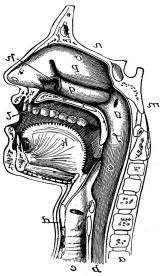
Pharynx I-II



Objectives:

- Lecture 1: Pharynx I
  - Anatomy of the pharynx and deep neck spaces (retro and parapharyngeal)
  - Physiology: function of pharynx in brief
  - Acute and chronic pharyngitis (non-specific and specific) e.g scarlet fever, infectious moniliasis
  - Zenker diverticulation in brief

- Lecture 2: Pharynx II
  - Adenoid and tonsil diseases
  - Complication of pharyngeal diseases
  - Adenotonsillectomy (indications, complication and management)
  - Differential diagnosis of Membranous tonsil

Resources: F2 slides, 436
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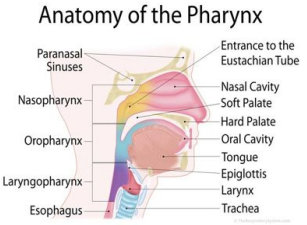
Clinical scenarios

- My child has snoring he is a mouth breather: most common cause of snoring in children adenoid
- I have a sore throat everyday: chronic pharyngitis
- have a fever, sore throat, dysphagia, I can't open my mouth: Tonsillitis
- Adult patient spitting blood and has nasal obstruction you have to use fiberoptic and look at the nasopharynx to look for nasopharyngeal carcinoma
- Patient after eating regurgitates undigested food, and has a bad smell in his mouth, on barium swallow we will find a pouch, treatment is endoscopic removal

- Pharynx البلعوم

- It extend from the base of the skull to the level 6 cervical vertebra at the lower border of cricoid cartilage.
- Funnel shaped,10 cm length



- Parts of the pharynx:

1. **Nasopharynx:** Open anterior to the nose

- **Above**: the base of skull
- **Below:** soft palate
- **Laterally** :opening of the eustachian tube, torus tuberous, Pharyngeal recess (fossa of rosenmuller common site for nasopharyngeal carcinoma*very important to examine
- nasopharynx in smoker adult complaining of nasal obstruction + spitting blood *), Adenoid, Nasopharyngeal isthmus
- In patients with a large adenoid blocking the eustachian tube, they would develop otitis media with effusion (fluid in middle ear). Adenoid is in nasopharynx. not the the nose

2. **Oropharynx:** Open anteriorly the to mouth.

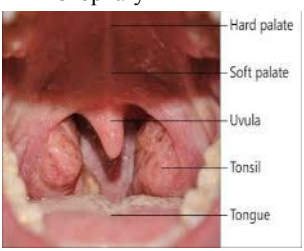
- **Above:** soft palate
- **Below** : the upper border of epiglottis
- Palatine tonsils between the ant pillars and post pillars, tonsils are located between 2 arches palatoglossal arch(1st) and palatopharyngeal arch(2nd).
- How to measure the grade of the tonsils? put imaginary line in uvula, if the tonsils are within the fossa then this is grade 1 (45%) if it extends more then 50% if more then 75% if they are touching each other this is grade 4 (kissing tonsils) متلاصقة

3. **Laryngopharynx (hypopharynx):** Open anterior to the larynx

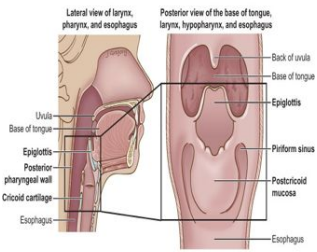
- Above : the upper border of the epiglottis
- Below :lower border of cricoid
- Three parts:

* Pyriform fossa
* Posterior cricoid area
* Posterior pharyngeal wall

Oropharynx



Laryngopharynx

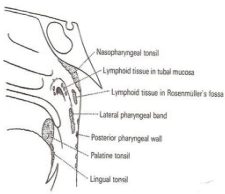


- Structure of the pharynx

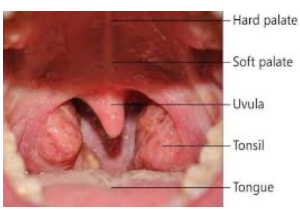
- Fibromuscular tube: Four layers. From internal to external, the layers are the mucosa, pharyngeal aponeurosis , muscle layer, and buccopharyngeal fascia.

