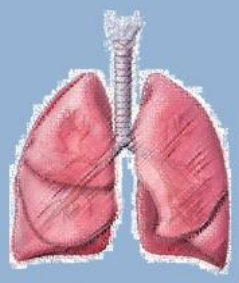


Respiratory System

Problem Based Learning

Med433 Team

First case:

I am short of breath

Done by:

- Aisha Al Raddadi.
- khwlaa alshakrah.
- Mohammed Albaz.
- Mohammed alnafesah

PBLteam433@gmail.com

Color Index

Important

New terms

Explanation

Key points from the Scenario:

- Saleh, male, 19 years old, university student.
- Comes to the emergency because of shortness of breath for the last couple of days , also has cough and feels tired.
- He spent the weekend in motorbike show. The weather was dusty and cold. That night he was unable to sleep because of shortness of breath and cough (dry and no phlegm), also his chest is wheezing. He needed to place two pillows behind his head. He has no fever, no running nose, and no sore throat.
- He took two tablets of Aspirin but without improvement.
- His friends decided to take him to KKUH.

Examination:

- He able to speak a few words. Not full sentences.
- He uses his sternocleidomastoid muscles and alae nasi during breathing.
- He sitting and leaning forward.
- Pulse rate, blood pressure and temperature are normal.
- Respiratory rate is 28/min. (Normal = 16-22/min).
- On auscultation expiratory wheezing in both sides.
- No cyanosis and clubbing of fingers.

Investigations → results

- Peak expiratory flow (PEF) → 350 L/min (60% of predicted value).
- pulse oximeter to Saleh' → O_2 saturation is 89%.
- Complete Blood Count (CBC) → normal.
- Plain chest X-ray (postero-anterior view):
  - Both lung fields are clear.
  - No pneumothorax and patches of consolidation.

Diagnosis:

- **(bronchial asthma)**
  - mild attack of asthma related to exercise and exposure to dusty and cold air.

Management:

- The doctor gives him a bronchodilator (Salbutamol) by inhalation for 7-10 minutes. repeated measurement of PEF shows improvement with reading of 475 L\min (80% of predicted value)

- Responding to the bronchodilator is sign of asthma

- The doctor ask Saleh to see pulmonary consultant in respiratory clinic to: outline the Management plan for long term control asthma and educate him how to prevent these attacks.

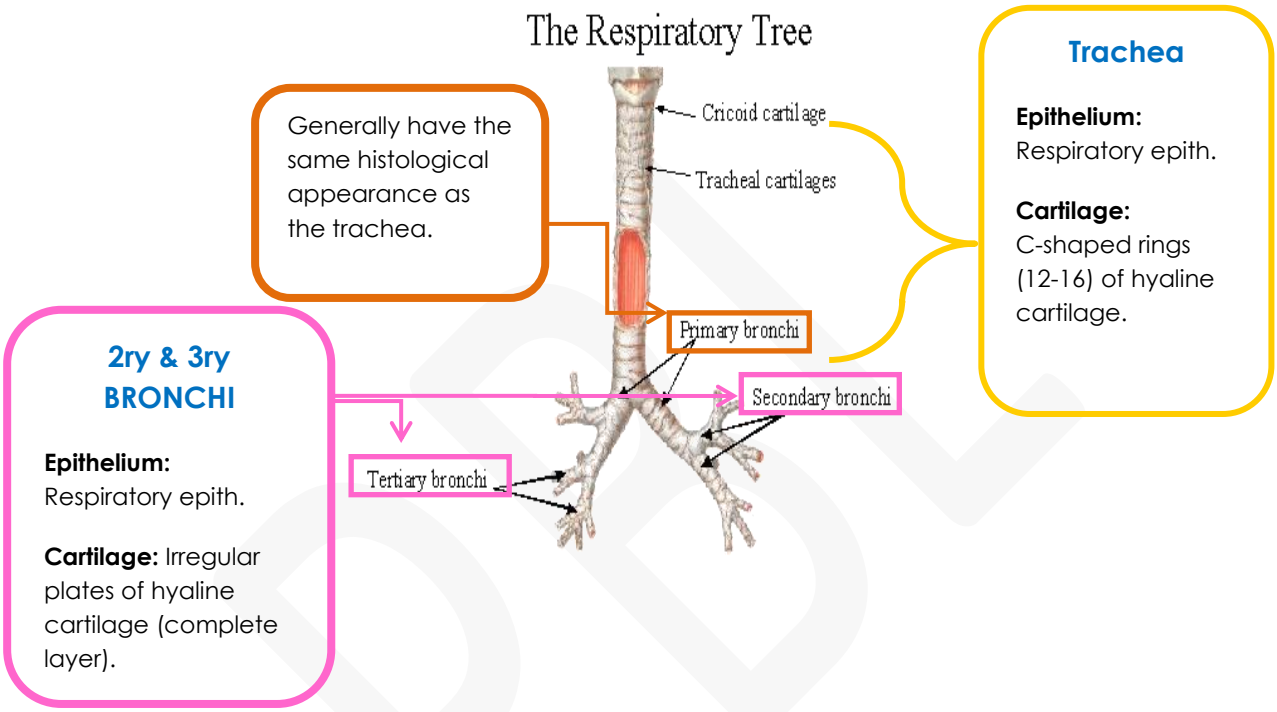
Anatomy and histology of bronchial tree:

