinonasal disease
  - Dental infections
  - Chest infections
  - Smoking
  - Gastro esophageal reflux

♣ **CLINICAL FEATURES**

-Sore throat
-Irritation
-Cough
-O/E

♣ **TREATMENT**

- Treatment of the cause
- Humidification

♣ **TREATMENT :**

✍ **Adenoidectomy**

- Absolute Indications

- Adenoid hyperplasia resulting in sleep disturbances or sleep apnea
associated with cor pulmonale
-Nasal obstruction associated with orofacial abnormalities
- Failure to thrive (not attributable to other causes)

- Relative Indications

- Chronic adenoiditis with persistent sore throat, halitosis, or cervical adenitis
-Swallowing difficulties (not attributable to other causes)
- recurrent or chronic otitis media or sinusitis

♣ **CONTRAINDICATION**

Local :

- Palatopharyngeal incompetence
- Palatal clefting
- Velopharyngeal insufficiency (hypernasal speech, nasal regurgitation)

•Another Contraindication of Adenoidectomy:

- Bleeding
- Recant infection

♣ **COMPLICATIONS**

- Immediate and Delayed Hemorrhage
- Postoperative Airway Compromise
- Dehydration typically secondary to pain
-Atlantoaxial (C1-C2) Subluxation
- Velopharyngeal insufficiency
- Nasopharyngeal Stenosis
- Eustachian Tube Dysffunction

END !! ☺

5.CHRONIC SPECIFIC PHARYNGITIS

- Tuberculosis
- Syphilis
- Lupus vulgaris
- Leprosy
- Sarcoidosis

6. Acute diphtheria

♣ **CAUSED** by Corynebacterium diphtheria

(Very rare nowadays because of vaccination)

♣ **PATHOLOGY**

- Local grayish membrane (composed of fibrin, leukocytes, and cellular debris)
- Powerful Exotoxins travels to heart and nervous system

♣ **CLINICAL MANIFESTATIONS**

- Systemic symptoms due to the exotoxins
  -Toxemia
  -Mild fever
  -Tachycardia
  -Paralysis

- Local manifestations
  -Sore throat
  -Membrane
  -Marked lymphadentitis ('bull neck')imp…

♣ **TREATMENT**

- Notification , Isolation ,Rest , Antitoxin serum as early as possible
- Antibiotics (erythromycin, penicillin G, rifampin, or clindamycin)

♣ **COMPLICATIONS**

-Respiratory obstruction
-Heart failure
-Muscular paralysis

7. Infectious mononeuclosis

✍ Systemic infection **caused by** Epstein-Barr Virus (EBV)
✍ (Epstein — Barr virus is related to nasopharyngeal carcinoma)
✍ Clinical disease is usually seen in young adults

♣ **CLINICAL MANIFESTATIONS**

- Fever
- Pharyngitis and/or tonsillitis
- Fatigue
- Cervical lymphadenopthy "bull neck" - ulceration
- Jaundice
-Atypical lymphocytes
-Other clinical findings Splenomegaly – 50% Hepatomegaly – 10% Rash – 5%

♣ **DIAGNOSIS**

Paul-Bunnel test & Monospot test

♣ **TREATMENT**

- "supportive" we can give steroid for severe cases.
- Avoid ampicillin

(**IF** we give hem/her Ampicillin it will cause RASH)

♣ **COMPLICATIONS**

-Autoimmune hemolytic anemia

-Cranial nerve palsies

-Encephalitis

-Hepatitis

-Pericarditis

-Airway obstruction

8. Vincent's angina

- Subacute infection **Caused By** Spirochaeta denticolata and Vincent's fusiform bacillus.
- (Acute oropharyngeal ulcerative → pseudomembranous ulceration)
- Poor oral hygiene (fetid breath) → malnutrition→fatigue
- cervical lymphadenopathy

