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BS: RADIOLOGY

FINAL EXAM

PAPER

CLINICAL MEDICINE

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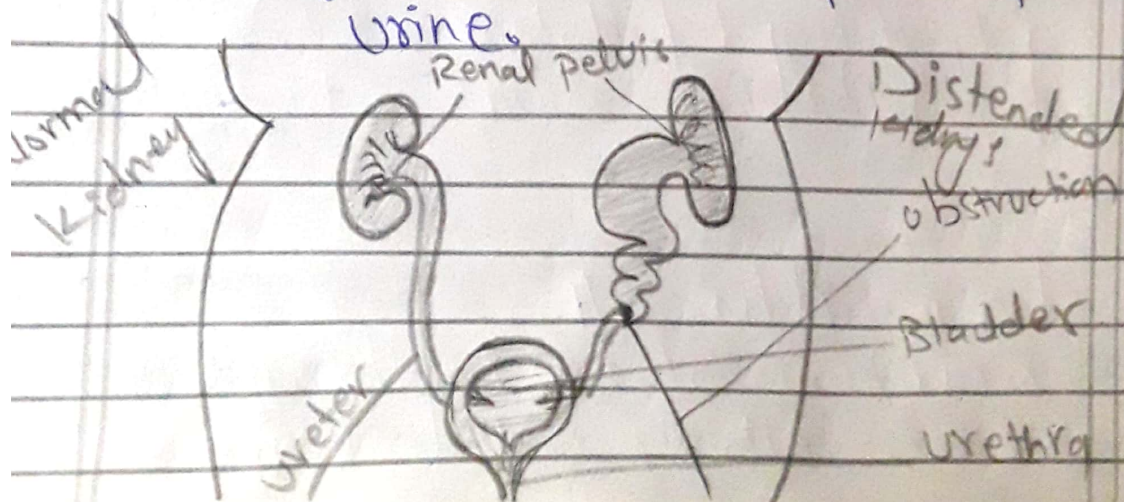
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Question 1:-

What is hydronephrosis? Write in detail its causes, pathophysiology, Diagnosis and Treatment?

~~Hydro~~ "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 kidneys.
- ⇒ Usually due to partial obstruction to the outflow of



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Causes-

⇒ Hydronephrosis is usually caused by another underlying illness or Risk Factor. Causes of hydronephrosis include, but are not limited to the following illnesses or Risk Factors.

- Kidney Stone
- Congenital blockage (a defect that is present at birth)
- Blood clot
- Scarring of tissue (from injury or previous surgery)
- Tumor or Cancer (examples include bladder, Cervical, Colon, or prostate)
- Enlarged prostate (noncancerous)
- pregnancy
- Urinary tract infection (or other disease) that cause inflammation of the urinary tract).

Pathophysiology-

Hydronephrosis is caused by obstruction of urine before the renal pelvis. The obstruction causes dilation of the Nephron

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tubules and flattening of the lining of the tubules within the kidney which in turn causes swelling of the renal calyces.

⇒ Hydronephrosis can either be acute or chronic. In acute hydronephrosis full recovery of kidney function is seen, however with chronic hydronephrosis, permanent loss of kidney function is seen even once obstruction is removed.

→ Obstruction occurring in the lower urinary tract can also cause this increased pressure through the reflux of urine into the kidney.

Common causes include bladder dysfunction and urethral obstruction (such as posterior urethral valves in male, prostatic hypertrophy in older male adults.)

Diagnosis:-

→ An ultrasound is typically used to confirm a diagnosis. This procedure uses

Sound waves to create an image of your kidneys. A Doctor can also confirm a diagnosis with x-rays, computerized tomography (CT) and magnetic resonance imaging (MRI). Diagnosis could also involve a cystoscopy, which uses a long tube with a light and camera at the end (cystoscope) that allows the doctor to look inside the bladder and urethra.

=> Blood and urine tests can also check kidney function. The doctor can also check for blood in the urine, which can be caused by a kidney stone, infection or other factor.

=> Symptoms and signs

=> ultrasound

=> IVP

=> Cystourethrogram

=> Cystoscopy

=> RUGP

=> Delayed empty

=> Isotope Renography

=> Urine culture

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Treatment:-

⇒ Hydronephrosis is usually treated by addressing the underlying disease or cause, such as a kidney stone or infection. Some causes can be resolved without surgery. Infection can be treated with antibiotics. A kidney stone can pass through by itself or might be severe enough to require removal with surgery.