Conductive zone

nose → pharynx→ larynx→ trachea→ bronchi→ pre-terminal bronchioles and terminal bronchioles

Respiratory zone

Respiratory bronchioles → Alveolar ducts → Alveolar sacs → Alveoli.



Muscles involved in respiration:

Normal inspiration:

Diaphragm - external intercostal muscles.

Forced inspiration:

Scalene muscles - pectoralis major and minor - sternocleidomastoid.

Normal expiration: By elastic recoil

Forced expiration:
Rib depressors:
Internal intercostal, innermost intercostal,Subcostals and Transversus thoracis

Anterior abdominal wall muscles:
External oblique, Internal oblique, Transversus abdominis and Rectus abdominis.

Pathogenesis of Bronchial Asthma:

1. **Chronic airway inflammation.**
2. **Airflow obstruction:** can be caused by a variety of changes, including acute bronchoconstriction, airway edema, chronic mucous plug formation, and airway remodeling
3. **Bronchial hyper-responsiveness.**

- Principal cells in asthma: mast cells, eosinophils, epithelial cells, macrophages, and activated T lymphocytes (TH2 subset) and neutrophils.
- T lymphocytes play an important role in the regulation of airway inflammation through the release of numerous cytokines.

Pathogenesis of Bronchial Asthma (type 1 IgE-mediated Atopic Asthma):

- First there is initial sensitization or priming: first time exposure to an inhaled allergen which stimulates induction of Th2-type T cells (CD4 T_H2) to produce cytokines (interleukin IL- 4, IL-5 and IL-13).
- And then there is subsequent re-exposure to the allergen will leads to an IgE mediated reaction.
- This IgE-mediated reaction to inhaled allergens elicits:

1. An acute response (within minutes).

2. A late phase reaction (after 4-8 hours).

Signs and symptoms of Asthma:

- Coughing, Wheezing, Chest tightness, Shortness of breath.

1. **what is peak expiratory flow (PEF) ?**

is the maximal rate that a person can exhale during a short maximal expiratory effort after a full inspiration. It measures the airflow through the bronchi and thus the degree of obstruction in the airways.

2. **why he didn't response to aspirin ?**

Aspirin causes the body to produce excess amounts of the class of chemicals known as leukotrienes. Leukotrienes cause the muscles surrounding the bronchial tubes to contract, resulting in wheezing and shortness of breath.

New terms:

- **Wheezing**: An abnormal high or low pitched sound heard either by unaided ear or through the stethoscope. Usually indicates a bronchospasm, chronic bronchitis or bronchial asthma.
- **Phlegm:** (Also known as sputum) A material coughed up from the respiratory tract, white. Yellowish or green in color. Changing color to yellowish green is the indication of infection.
- **Sternocleidomastoid muscles:** is a paired muscle in the superficial layers of the anterior portion of the neck; it is one of the largest and most superficial cervical muscles.
- **Alae nasi**: (**wing of the nose**) is the lateral surface of the external nose.
- **Cyanosis:** Blue discoloration of the skin and mucus membrane due to more than 5 g/dl of reduced (deoxygenated) hemoglobin in blood.
- **Pulse oximeter**: a device that measures the oxygen saturation of arterial blood in a subject by utilizing a sensor attached typically to a finger, toe or ear to determine the percentage of oxyhemoglobin in blood pulsating through a network of capillaries and that typically sounds an alarm if the blood saturation becomes less than optimal.
- **Salbutamol:** a beta-agonist bronchodilator that is administrated as an inhalational aerosol to treat bronchospasm associated especially with asthma and chronic obstructive pulmonary disease.
- **Spacer:** a devise by means of which usually inhalation drugs are delivered.
- **Cyanosis**: Blue discoloration of the skin and mucus membrane due to more than 5 g/dl of reduced (deoxygenated) hemoglobin in blood.

Oximeter Pulse	Spacer	Salbutamol