

Respiratory System

Problem
Learning
based
Med433 Team

Second case:

"... Still coughing"

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Key points from the Scenario:

- 🏠 Khalid, 21 years old, male, medical student.
- 🏠 Comes with persistent cough with some non-bloody phlegm and a lot of night sweat for the last 3-4 weeks .
- 🏠 He noticed shortness of breath when he runs or climbs stairs .
- 🏠 3-4 weeks ago, he has been diagnosed with chest infection and GP prescribed a course of amoxicillin. His coughing has worsened and becomes productive cough.
- 🏠 He lost more than 8 kg in body weight over the last 4 months.
- 🏠 His sputum is thick with some streaks of blood.
- 🏠 Two years ago, he had a positive mantoux skin test with normal chest x-ray.

Examination:

- 🏠 He looks a little thin. His Body Mass Index is decreased (BMI is 16.2).
- 🏠 Feverish 38.5 c.
- 🏠 His vital signs show elevated pulse rate (110/min) and respiratory rate (22/min).
- 🏠 His chest is flattened (small Antero-posterior diameter).

Investigations → results

- 🏠 **Percussion note** → the right upper zone is dull to percussion.
- 🏠 **Auscultation** → nothing significantly found.
- 🏠 **Chest x-ray (postero-anterior view)** → an area of consolidation in the right upper lobe and increased lucency within the area of consolidation, consistent with early cavitation .
- 🏠 **Blood test** → elevated erythrocytes sedimentation rate (ESR) => (55)
* (normal= less than 15 mm/hr).
- 🏠 **Sputum sample** → presence of chronic inflammatory cells, mainly lymphocytes and a large number of acid-fast bacilli (AFB).

Diagnosis:

- 🏠 **(Pulmonary Tuberculosis).**

Management:

- 🏠 Khalid is admitted to an isolation room and commenced on treatment of for TB for at least 6 to 9 months.
- 🏠 Khalid commenced on : **Isoniazid, Rifampicin, Ethambutol, Pyrazinamide and Pyridoxine (vitamin B₆).** (IREPP)
- 🏠 Khalid continues to take pyridoxine for 2 months. Then the doctor asks him to continue on isoniazid and rifampicin only for another 7 months.
During this time Khalid is seen by his doctor once every month to check-up and follow-up investigations.
- 🏠 Health authorities decide to screen people who are in contact before the treatment (usually done by mantoux skin test).

Overview of TB:

It is an infectious disease caused by *Mycobacterium tuberculosis*, It affects mainly the lungs but may spread to other organs .TB can be either active or latent in people who have been exposed to the organism. People with Latent TB are asymptomatic, however the symptoms may appear when the disease turns to the active stage, the characteristic feature of TB under microscope is the presence of granuloma, which contains:

Caseous necrosis, Epithelioid histiocytes, rim of lymphocytes, langhan's giant cells.

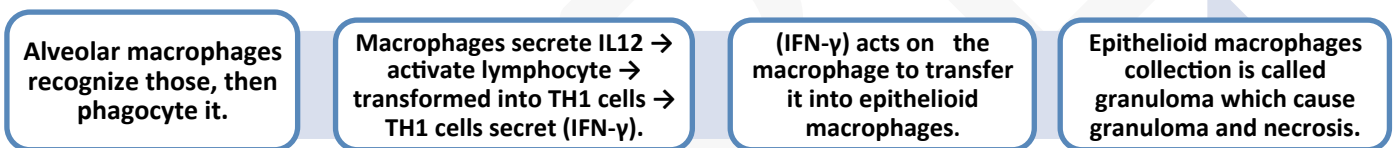
Tests for TB:

- 1- Interferon-Gamma Release Assays (IGRAs)
- 2- HEAF test
- 3- Tuberculin skin (Mantoux test)
- 4- Sputum culture

* Chest x-ray has a major role in TB diagnosis

* When the infection invades the bloodstream it is called **Miliary TB**.

Pathogenesis of TB: After inhalation of M.tuberculosis



1- What is name of the stain that used to identify acid-fast organisms, mainly Mycobacteria?

Ziehl-Neelsen stain (ZN).

2- What is tuberculin skin test (Mantoux test)?

is a screening tool for tuberculosis (TB), tells if your body has been exposed to the TB germ. Doctor will inject a small amount of fluid just under the skin, after 2-3 days, if there is a reaction, some redness and a small bump means you may have the TB germ antigen in your body.

3- Why is pyridoxine (vitamin B6) given with anti-TB drugs?

Because vitamin B6 prevents isoniazid-induced neuropathy.

4- the cough worsened despite amoxicillin, Why?

Because the organism (mycobacterium tuberculosis) shows resistance to amoxicillin .

The risk factors of tuberculosis:

1. Immunocompromised patients (AIDS)
2. Immunosuppression drugs.
3. Malnutrition.
4. Diabetes
5. Elderly people

Preventions:

6. TB vaccine
7. Mantoux test
8. Don't be with someone has active TB in enclosed room for long time
9. Protective measures

COUGH:

👤 Cough is an explosive expiration that provides a normal protective mechanism for clearing the tracheobronchial tree of secretions and foreign materials.

The bronchi and trachea (carina) are so sensitive to light touch that excessive amounts of foreign matter or other causes of irritation initiates the cough reflex.

- Coughing may be initiated either voluntarily or reflexively.
- As a defensive reflex it has both afferent and efferent pathways.

👤 Cough receptor:

They are located in different parts of the respiratory system, when they are exposed to irritating substances, they are stimulated.

The afferent limb: trigeminal, glossopharyngeal, superior laryngeal, and vagus nerves.

The efferent limb: recurrent laryngeal nerve and the spinal nerves.

*** Result in removal of any irritant substance from respiratory system.**

New terms:

- 🕯 **Cough:** is a sudden and often repetitively occurring reflex which helps to clear the large breathing passages from secretions, irritants, foreign particles and microbes .
- 🕯 **amoxicillin :** is a moderate-spectrum, bacteriolytic, β -lactam antibiotic in the aminopenicillin family used to treat bacterial infections caused by susceptible microorganisms.
- 🕯 **Productive cough:** A cough is defined as a productive cough when some types of secretions come up during coughing.
- 🕯 **Siblings:** is one of two or more individuals having one or both parents in common.
- 🕯 **BMI (body mass index):** is a measure for human body shape based on an individual's mass and height.
- 🕯 **Percussion note:** Percussion is a method of tapping on a surface to determine the underlying structure, and is used in clinical examinations to assess the condition of the thorax or abdomen.
- 🕯 **Streaks of blood:** streak means a line, mark, smear, or band differentiated by color or texture from its surroundings.
- 🕯 **Consolidation:** is a region of (normally compressible) lung tissue that has filled with liquid, a condition marked by induration (تقيس).
- 🕯 **Postero-anterior view:** The x-rays enter through the posterior aspect of the chest, and exit out of the anterior aspect where they are detected by an x-ray film.
- 🕯 **Increased lucency :** Refers to a region in an image caused by an absorber of x-ray attenuation than its surrounding tissues (appears lighter)
- 🕯 **Cavitation:** are gas-filled areas of the lung in the center of a nodule, mass or area of consolidation.