⇒ Depends on the cause, site, duration, and degree of kidney damage

- 1 U.T.I. Antibiotic therapy
- 2 Prompt Drainage
- 3 Corrected to the cause
- 4 Relief of lower tract obstruction

Catheter Drainage, Urinary Diversion, indwelling pigtail ureteral catheter

5 Nephrectomy (tumor or nonfunction kidney).

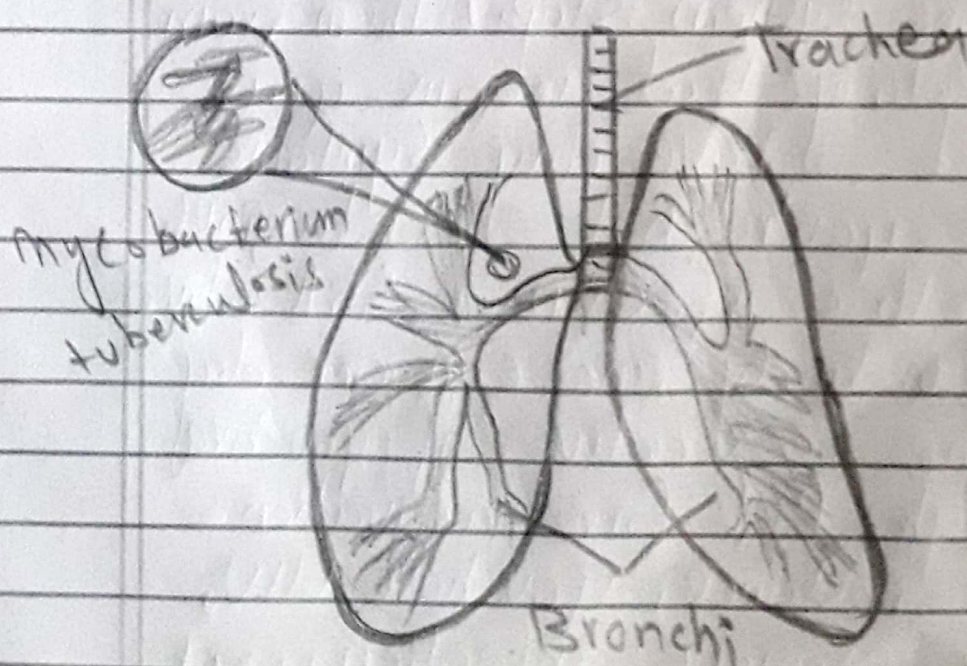
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Question 2:-

Explain in Detail the types
Categories and pathophysiology
of tuberculosis?

Tuberculosis:-

Tuberculosis (TB) is a disease caused by bacteria called mycobacterium tuberculosis. The bacteria usually attack the lungs, but they can also damage other part of the body. TB spreads through the air when a person with TB of the lungs or throat coughs, sneezes, or talks.



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Types:-

- ① Active TB
- ② Latent TB
- ③ Miliary TB

① Active TB:-

This means the germs multiply and can make you sick. You can spread the Disease to others, Ninety percent of adult cases of active TB are from the Reactivation of a latent TB infection.

② Latent TB:-

You have the germs in your body, but your immune system stops them from spreading. That means you don't have any symptoms and you're not contagious. But the infection is still alive in your body and can one day become active, if you're at high risk for re-activation - for instance, you have HIV, your primary infection was

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in the past 2 years, your chest x-ray is abnormal, or your immune system is compromised. Your doctor will treat you with antibiotics to lower the risk for developing active TB.

③ Miliary TB:-

Miliary TB is a rare form of active disease that occurs when TB bacteria find their way into the blood stream. In this form, the bacteria quickly spread all over the body in tiny, tiny nodules and affect multiple organs at once.

⇒ 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.

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Pathophysiology:-

Initial infection or primary infection

↓
Entry of micro organism through droplet nuclei

↓
Bacteria is transmitted to alveoli through airways

↓
Deposition and multiplication of bacteria

↓
Bacilli are also transported to other parts of the body via blood stream and phagocytosis by neutrophils and macrophages

↓
mycobacterium

↓
pulmonary alveoli

↓
Immune system has lodged in (Alveolar macrophages)

↓
Detects presence of pathogen and engulf the bacteria

↓
mycobacterium bacteria inhibits the

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macrophages (phagosome + lysosome)
to form phagolysosome and remains
protected inside the macrophages



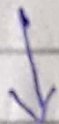
Starts Replication inside Macrophages



Primary infection occurs



cell mediated immunity gets activated,
Surrounds the cell to form granuloma
(3 weeks)



leads to Necrosis of tissue at infection
site (Terminus gone Focus)



Involve Neaby lymph Nodes
(cone complex)



Calcification of Cone complex
(latent T.B)

Question 3:-

Briefly describe the types, causes, diagnosis and treatment of goiter?