♣ **TREATMENT**

penicillin ,metronidazole and local oral hygiene

9. Scarlet fever الحمى القرمزية

- Acute specific - Strept haemolyticus
- Erythrotoxin cause rash

♣ **TREATMENT**

penicillin

10. FUNGAL PHARYNGITIS

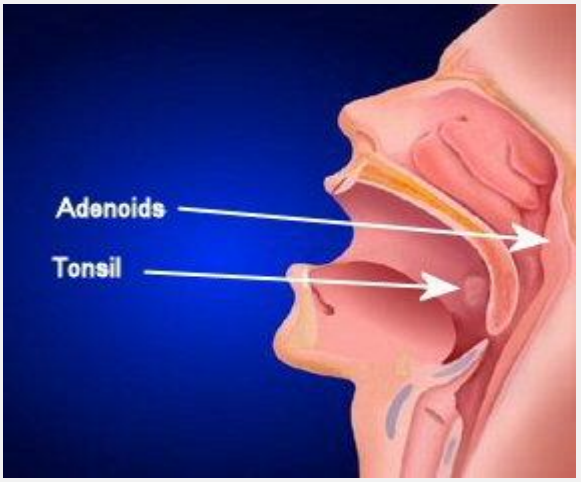
♣ **CAUSES**

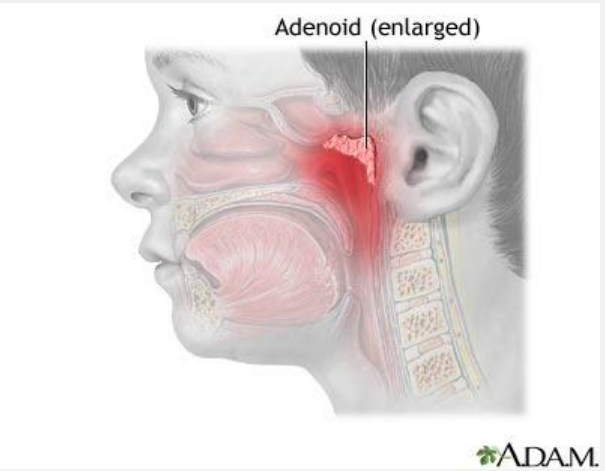
- Long term antibiotics
- Immunosuppresion (Leukopenia, Corticosteroid therapy..etc)
- **CANDIDIASIS (MONILIASIS**, THRUSH) >> the most common.
- Pseudomembranous candidiasis (Thrush)
- DM or immunodeficiency

♣ **TREATMENT**

- Nystatin
- Fluconazole

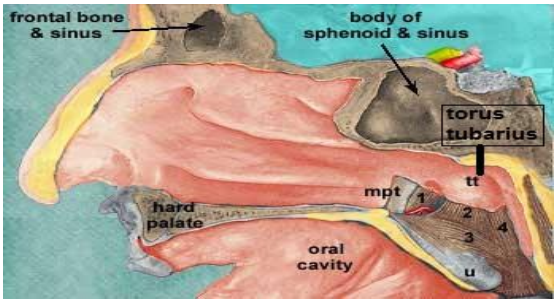
♣ DISEASES OF THE NASOPHARYNX: Adenoid



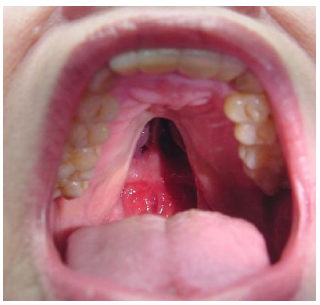


- **NOTE** !

- Just lateral and posterior to **Torus tubarius** is a common area for nasopharyngeal carcinoma



- **Palatopharyngeal incompetence**: inability of the soft palate to contribute to palatopharyngeal closure.
- **Palatal clefting :** picture >>



