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B.S Radiology 4<sup>th</sup> Semester  
Subject: Clinical Medicine-1

Question No: 1

What is Hydronephrosis? Write in detail its causes, pathophysiology, diagnosis and treatments.

Ans: Hydronephrosis:

Hydronephrosis is the swelling of a kidney due to a build-up of urine. It happens when urine cannot drain out from the kidney to the bladder from a blockage or obstruction. Hydronephrosis can occur in one or both kidney.

→ The main function of the urinary tract is to remove wastes and fluid from the body.

\* Causes of hydronephrosis:

Hydronephrosis is usually caused by another underlying illness or risk factor. Cause of hydronephrosis includes, but are not limited to, the following illnesses or risk factors.

- 1 Kidney Stone
- 2 Congenital blockage (a defect that is present at birth)
- 3 Blood clot
- 4 Scarring of tissue (from injury or previous surgery)
- 5 Tumor or cancer (example include bladder, cervical, colon, or prostate)
- 6 Enlarged prostate (noncancerous)
- 7 Pregnancy
- 8 Urinary tract infection (or other disease that cause inflammation of the urinary tract)
- 9 Nerve or muscle problems
- 10 Cystocele (fallen bladder)
- 11 Narrowing of the ureters (occur as a result of injury to the ureter, infection or surgery).



## \* Patho Physiology:

Due to the ethiological factors



obstruction of the urine flow



Fluid backs up into the kidney



Causing dilatation of renal pelvis



Results in barotraumas/pressure trauma



Higher pressure causes irreversible destruction of the nephrones



Hypertrophy of the kidneys as a consequence of increased workload



Hydronephrosis



Renal failure

## \* Diagnosis of hydronephrosis:

- 1 ultrasound
- 2 IVP
- 3 Cystourethroalgram
- 4 Cystoscopy
- 5 RGP
- 6 Delayed empty
- 7 Isotope renography

Urine culture

## Treatment of hydronephrosis:

Hydronephrosis is not a specific diagnosis but a finding or sign.

Management is highly dependent on underlying condition and the timing (acute vs chronic).

Urgent decompression is needed with:  
Severe pain

Active urinary tract infection and acute kidney insufficiency

Retrograde ureteral stent or Percutaneous

Nephrostomy can provide equally effective drainage.

U.T.I Antibiotic therapy

Prompt drainage

Relief of lower tract obstruction (catheter drainage, urinary diversion, indwelling Pigtail ureteral catheter).