1. Mucous membrane:

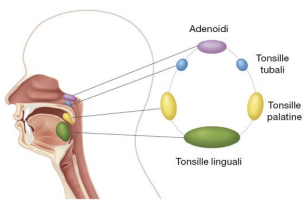
- Ciliated epithelium
- Stratified squamous epithelium
- Transitional epithelium
- Subepithelial lymphoid tissue of the pharynx (waldeyer's ring) scattered in pharynx includes the (adenoid, palatine tonsils, lingual tonsils)
- Structures of Waldeyer's Ring:
  * Adenoid (no capsule) high chance of reoccurrence
  * Lingual tonsils
  * Tubal tonsils
  * Lateral pharyngeal bands
  * Discrete modules



- Palatine tonsils:
  * 12-15 crypt a lot of patients complain from white cheese like pieces coming out from the nose this is tonsil liths which is cause by accumulation of food in the crypts and it causes bad smell
  * The deep surface is separated from the constrictor muscles of the pharynx by connective tissue' capsule'



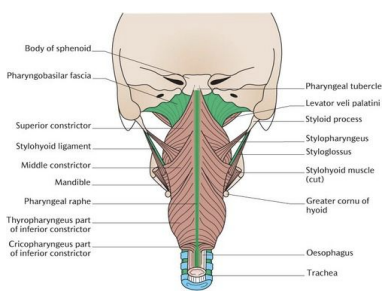
Palatine tonsils



Waldeyer's ring

2. Pharyngeal aponeurosis

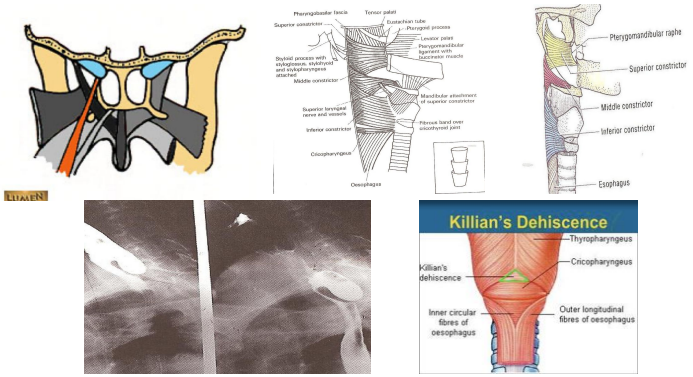
- Incomplete connective tissue coat in the lateral and posterior walls of the pharynx between the muscular layers
- Starts from the pharyngobasilar fascia
- Gives more strength to the structures



3. Muscular coat

- **External: Three constrictor muscles:**
- Superior constrictor: arise from pterygoid , pterygomandibular ligament post end of mylohyoid fibers
- Middle constrictor: arise from the hyoid bone and stylohyoid ligament
- Inferior constrictor: has insertions in thyroid and cricoid. Thyropharyngeus, Cricopharyngeus.

  * Killian's dehiscence weak area: Potential gap between the thyropharyngeus and cricopharyngeus
- **Internal: Three muscles:**
- Stylopharyngus
- Salpingopharyngus
- palatopharyngus

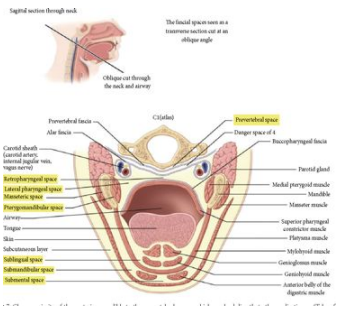


4. Buccopharyngeal fascia

- Thin layer covers the muscular layer of pharyngeal wall.

Relation of the pharynx:

- **Posteriorly:** prevertebral fascia (behind prevertebral fascia we have cervical spine)
- **Anteriorly:** Parapharyngeal space



● Parapharyngeal space

- Potential space lies outside the pharynx
- Triangular in cross section , it extend from the base of the skull above to the sup mediastinum and apex of hyoid bone
- **Anteromedial wall:** buccopharyngeal fascia
- **Posteromedial wall:** cervical vertebrae, prevertebral muscle and fascia
- **Lateral wall:**

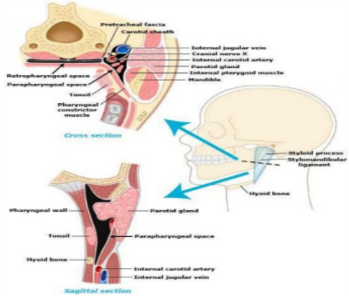
  * (up) the mandible ,pterygoid muscle, parotid gland

  * (Lower) sternomastoid muscle
- **Compartment:** divided by the styloid process

  * Prestyloid is anterior: internal maxillary artery, fat, inferior alveolar, lingual, and auriculotemporal nerves.