GOITER:-

- ⇒ Goiter is a disease of thyroid gland characterized by an enlargement of the gland, visible externally as a swelling on the front of the neck. In simple goiter the Basal metabolic Rate (the least amount of energy necessary to maintain the vital involuntary activities) is somewhat lowered, and in toxic goiter is elevated.
- ⇒ A goiter may develop in anyone, but is more common in women. Sometimes, it affects the way the thyroid function.

Types:-

There are 2 main types of goitre.

① Diffuse Goiters

where the entire thyroid gland swells and feels smooth to the touch.

② Nodular Goiters

where solid or fluid-filled lumps called nodules develop within the thyroid and make the thyroid gland feel lumpy to touch, the nodules can be single or multiple and may contain fluid.

Causes:-

- ⇒ Lack of dietary iodine, Family history, people over age 40
- ⇒ High levels of TSH
- ⇒ Grave Disease, Hashimoto's Disease
- ⇒ multi-nodular goiter, Solitary thyroid nodules
- ⇒ Thyroid Cancer, pregnancy and inflammation

The most common cause of goiters worldwide is a lack of iodine in the diet. In the United States, where the use of iodized salt is common, a goiter is more

often due to the over- or underproduction of thyroid hormones or to nodules in the gland itself.

Diagnosis:-

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

1:- Physical Exam

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 Test:-

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

3:- Antibody Test:-

This blood test looks for certain antibodies that are produced in some form of goiter. An antibody is a protein made by

white blood cells. Antibodies help defend against invaders (for examples

viruses, that causes Disease or infection in the body.

4:- ultraSound of the thyroid:-

An ultraSound produces images of your Neck, the size of your goiter, and whether there are Nodules, over time, an ultraSound can show change in those Nodules and the goiter.

5:- 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.

6:- CT Scan or MRI:-

if the goiter is

Very large or spreads into the chest, a CT Scan or MRT is used to measure the size and spread of the goiter.

Treatment:-

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.

Medication:-

If you have hypothyroidism or hyperthyroidism, medication to treat these conditions, may be enough to shrink a goiter. Medication 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, RAI be necessary. The RAI is ingested orally, and then travels to your thyroid through your blood, where it destroys the excess tissue.

Home Care:-

Depending on your type of goiter, you may need to increase or decrease your iodine intake at home.

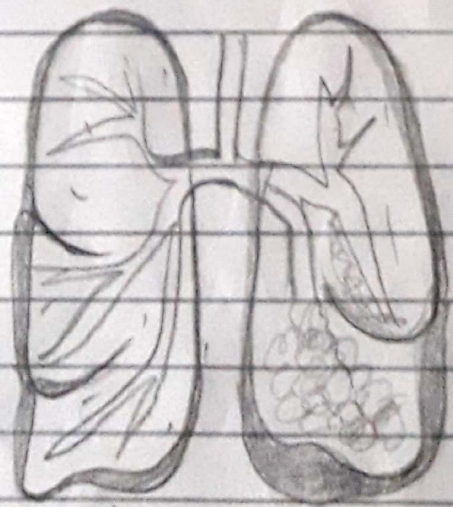
If a goiter is small and doesn't cause any problems, you may require no treatment at all.

Question 4:-

write a detail Note on
Atelectasis, bronchiectasis
and pneumonia?

① Bronchiectasis:-

Bronchiectasis is the permanent dilation of bronchi and bronchioles due to destruction of the muscle and elastic supporting tissue, Resulting from or associated with chronic / Narcotizing infection. Bronchiectasis is a secondary Disease due to persistent infection or obstruction.



Normal lung

Bronchiectasis

Clinical Manifestation:-

- Persistent or Recurrent cough with purulent sputum.
- Haemoptysis
- Dyspnoea, wheezing - widespread bronchiectasis or underlying COPD.
- Episodic Fever
- Upper Respiratory infection may develop
- In Severe cases due to obstructive ventilatory defect are cause hypoxemia, hypercapnia, and pulmonary hypertension
Rarely

Diagnoses:-

- Clinical
- Radiology: chest x-ray
may be non-specific
mild disease
- CT Scan: bronchial thickening
dilated bronchioles
- Sputum culture: pseudomonas aeruginosa, H. influenzae
- Lung Function: Airflow obstruction
- Sweat test - increase sodium and chloride in cystic fibrosis
- Immunoglobulin

Treatment:-

- Eliminate Cause
- Improve tracheo bronchial clearance
- Control infection
- Reverse airflow obstruction
- Chest physical therapy
- Bronchodilators
- Antibiotics - short course, prolonged course, intermittent regular courses, inhalation.