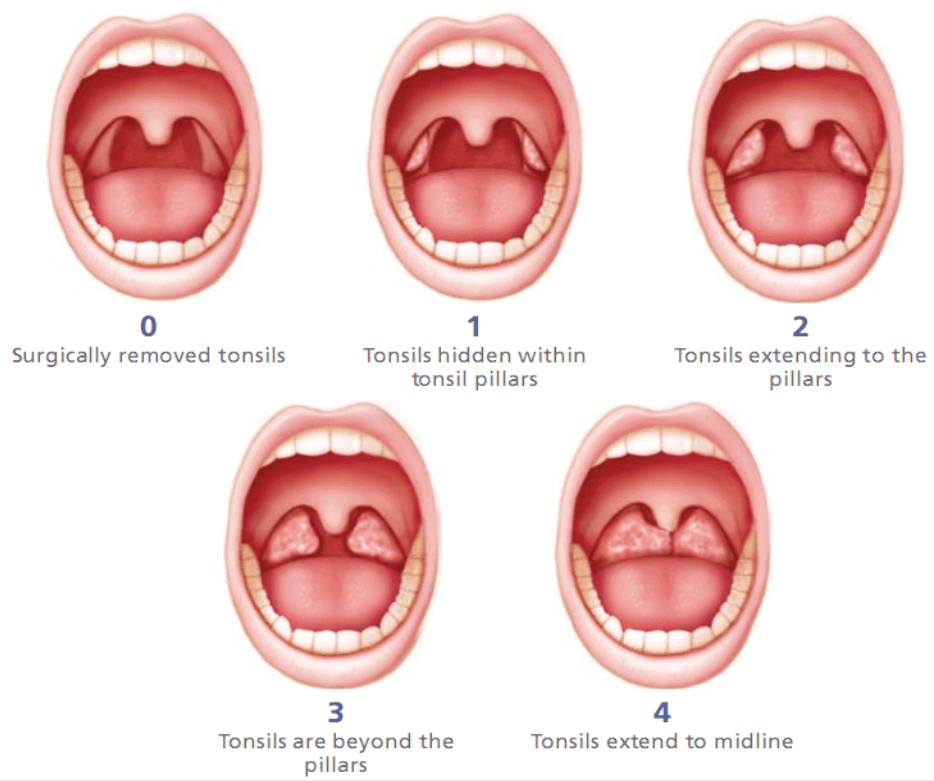
1-ACUTE TONSILLITIS:

- **TONSILS SIZE :** (occupation of oropharynx)

Grading system:

A. 0 tonsils in fossa
B. +1 tonsils less than 25%
C. +2 tonsils less than 50%
D. +3 tonsils less than 75%
E. +4 tonsils greater than 75%

N.B. Tonsils size is not an indication for surgery unless it is symptomatic



- **ETIOLOGY :**

at about 5 to 6 years of age.
- %70 viruses → Influenza, Rhinovirus, Adenoviruses, Coronaviruses
- %20 bacteria →: **GABHS*,**Strept pneumonia, H. infleunzae, Staph. aurius
- %40 are beta- lactamse producing bacteria

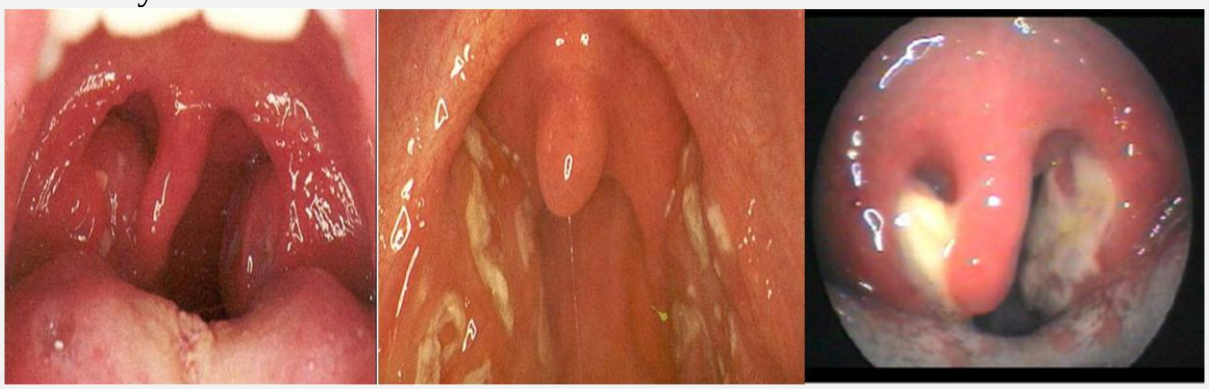
*** GABHS : Group A Beta Hemolytic Streptococcus. The most common bacteria causing tonsillitis → Very sensitive to penicillin**