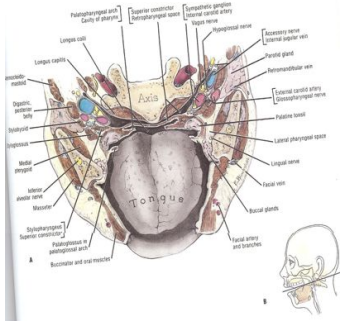
  * Poststyloid: neurovascular bundle (carotid artery, internal jugular vein, sympathatic chain, CN IX, X and, XI . Vital structures (infection in this space may lead to cranial nerve paralysis or carotid rupture)

  (If a child has tonsillitis and on examination you found a bulge in the posterior wall (in front of you) you do a CT scan. It might be an abscess. an adult with a posterior bulge without acute infection, think of TB).



● Retropharyngeal space

- Posterior space
- It extend from the base of skull to super mediastinum.
- Lies behind the pharynx
- **Anterior:** posterior pharyngeal wall and its covering buccopharyngeal fascia
- **Posterior:** cervical vertebrae and muscles and fascia
- **Contents:** Retropharyngeal lymph nodes



Nerve Supply

Sensory: Each of the three sections of the pharynx have a different innervation:

* The **nasopharynx** is innervated by the maxillary branch of the trigeminal nerve (CN V).
* The **oropharynx** by the glossopharyngeal nerve (CN IX).
* The **laryngopharynx** by the vagus nerve (CN X).

Motor: All the muscles of the pharynx are innervated by the vagus nerve (CN X), except for the stylopharyngeus which is innervated by the glossopharyngeal nerve (CN IX).
Also the Sympathetic fibers of the superior cervical ganglia play a role in the innervation.

Arterial from the external carotid

Artery:

* Ascending pharyngeal
* The lingual artery
* The facial artery
* The maxillary artery

Venous drainage:

* To the internal jugular

Lymphatics:

* Retropharyngeal nodes.
* Deep cervical (jugular) nodes

- Physiology of the pharynx

1. Functions of the subepithelial lymphoid tissue:

- Protective functions :
  - Formation of lymphocytes
  - Formation of antibodies
  - Acquisition of immunity
  - Localization of infection
- Salivation scattered salivary glands that moisturizes the area

2. Functions of the pharynx

- Respiration
- Speech
- Resonating cavity
- Articulation
- Taste: taste buds

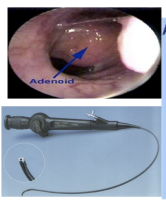
3. Deglutition cont. : Three stages

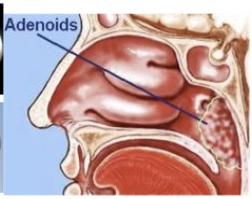
A. Oral stage	- voluntary you can stop it - closure of mouth - cessation of respiration - raising of larynx - sudden elevation of the tongue to mixes food with saliva - press the tongue against the palate, and pushes it backwards towards the oropharynx (soft palate closes against posterior pharyngeal wall to prevent food and water from coming out of the nose, in people with cleft palate or short palate everything comes out of the nose)
B. Pharyngeal stage	- reflux - contraction of nasopharynx sphincter - larynx rises more - laryngeal inlet closure - epiglottis (closes the airway) diverts the food into cricopharyngeal sphincter (upper esophageal sphincter) - contraction of constrictor muscles - relaxed cricopharyngeal sphincter (cricopharyngeal spasm causes choking) - cessation of respiration
C. Esophageal Stage	

- **Adenoid اللحمية**

- A hypertrophy of the nasopharyngeal tonsil to produce symptoms, most commonly between the age of 3-7 years
- **Pathological types:** 1. Simple inflammatory, 2. Tuberculosis
- **Clinical features:** Mouth breathing, snoring, hyponasality, adenoid face, nasal discharge, eustachian tube obstruction (eustachian tube dysfunction and fluids accumulation, so the child presents with otitis media with effusion)
- **Main adverse effects:** nasal obstruction - pharyngitis "due dry mouth" - otitis media - rhinosinusitis - recurrent upper respiratory tract infection - obstructive sleep apnea.
- **Diagnostic:** x-ray (head fully extended to visualize the adenoid), flexible fiberoptic (nowadays instead of x-ray)
- **Treatment:** Conservative (if small) - Surgical > adenoidectomy
- Insert flexible fiberoptic and grade the adenoid (25% ,50% ,75% ,complete grade 4)
- If flexible fiberoptic is not available → do an x-ray (lateral neck)
- How to read the x-ray? white → bone / black → air / grey → soft tissue