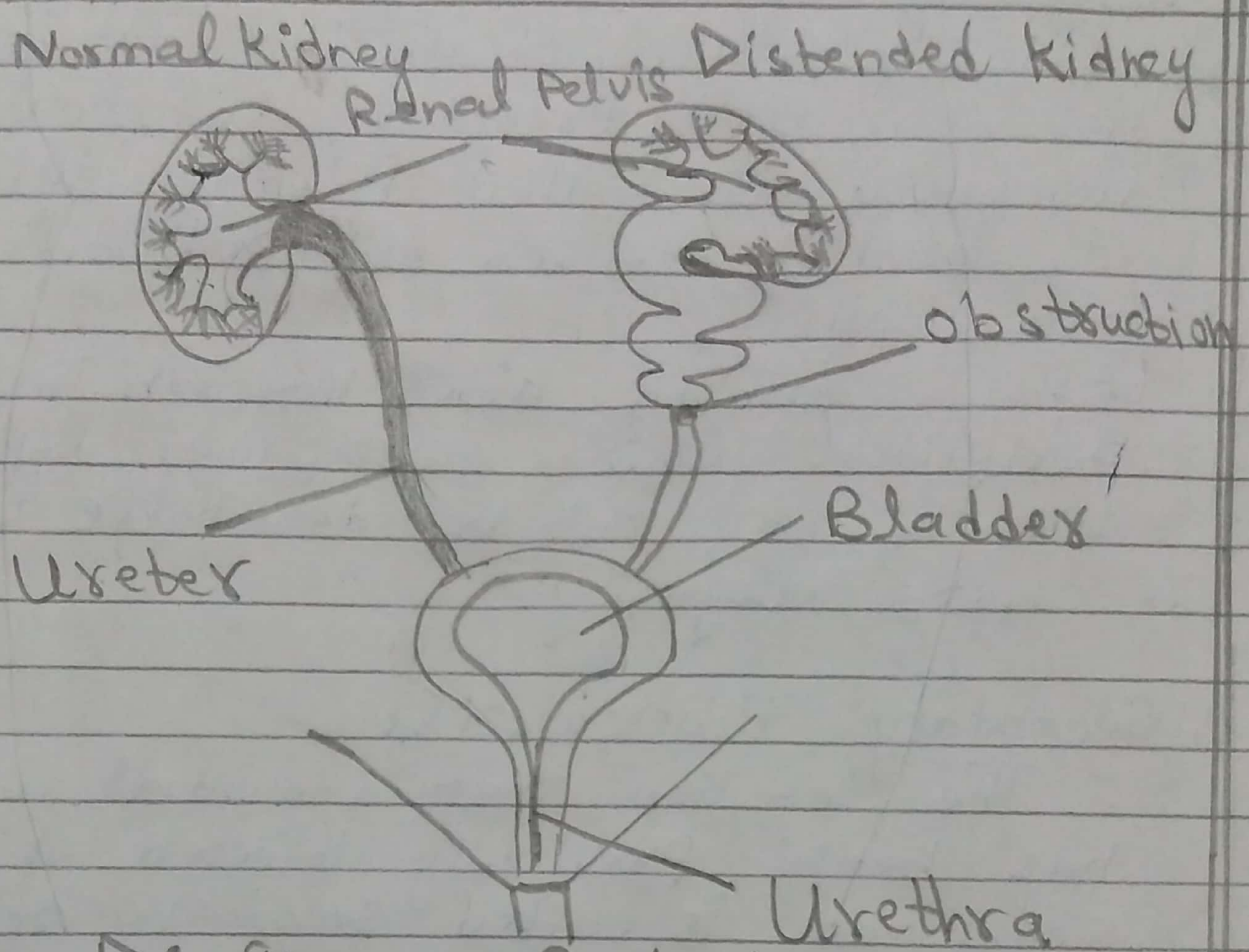


Diagram of hydronephrosis

Q Question No: 2

Explain in detail the types/categories and Pathophysiology of tuberculosis.

\* Types of tuberculosis:

- 1 Pulmonary TB
- 2 Extra-pulmonary TB

A Pulmonary TB:

Pulmonary TB has two types

- 1 Primary Tuberculosis
- 2 Secondary Tuberculosis

## 1. Primary Tuberculosis:

The infection of an individual who has not been previously infected or immunised is called Primary tuberculosis or Ghon's complex or childhood tuberculosis.

Lesions forming after infection is peripheral and accompanied by hilar which may not be detectable on chest radiography.

## 2. Secondary Tuberculosis:

The infection that individual who has been previously infected or sensitized is called secondary or Post Primary or reinfection or Chronic tuberculosis.

## B Extra Pulmonary TB:-

20% of Patients of TB Patient affected sites in body are:

### 1 Lymph node TB (tuberculous lymphadenitis):

Seen frequently in HIV infected Patients:

**Symptoms:** Painless swelling of lymph nodes most commonly at cervical and supraclavical (scrofula).

Systemic systems are limited to HIV infected P.



## 2 Pleural TB:

Involvement of pleura is common in Primary TB and results from Penetration of tubercle bacilli into Pleural space.

## 3 TB of Upper airways:

Involvement of Larynx, Pharynx and epiglottis.

Symptoms:

Dysphagia, chronic productive cough

## 4 Genitourinary TB:

- 15% of all Extra Pulmonary cases
- Any part of the genitourinary tract get infected

Symptoms:

Urinary frequency, Dysuria, Hematuria.

## 5 skeletal TB:

- Involvement of weight bearing Part like spine, hip, knee.

Symptoms:

Pain in hip joints, knees, swelling of knees, trauma.

## 6 Gastrointestinal TB:

Involvement of any part of GI tract.

## Symptoms

Abdominal pain, diarrhea, weight loss.

### 7 TB Meningitis and tuberculomas

- 5% of all extra pulmonary TB.
- Results from Hematogenous spread of 1° and 2° TB.