♣ CLINICAL FEATURES

- Dysphagia
- odynophagia
- Otalgia
- Headache
- Painful cervical lymphadenitis
- Fever
- Exudates
- Absence of cough coryza and hoarseness
- ± sever sore throat , deep cervical lymph node enlargement

♣ THROAT EXAMINATION

A. Parenchymatous tonsillitis B. Follicular tonsillitis C. Membranous tonsillitis



♣ NECK EXAMINATION

Enlargement and tenderness of the jugulo-digastric lymph nodes

♣ INVESTIGATIONS

- Throat swab
- CBC

♣ TREATMENT

- Symptomatic & supportive treatment
- Antibiotics
  - Penicillin V for 5-7days→ first line
  - Erythromycin – second line
- Steroids
- IV antibiotics
- Recurrent , chronic tonsillitis or obstruction →Tonsillectomy

♣ COMPLICATIONS OF ACUTE TONSILLITIS

General .. due to toxin produce by GABHS

- Acute rheumatism
- Acute glomerulonephritis
- Septicaemia

Local:

1. Peritonsillitis & peritnosillar abscess (Quinsy)

   An abscess between the tonsil capsule and the adjacent lateral pharyngeal wall

   ♣ CLINICAL FEATURES
   - More common in adults
   - Usually unilateral
   - Usually follow an attack of tonsillitis
   - Sever pain > one side
   - Unilateral earache and cervical lymphadenitis
   - More odynophagia & drooling
   - Trismus
   - Thickened speech (hot potato voice)

   ♣ TREATMENT
   - IV antibiotics
   - Incision and drainage followed by elective tonsillectomy 6 -8 weeks later.
   - Hot (abscess) tonsillectomy

2. Neck Abscess
3. Parapharyngeal abscess

   Down ☺
4. Retropharyngeal abscess:

   Down ☺

3. TH PARAPHARYNGEAL SPACE (PPS)

(Cone shaped at the lateral wall of pharynx.)

- Base at temporal bone
- Apex at the hyoid bone
- Between: - Pharyngeal
  - Lateral and medial pterygoid muscles

>> Most frequently involved with infection .

♣ CONTENTS :

they are very important because any infection in the tonsils or pharynx can spread and cause parapharyngeal abscess so you should worry about these structures . Local spread can happen also.

-Loose fibrofatty tissues
- Carotid artery
-Internal jagular vein
- Cranial nerves IX, X, XI , and XII - Cervical sympathetic chain
- Lymph noded
- Nasal cavity , paranasal sinuses
- Nasopharynx and oropharynx
- Mastoid tip

♣ COMMUNICATION :

-Submandibular
-Retropharyngeal
-Parotid spaces
-Masticatior
-peritonsilar

♣ CLINICAL FEATURES :

-Systemic manifestations
-Pain, trismus, swelling

♣ INVESTIGATION

-Laboratory and bacteriology
-CT
-MRI

♣ PRINCIPLES OF TREATMENT

- Secure the airway
- Antimicrobial therapy
- Surgical drainage
  - -External cervical incision
  - -In order to avoid injury to the great vessels

4. RETROPHARYNGEAL ABSCESS

- ♣ BETWEEN
  - -Prevertebral fascia
  - -Posterior pharyngeal wall and oesophagus fascia
    - From Skull base to tracheal bifurcation
- ♣ MAJOR ROUTE → mediastinum
- ♣ CONTENTS :
  - Lymph node (<5 y) that receive from:
    - -Nose
    - -Nasopharynx
    - -Paranasal sinuses
    - -oropharynx
    - -Middle ear
- ♣ **ACUTE** RETROPHARYNGEAL ABSCESS →