Q:what do you see? Lateral Head Neck x-ray showing enlarged adenoid (IMP)





Sleep Apnea and Snoring

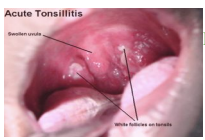
- Snoring is common in children but obstructive sleep apnea is not “my kid snores then suddenly stops and then he takes a deep breath”
- Snoring is a sign of partial obstruction of the upper airway during sleep
- Snoring is always present during type of sleep apnea
- **Sleep apnea:** Cessation of airflow at the mouth and nostrils lasting 10 seconds for at least 30 apnoeic episodes.
-

Types	Stages
* Central sleep apnea: failure of respiratory drive from the brain * Obstructive sleep apnea (OSA): due to anatomical narrowing of the upper airway * Mixed	* Slow wave sleep: brain waves are slow deep restful sleep, and there is a decrease in the vascular tone and respiratory rate and basal metabolic rate * Rapid eye movement: brain quite active, and active dream

- **Pathophysiology of OSA:**
  1.During REM or deep sleep, obstructive occurs resulting in decrease arterial oxygen and increased arterial carbon dioxide pressure.
  2.Nocturnal desaturation arouses patient and causes increase pulmonary artery, systemic arterial pressure.
  3.Lead to hypersomnolence
- **Investigations:** Sleep study > to know how frequent the patient is having OSA and for how long > EEG, EKG, EOG, pulse oximeter, respiration rate , nasal and oral air flow.
- **Treatment**:
  * Nonsurgical:
    - behavior modification, reduce weight
    - medical treatment
    - CPAP continuous positive airway pressure
  * Surgical: remove nasal polyp, reduction of big tongue
    - UPPP (uvelopalatopharyngoplasty remove tonsils and uvula to widen oropharynx if they are big)

- Acute infection of the oropharynx

Acute tonsillitis	
Causes	Viral fellow by bacterial (group A B-hemolytic streptococcus, moraxella, H. influenza, bacteroides.
Signs & symptoms	Fever, sore throat, odynophagia, trismus, halitosis, Enlarged jugulodigastric lymph nodes are also commonly found. Phases: erythema,exudative ,follicular tonsillitis
Complication	Peritonsillar abscess, parapharyngeal (abscess may go to parapharyngeal space (post styloid) which contains cranial nerves) or retropharyngeal abscess, rheumatic fever, glomerulonephritis (if patient is not treated well), otitis media. untreated? abscess
Treatment	Antibiotics, bed rest, hydration, analgesia. Always ask about frequency of tonsillitis

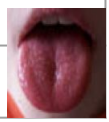


Follicular tonsillitis (not membranes)

Infectious mononucleosis	
Pathogen	Epstein barr virus
Signs & symptoms	Fever, lymphadenopathy, malaise, exudative tonsillitis, hepatosplenomegaly, membranous tonsillitis.
Diagnosis	- Monospot test. - Paul bunnell test (heterophile antibodies in serum) 80% mononuclear and 10% atypical lymphocytes on smear.
Complication	Cranial nerves involvement, meningitis, autoimmune hemolytic anemia, splenic rupture
Treatment	Hydration, analgesia oral hygiene

Infectious mononucleosis:
Patient came in with fever, sore throat, membranous tonsils, and cervical lymphadenopathy, and hepatosplenomegaly

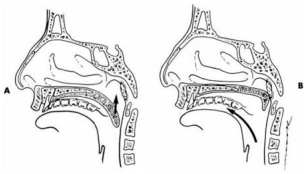
Scarlet fever	
Cause	Endotoxin produced by by type A B-hemolytic streptococcus
Signs & symptoms	Red pharynx, strawberry tongue, perioral skin erythema and desquamation, dysphagia, malaise, severe cervical lymphadenopathy.
Diagnosis	Dick test a test to determine susceptibility or immunity to scarlet fever by an injection of scarlet fever toxin.
Treatment	Antibiotics