### 8 TB Pericarditis:

- 1-8% of all extra pulmonary TB cases.
- Spreads mainly in mediastinal or hilar nodes or from lungs.

### 9 Miliary or disseminated TB:

- Results from Hematogenous spread of Tubercle Bacilli.
- Spread is due to entry of infection into pulmonary vein producing lesions in different extra pulmonary sites.

### 10 Less common Extra Pulmonary TB:

uveitis, Panophthalmitis, Painful Hypersensitivity related Phlyctenular conjunctivis.



## Categorized of TB:

TB can be categorized into:

Active TB

Latent TB

Milliary TB

## Active TB:

Active TB is an illness in which the TB bacteria are rapidly multiplying and invading different organs of the body.

A person with active Pulmonary TB disease may spread TB to other by airborne transmission of infectious particles coughed into the air.

Active TB is contagious and causes symptoms

The most common form of active TB is lung disease, but it may invade other organs, so called "extrapulmonary TB".

## Latent TB:

Latent TB occurs a person has the TB bacteria within their body. The bacteria are present in very small numbers and don't develop disease. They are kept under control by the body's immune system.



- Latent TB doesn't cause symptoms and isn't contagious.
- People with latent TB have a normal chest x-ray and a negative sputum test. It is often only known that someone has latent TB because they have had a TB test, such as the TB skin test.
- There is an ongoing risk that the latent infection may turn into active disease. The risk is increased by other illnesses such as HIV or medications which compromise the immune system.

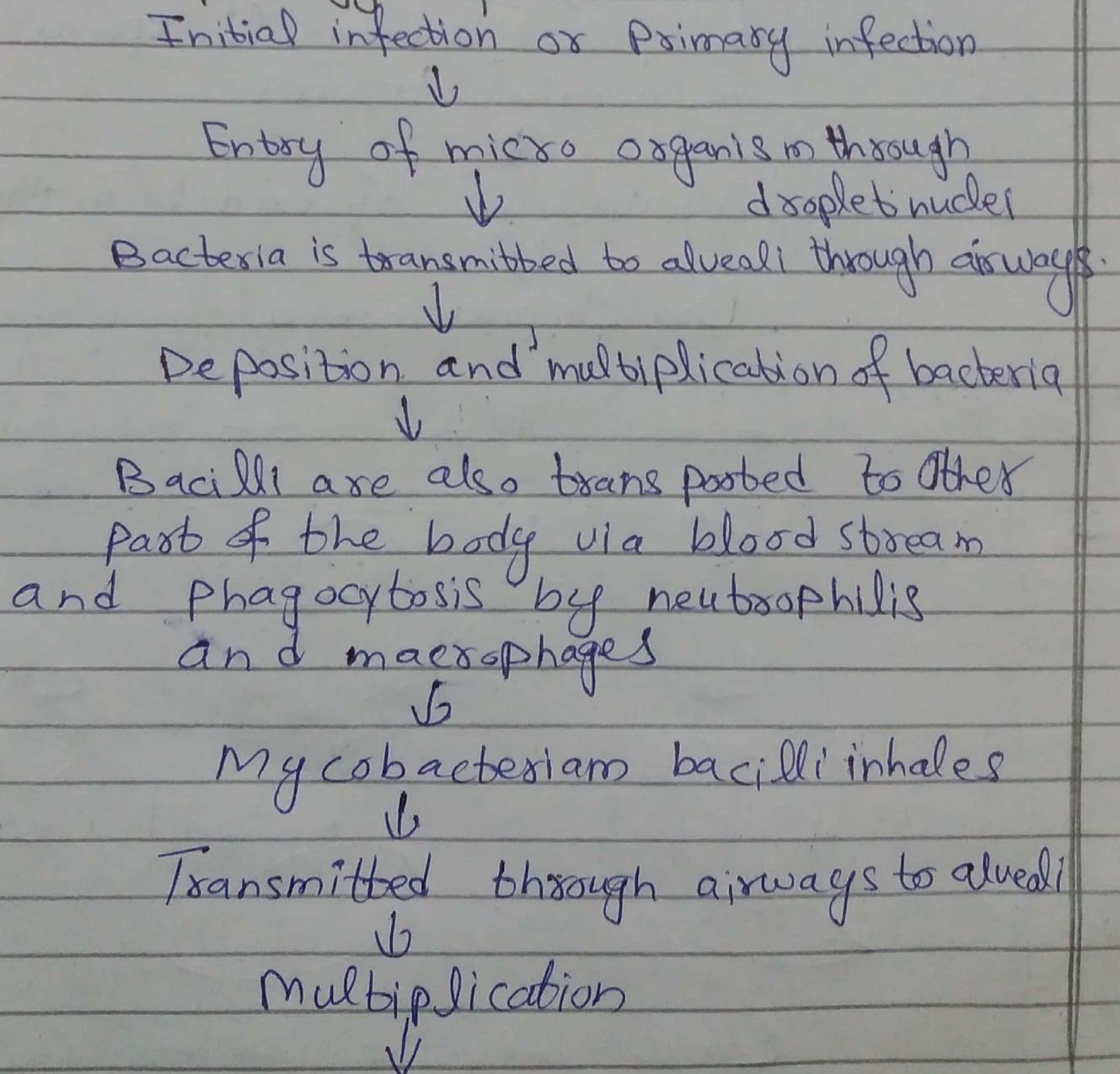
### 3 Miliary TB:

- Miliary TB is a rare form of active disease that occurs when TB bacteria find their way into the bloodstream. In this form bacteria quickly spread all over the body in tiny nodules and affect multiple organs at once.
- Miliary TB causes general active TB symptoms in addition to other symptoms, depending on the body parts involved. For example, if your bone marrow is affected you may have a low red blood cell count or a rash.



- Its name comes from a distinctive pattern seen on a chest radiograph of many tiny spots distributed throughout the lung fields with the appearance similar to millet seeds thus the term "miliary" tuberculosis.
- This form of TB can be rapidly fatal.

### \* Pathophysiology of TB:



↓  
Transfer to lymph system and  
blood stream (in cerebral cortex, kidney,  
bones)

↓  
Immune system responds

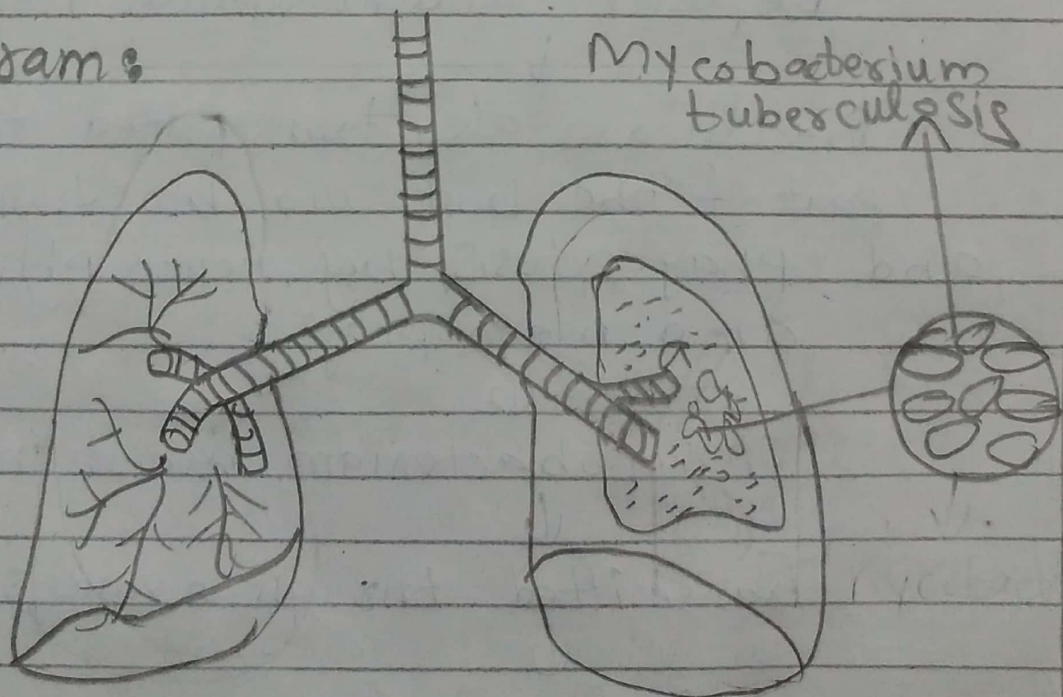
↓  
Phagocytes engulf to many  
bacteria

↓  
T.B lymphocytes bacilli spreads  
in normal tissues

↓  
Accumulation of exudate in alveoli

↓  
Bronchopneumonia

Diagram:



Lungs infected with tuberculosis (TB)



### Question NO: 3

How are renal stones formed and what are different types of renal stones? Which radiological procedure is most suitable for diagnosing renal stones?