  Due to suppuration of the retropharyngeal lymph nodes present in the retrophayngeal space
- ♣ CLINICAL FEATURES
  - •Systemic manifestations
  - •Respiratory obstruction
  - •Odynophagia & Dysphagia
  - •Swelling of posterior pharyngeal wall (usually unilateral)
- ♣ INVESTIGATION
  - •Laboratory and bacteriology
  - •Plain X-rays
  - •CT
  - •MRI
- ♣ TREATMENT OF ACUTE RETROPHAYNGEAL ABSCESS
  - -Secure airway
  - -Antimicrobial
  - -Surgical drainage
  - -Trans oral
- ♣ COMPLICATIONS of peritonsillar , para and retropharyngeal infections:
  - - Respiratory obstruction
  - - Spontaneous rupture (inhalation pneumonia
  - - Extension of infection
  - - Other spaces
  - - Carotid & internal jugular
  - - Mediastinitis

♣ **CHRONIC** RETROPHARYNGEAL ABSCESS

- Tuberculous (cold abscess)
- Usually due to TB spines but may be secondary to TB lymphadentis

♣ Symptoms are insidious

♣ Treatment is by anti tuberculous medication, repeated aspiration and external drainage

♣ LUDWIG'S ANGINA

- Infection of the submandibular space (floor of mouth)
- Usually secondary to dental infection or trauma

♣ TREATMENT

-Secure airway
-Most cases respond to antibiotics (aggressive one)
-Drainage may be needed

♣ PHARYNGEAL (ZENKER'S) POUCH

- A mucosal sac protruding through Killian's dehiesence
- Most probably related to neuromuscular incoordination →
  - -Failure of relaxation OR
  - - Early closure OR
  - - Spasm of cricopharyngeus

♣ CLINICAL FEATURES

-Dysphagia
-Regurgitation
-Aspiration

♣ DIAGNOSIS

-Clinical examination
-Barium swallow
-Endoscopy

♣ TREATMENT

-Excision(surgery)

♣ CHRONIC TONSILLAR HYPERTOPHY

♣ CAUSES

-Chronic or frequent acute infections
-Idiopathic (exaggerated immune response)

♣ PRESENTATION

- Upper airway obstruction
  -Mouth breathing, snoring
  -Disturbed sleep and apnea
- Pulmonary hypertension, cor pulmonale and heart failure.

♣ TREATMENT

Tonsillectomy & adenoidectomy

♣ TONSILLECTOMY

♣ INDICATIONS

- Absolute Indications

• Obstructing tonsillar enlargement→ resulting in sleep disturbances or sleep apnea associated with cor pulmonale **>> IMP**
• Suspected malignancy(unilateral tonsilar hypertrophy) **>> IMP!**
•Tonsillitis resulting in febrile convulsions (may require a Quincy tonsillectomy)
•Persistent or recurrent tonsillar hemorrhage
•Failure to thrive (not attributable to other causes)

- Relative Indications

- Recurrent acute tonsillitis (documented 7 infections in 1 year, 5 infections in 2year
- Peritonsillar abscess
- Chronic tonsillitis with persistent sore throat, halitosis or cervical adenitis
- One attack of quinsy
- Swallowing difficulties (not attributable to other causes)
- Tonsillolithiasis
- Orofacial or dental disorders (results in a narrow upper airway)
- Recurrent or chronic otitis media
- Individual consideration
- PTA unresponsive to nonsurgical management

- CONTRAINDICATIONS

•Bleeding tendency
•Recent URTI
•Leukemia hemophilias, agranulocytosis, uncontrolled systemic
•disease - Relative Contraindicaitons: cleft palate, acute infection

- COMPLICATIONS

1. Hemorrhage
   -Primary:
      (Bleeding occurring during the surgery)
      - Causes
      -Bleeding tendency
      -Acute infections
      -Aberrant vessel
      -Bad technique
      - Management
      -General supportive measures
      -Diathermy, ligature or stitches
      -Packing

   -Reactionary:
      (Bleeding occurring within the first 24 hours postoperative period)
      - Causes
      -Bleeding tendency
      -Slipped ligature
      - Diagnosis
      -Rising pulse & dropping blood pressure
      -Rattle breathing
      -Blood trickling from the mouth
      -Frequent swallowing
      - Treatment
      -General supportive measures
      -Take the patient back to OR
      -Control like reactionary hemorrhage

   -Secondary:
      (Occur 5-10 days posoperatively)
      -Due to infection
      -Treated by antibiotics
      -May need diathermy or packing
2. Respiratory obstruction
3. Injury to near-by structures