Diphtheria	
Cause	Corynebacterium diphtheria
Signs and symptoms	Sore throat, fever, green (book: gray) plaques friable membrane same picture as infectious mononucleosis both have membranes over tonsils
Diagnosis	Culture
Complication	Nephritis, airway obstruction, death
Treatment	Antibiotics (penicillin or erythromycin), antitoxin

Vincent's angina	
Cause	- Acute ulcerative lesion in oral cavity - Gram negative fusiform bacillus and a spirillum with anaerobic
Signs & Symptoms	Sudden in onset, pain, fever, cervical adenitis, the base of the deep ulcers bleeds when the membranous slough is removed ,the symptoms subside in 4—7 days
Treatment	Metronidazole, antiseptic, mouthwash

- Bifid uvula



Clinical Scenario:

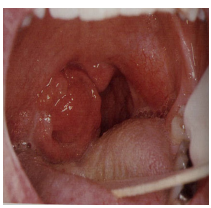
- A mother brought a child that snores and has noisy breathing and we decided to remove the adenoid but we didn't exam the oral cavity. The child had a bifid uvula and submucosal cleft. after adenoid removal surgery the mother brought the child that is now complaining of water coming out of his nose and hypernasality.
- Signs & symptoms: snoring and mouth breathing
- We **MUST examine the oral cavity** when the child is complaining of noisy breathing and snoring because he may have a bifid uvula or heart shaped uvula, and palpate the soft palate for a hidden submucosal cleft. **The adenoid was helping in closing the soft palate** against the posterior pharyngeal wall (bridging the gap between the soft palate and pharynx) during swallowing. So be careful you can't book all patients for adenoidectomy
- Sometimes they have this pathology and a big adenoid so we can do something called **partial adenoidectomy** (we remove the upper part and keep the part that is forming the bridge to prevent hypernasality and velopharyngeal insufficiency).
- Velopharyngeal insufficiency (VPI) is a disorder resulting in the improper closing of the velopharyngeal sphincter (soft palate muscle in the mouth) during speech, allowing air to escape through the nose instead of the mouth which results in hypernasality
- If the velopharynx is not closed, snort sound may be produced through the nose or you may hear air coming out of the nose during speech.
- Improper function of this structure also produce a nasal tone in the voice (hypernasality).

- Tonsillectomy

Indications

- Recurrent tonsillitis (7 times per year for 1 year or 4 times per year for 2 years or 3 times per year for 3 years)
- Hypertrophied tonsils causing obstructive sleep apnea "grade 3 or 4 tonsils"
- Asymmetric tonsillar enlargement suspicious of malignancy + smoker > you have to remove it to take biopsy
- Peritonsillar abscess or quinsy (risk of parapharyngeal abscess)

This is grade 4 tonsils (kissing tonsils), they will have Obstructive sleep apnea



We have to remove asymmetrical tonsils in adults because it could be cancerous

• Tonsillectomy Cont.

Complication

- Hemorrhage controlled by using diathermy: Primary, Reactionary, Secondary.
- Respiratory obstruction.
- Injury to nearby structures.
- Pulmonary and distant infections.

1. Primary hemorrhage: Bleeding occurring during the surgery.

Causes:

- Bleeding tendency
- Acute infections
- Bad technique

Management: OR

- General supportive measures
- Diathermy, ligature or stitches
- Packing

2. Reactionary hemorrhage: Bleeding occurring within the first 24 hours postoperative period.

Causes:

- Bleeding tendency
- Slipped ligature

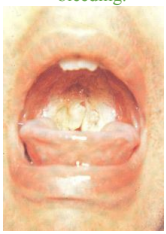
Diagnosis:

- Rising pulse & dropping blood pressure
- Rattle breathing
- Blood trickling from the mouth
- Frequent swallowing
- Examination

Treatment:

- General supportive measures
- Take patient back to OR
- Control like reactionary hemorrhage

recovery of children after tonsillectomy is 5 days but adults up to 2 weeks, swallowing is painful after surgery and there is whitish slough tissue that stays for 9-10 days patient can eat normally but should avoid hard or hot food. If the slough tissue accumulates it becomes a good medium for infection leading to secondary bleeding.