#### Renal stone formed:

Kidney stones (also called renal calculi, nephrolithiasis or urolithiasis) are hard deposits made of minerals and salts that form inside your kidneys.

Kidney stones form when your urine contains more crystal-forming substances such as calcium, oxalate and uric acid and than the fluid in your urine can dilute. At the same time, your urine may lack substances that prevent crystals from sticking together, creating an ideal environment for kidney stones to form.

#### Types of Renal Stones:

The type of kidney stone you have helps determine its cause and may give clues on how to reduce your risk of getting more kidney stones.

Types of kidney stones are includes



## Calcium stones

Most kidney stones are calcium stones, usually in the form of calcium oxalate. Oxalate is a substance made daily by your liver or absorbed from your diet. Certain fruits and vegetables, as well as nuts and chocolates, have high oxalate content.

Dietary factors, high doses of vitamin D, intestinal bypass surgery and several metabolic disorders can increase the concentration of calcium or oxalate in urine.

Calcium stones may also occur in the form of calcium phosphate.

This type of stone is more common in metabolic conditions, such as renal tubular acidosis. It may also be associated with certain medications used to treat migraines or seizures, such as topiramate (Topamax; Trobendi XR; Qudexy XR).



## 2 Struvite stones

Struvite stones form in response to a urinary tract infection. These stones can grow quickly and become quite large, sometimes with few symptoms or little warning.

## 3 Uric acid stones

Uric acid stones can form in people who lose too much fluid because of chronic diarrhea or malabsorption. Those who eat a high-protein diet, and those with diabetes or metabolic syndrome. Certain genetic factors also may increase your risk of uric acid stones.

## 4 Cystine stones

These stones form in people with a hereditary disorder called cystinuria that causes the kidneys to excrete too much of a specific amino-acid.

## ★ Diagnosis

If your doctor suspects that you have a kidney stone, you may have diagnostic tests and procedures such as:



## 1 Blood testings

Blood tests may reveal too much calcium or uric acid in your blood. Blood test results help monitor the health of your kidneys and may lead your doctor to check for other medical conditions.

## 2 Urine testings

The 24-hour urine collection test may show that you are excreting too many stone-forming minerals or too few stone-preventing substances. For this test, your doctor may request that you perform two urine collections over two consecutive days.

## 3 Imagings

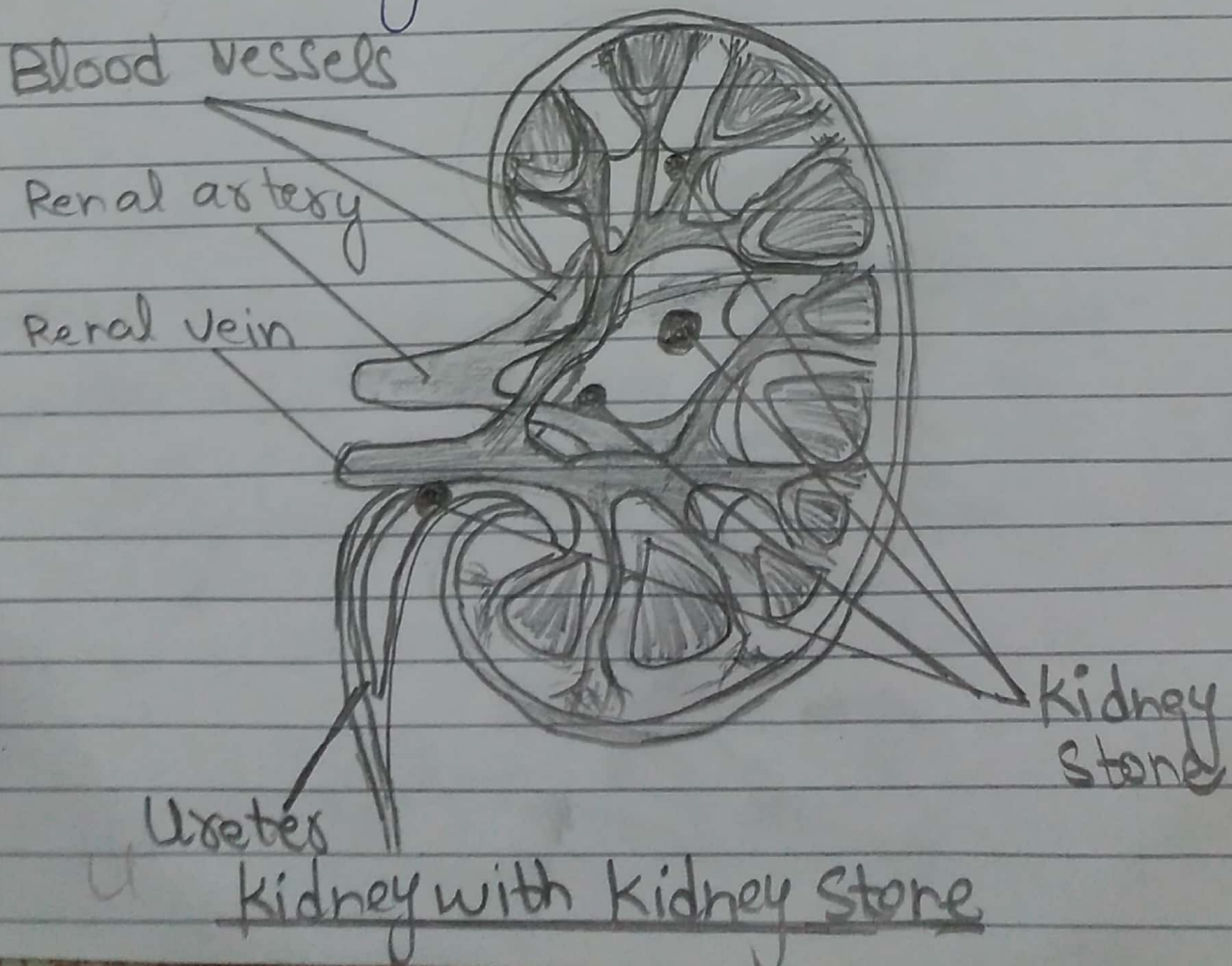
Imaging tests may show kidney stones in your urinary tract. High speed or dual energy computerized tomography (CT) may reveal even tiny stones. Simple abdominal x-rays are used less frequently because this kind of imaging test can miss small kidney stones.



Ultrasound, a noninvasive test that is quick and easy to perform, is another imaging option to diagnose kidney stones.

#### 4 Analysis of Passed Stones

You may be asked to urinate through a strainer to catch stones that you pass. Lab analysis will reveal the makeup of your kidney stone. Your doctor uses this information to determine what's causing your kidney stone and to form a plan to prevent more kidney stones.



## Question NO: 4

Briefly describe the types, causes, diagnosis and treatment of goiters

### Goiters:

Non-inflammatory, non-neoplastic enlargement of the thyroid gland.

### TYPES of goiters:

Goiters have many causes. As a result, there are different types. These include:

#### Colloid goiter (endemic):

A colloid goiter develops from the lack of iodine, a mineral essential to the production of thyroid hormones. People who get this type of goiter usually live in areas where iodine is scarce.

#### Non-Toxic goiter (sporadic):

The cause of a non-toxic goiter is usually unknown; though it may be caused by medications like lithium. Lithium is used to treat mood disorders such as bipolar disorder. Non-toxic goiters don't affect the production of thyroid hormone, and



thyroid function is healthy. They are also benign.

### 3 Toxic nodular or multinodular goiters:

This type of goiter forms one or more small nodules as it enlarges. The nodules produce their own thyroid hormone, causing hyperthyroidism. It generally forms as an extension of a simple goiter.