3. Secondary hemorrhage

- Occur 5-10 days postoperatively
- Due to **infection**
- Treated by antibiotics
- May need diathermy or packing

Tonsillar Hypertrophy grading

- **Grade 0 :** Tonsils are found confined to the space between the anterior and posterior pillars
- **Grade 1 :** Tonsils are enlarged and is just seen coming out of the anterior pillar. (cover 25% of the space between the pillars)
- **Grade 2 :** The enlarged tonsil reaches to about half the distance of uvula. (cover 50% of the space between the pillars)
- **Grade 3 :** The enlarged tonsil comes into contact with the uvula. (cover 75% of the space between the pillars)
- **Grade 4 :** The enlargement of tonsil is so much that both tonsils lie virtually in contact with each other i.e. kissing tonsils

- Moniliasis: Oral thrush, immunocompromised, steroid inhaler

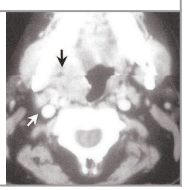
Signs & symptoms	White patches caused by candida albicans fungus	
Treatment	Nystatin antifungal	

- Peritonsillar Abscess (quinsy):

An abscess between the tonsil capsule and the adjacent lateral pharyngeal wall
Not treated tonsilitis leads to collection of pus in the connective tissue it will lead to hot potato voice (trismus) because patient can't open his mouth due to the presence of a bulge

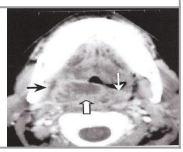
Signs & Symptoms	Fever, otalgia odynophagia, uvular deviation, trismus ,drooling of saliva	
Complication	Para and retropharyngeal abscess, aspiration pneumonia	
Treatment	- I&D - Aspiration - Iv ABX - After 6 weeks I have to do tonsillectomy	

- Parapharyngeal Abscess

Source of the infection	Odontogenic tooth abscess , tonsils, parotid abscess or infection	
Signs	Trismus, fever, muffled voices , intraoral bulge (behind tonsil in lateral posterior pharyngeal wall), neck mass	
Complication	Aspiration, cranial nerve palsy, airway compromise, septic thrombophlebitis, carotid blowout, endocarditis	
Treatment	- Admit the patient - External drainage - IV Antibiotics - Airway management	

- **Retropharyngeal abscess:** More common in children

Signs & symptoms	Odynophagia, hot potato voice, drooling, stiff neck fever, stridor
Complication	Mediastinitis, respiratory distress, rupture abscess,
Treatment	- Drainage transoral - IV ABX - Secure airway



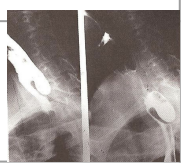
- **Ludwig's Angina:** Bilateral cellulitis of submandibular and sublingual spaces, occurs due to extraction of a tooth that has an abscess without putting him under antibiotic coverage first.

Signs & symptoms	Wooden floor of the mouth, neck swelling, indurations, drooling, respiratory distress, swollen tongue, dysphagia, trismus
Complication	Airway distress , sepsis
Treatment	- Tracheotomy (can't intubate because of the tongue) - External drainage - IV antibiotics

Submandibular swelling that extended below the tongue, pushing to tongue against the soft palate making the patient unable to breath.

- **Zenker's diverticulum:** Herniation of the mucosa at killian's triangle due to increased intraluminal pressure when cricopharyngeus is closed

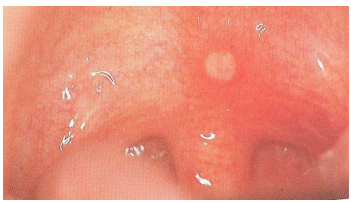
Signs & symptoms	Dysphagia, regurgitation of undigested food aspiration
Diagnosis	Barium swallow we see the bulge
Treatment	- Cricopharyngeal myotomy(the sphincter) to give relaxation - Diverticulectomy



- Chronic pharyngitis: ask about mouth breathing (hair in the nose cleans the air from the dust and humidifies, this doesn't occur when we breath through the mouth

Pathogenesis	Postnasal drip, irritant (dust, dry heat, smoking, alcohol), reflux esophagitis, chronic mouth breathing, allergy granulomatous disease, connective tissue disease , malignancy
Signs & symptoms	Constant mouth clearing, dry throat, pharyngeal crusting, thick granular wall, no fever just dry and red,
Treatment	Address underlying etiology

- Aphthous ulcer
  - Unknown cause (viral? related to vitamin deficiency?), unknown cause could be due to stress or food. Usually due to stress (exam week), stays for a few days and spontaneously resolves.
  - Disappears after a few days, طحينة can be used.

- Angular stomatitis
  - Common in young females
  - Iron deficiency anemia (coffee, tea decreases iron absorption)
  - Dry lip