### \* Causes of goiters:

Other disease and conditions can also cause a goiter. These include:

#### 1 Graves' disease:

Graves' disease is an autoimmune disease (your body's immune system mistakenly attacks your health body). In this case, the immune system attacks the thyroid gland and the thyroid grows larger.

#### 2 Hashimoto's disease:

This is another autoimmune disease. In this case, the disease causes inflammation (swelling) of the thyroid gland. This causes it to produce fewer thyroid hormones, resulting



in a goiter. This type of goiter usually gets better on its own over time.

### Nodular goiter:

In this condition, growths called nodules occur on one or both sides of the thyroid gland, causing it to grow larger.

### Thyroid Cancer

Cancer of the thyroid gland often enlarges the thyroid.

### Pregnancy:

Human chorionic gonadotropin, a hormone that a woman produces during pregnancy, can cause the thyroid to grow.

### Thyroiditis:

Inflammation of the thyroid gland itself can cause the thyroid gland to grow. This can happen after the person has an illness caused by a virus or after a woman gives birth.



## \* Diagnosis of goiters:

Several tests can be used to diagnose and evaluate goiters, including the following:

### 1 Physical exams:

Your doctor may be able to tell if the thyroid gland has grown by feeling the neck area for nodules and signs of tenderness.

### 2 Hormone tests:

This blood test measures thyroid hormone levels, which tell if the thyroid is working properly.

### 3 Antibody tests:

This blood test looks for certain antibodies that are produced in some forms of goiter. An antibody is a protein made by white blood cells. Antibodies help defend against invaders (for example, viruses) that cause disease or infection in the body.

### 4 Ultrasound of the thyroid:

Ultrasound is a procedure that sends high-frequency sound waves through body tissues. The echoes are recorded and transformed into video or

Photos. Ultrasound of the thyroid reveals the gland's size and finds nodules.

### Thyroid scans:

This imaging test provides information on the size and function of the gland. In this test, a small amount of radioactive material is injected into a vein to produce an image of the thyroid on a computer screen. This test is not ordered very often, since it is only useful in certain circumstances.

### CT scan or MRI (magnetic resonance imaging) of the thyroid:

If the goiter is very large or spreads into the chest, a CT scan or MRI is used to measure the size and spread of the goiter.

### Treatment of goiters:

Your doctor will decide on a course of treatment based on the size and condition of your goiter, and symptoms associated with it. Treatment is also based on health problems that contribute to the goiter.



## Medications:

If you have hypothyroidism or hyperthyroidism, medications to treat these conditions may be enough to shrink a goiter. Medications (corticosteroids) to reduce your inflammation may be used if you have thyroiditis.

## Surgeries:

Surgical removal of your thyroid, known as thyroidectomy, is an option if your goiter grows too large or doesn't respond to medication therapy.

## Radioactive iodine:

In people with toxic multinodular goiters, radioactive iodine (RAI) may be necessary. The RAI is ingested orally, and then travels to your thyroid through your blood, where it destroys the overactive thyroid tissue.

## Home Care

Depending on your type of goiter, you may need to increase or decrease your iodine intake at home. If a goiter is small and does not cause any problems, you may need no treatment at all.

## Question No: 5

Write a detail note on Atelectasis, bronchiectasis and Pneumonia.

### Atelectasis:

Area of collapsed or non expanded lung. At refers either to incomplete expansion of the lungs or the collapse of previously inflated lung substance, producing area of relatively airless pulmonary parenchyma.

### Types of Atelectasis:

#### Obstruction/ resorption atelectasis:

Collapse of lungs due to resorption of air distal to an obstruction.

#### Examples:

aspiration of a foreign body  
Chronic obstructive pulmonary disease (COPD)  
OR Postoperative

#### Compression atelectasis:

Due to fluid, air, blood, or tumor in the pleural space.

#### Contraction (scar) atelectasis:

Due to fibrosis and scarring of the lungs.



## Patchy atelectasis:

Due to a lack of surfactant in neonatal and acute (adult) respiratory distress syndrome (ARDS).

Atelectasis causes decrease oxygenation and predisposed to infection.

Most of the atelectasis are reversible disorder.

## Risk factors:

Anesthesia, foreign bodies in the airway, lung disease, mucous plugging of the airway pressure caused by mass or fluids, prolong bed rest.

## Symptoms:

Trouble breathing

Pleurisy (chest pain with inspiration)

Cough

Fever

## Diagnostic evaluation:

Physical examination

History collection

chest X-ray

CBP :

CUA

sputum test c/s AFB staining

- CT-Chest/ CT- abdomen
- Bronchoscopy
- Radiography
- Oximetry

### \* Treatments:

- Cough and deep breath
- Analgesia
- Early ambulation
- Incentive spirometry
- Intermittent positive pressure breathing
- Oxygen
- Chest percussion and postural drainage
- Bronchodilators (Proventil)
- Antibiotics
- Mucolytic agent (Mucomyst - Decrease viscosity of secretions)
- chest tube

## 2 Bronchiectasis:

Bronchiectasis is a chronic, irreversible dilation of the bronchi and bronchioles. Bronchiectasis is characterized by permanent abnormal dilation of one or more large bronchi.



## Causes:

Bronchiectasis may be caused by a variety of conditions.

Airway obstruction

Diffuse airway injury

Pulmonary infections (complications of long term pulmonary infection)

Genetic disorder (cystic fibrosis)

Abnormal host defense

Idiopathic cause

## Clinical Features:

Sputum: copious and purulent

Fever

Hemoptysis

Persistent or recurrent cough with purulent sputum.

Anorexia and poor weight gain may occur as time passes.

Crackles localized to the affected area.

Wheezing as well as digital clubbing may also occur

Upper respiratory infection may develop

## \* Diagnosis:

- 1 Clinical
- 2 Radiology: chest X-ray → may be non-specific mild disease  
CT-scan: bronchial thickening, dilated bronchioles.
- 3 Sputum cultures: *Pseudomonas aeruginosa*, *H. influenzae*.
- 4 Lung function: Airflow obstruction.
- 5 Sweat test - increased sodium and chloride in cystic fibrosis.
- 6 Bronchoscopy: obstruction - foreign body, tumor.
- 7 Immunoglobulin
- 8 Cili function and structure - Kartagener syndrome

## 3 Pneumonia:

Pneumonia is an infection in one or both lungs. Pneumonia causes inflammation in the alveoli. The alveoli are filled with fluid or pus, making it difficult to breathe. "Inflammation and consolidation of lung tissue due to an infectious agent."



## \* Etiology:

- Bacteria, viruses, mycoplasmas, fungal agents and Protozoa.
- Aspiration of food, fluids/vomitus
- Inhalation of toxic/caustic chemicals, smoke, dusts/gases.
- Influenza.

## \* Risk Factors:

- Advanced age
- History of smoking
- Upper respiratory infection
- Tracheal intubation
- Prolonged immobility.
- Immunosuppressive therapy
- Non functional immune system
- Malnutrition
- Dehydration
- chronic disease state

## \* Clinical diagnosis

- History
- Signs and symptoms
- Chest X-ray
- CT



## \* Classification

classification based on two types

### 1 Type 1s

- Lobax pneumonia
- Bronchopneumonia

### 2 Type 2s

- Community-acquired pneumonia (CAP)
- Hospital-acquired pneumonia (HAP)

#### a. Lobax Pneumonias

Lobax Pneumonia is acute bacterial infection of a part of lobe the entire lobe, or even two lobes of one or both the lungs.

#### b. Bronchopneumonias

Bronchopneumonia is infection of the terminal bronchioles that extends into the surrounding alveoli resulting in patchy consolidation of the lungs.

→ The organisms which cause Lobax Pneumonia are streptococcus pneumonia (more than 90% in cases) staphylococcus aureus.

→ Gram negative bacteria such as H. influenza, klebsiella, pseudomonas, proteus and E. coli.



## Morphological stages

There are four morphological stages in lobar pneumonia.

Congestion

Red hepatization

Grey hepatization

Resolution

## Signs and Symptoms:

High fever, shaking chills

Shortness of breath (Dyspnoea)

Increased breathing rate

Chest pain when you breathe deeply or cough

Dusky or purplish skin colour (cyanosis)

from poorly oxygenated blood.

Fatigue and muscle aches

Nausea, vomiting or diarrhoea

Cough, particularly cough productive of sputum