② PNEUMONIA:-

Pneumonia is an inflammation of the lung parenchyma

(ie) alveoli rather than the bronchi

⇒ It is the most common infection causes of death.

⇒ It is usually characterized by consolidation (solidification)

⇒ Consolidation is a pathological process in which the alveoli are filled with a mixture of inflammatory exudate, bacteria and WBC

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Classification

Type 1

(Morphological classification)

- Lobar pneumonia
- Bronchopneumonia

Type 2

(Clinical classification)

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

⇒ The organisms which cause lobar pneumonia are

Streptococcus pneumoniae (more than 90% in case)

Staphylococcus aureus

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

Morphological Stages:-

There are four morphological stages in lobar pneumonia

- ① Congestion
- ② Red hepatization
- ③ Grey hepatization
- ④ Resolution

Clinical Diagnosis:-

- History
- Signs and Symptoms
- chest x-ray
- CT

Diagnoses:-

- Gram's Stain and culture of
- Sputum
- Blood culture
- polymense chain Reaction
- Serology
- Bronchoalveolar lavage
- Bronchoscopy

③ Atelectasis:-

Atelectasis is the collapse or closure of a lung resulting in reduced or absent gas exchange.

It is usually unilateral, affecting part or all of one lung. It is a condition where the alveoli are deflated down to little or no volume, as distinct from pulmonary consolidation in which they are filled with liquids.

⇒ Risk Factors:-

- ⇒ Anesthesia,
- ⇒ Foreign bodies in the airway,
- ⇒ Lung Disease, mucous plugging of the air way pressure caused by mass or fluid, prolong bed rest.

Symptoms:-

- ⇒ Trouble breathing
- ⇒ pleurisy (chest pain with inspiration)
- ⇒ Cough
- ⇒ Fever

① Obstructive Atelectasis:-

- Most common type
- Results from blockage of airway
- Resorption atelectasis occurs when an obstruction prevents air from reaching distal airway
- It is the consequence of complete obstruction of the airway.

② Non-obstructive Atelectasis:-

- Passive
- Compressive
- Contracture
- Adhesive

In these form of atelectasis secretions are able drain up the bronchial tree. Because there is no obstruction bronchoscopy is not therapeutic.

Types:-

① Resorptive Atelectasis:-

when airway are obstructed there is no further ventilation to the lungs and beyond. In the early stages,

blood flow continues and gradually the oxygen and Nitrogen get absorbed, Resulting in atelectasis

② Relaxation :-

The lung is held close to the chest wall because of the negative pressure in the pleural space. once the negative pressure is lost the lung tends to recoil due to elastic properties and becomes atelectatic. This occurs in patients with pneumothorax and pleural effusion.

③ Adhesive Atelectasis:-

Surfactant Reduce Surface tension and keep the alveoli open. In conditions where there is loss of surfactant, the alveoli collapse and become atelectatic.

In ARDS this occurs diffusely to both lungs. In pulmonary embolism/ due to loss of blood flow and lack of CO_2 , the integrity of Surfactant gets impaired.

④ Circumferential Atelectasis:-

Alveoli gets trapped in Scar and becomes atelectatic in Fibrotic disorders.

⑤ Round Atelectasis:-

An instance where the lung gets trapped by pleural Disease and is devoid of air, classically encountered in asbestosis.

Mechanisms:-

Compression atelectasis occurs from any space-occupying lesion of the thorax. Compresses the lung and forces air out of the alveoli. The mechanism is similar to Relaxation atelectasis.

Question 5:-

How are Renal Stones formed and what are different types of Renal Stones? which Radiological procedure is most suitable for Diagnosing Renal Stone?

Formation of Renal Stones:-

The Formation of Renal Stones is a consequence of increased urinary supersaturation with subsequent formation of crystalline particles. Since most of the solid particles crystallizing within the urinary tract will be excreted freely, particle formation is by no means equivalent to symptomatic stone disease. However when solid particles are retained within the kidney, they can grow to become full size stones.

Crystals can be retained at many sites in the kidney and

undergo the size-enhancing process of growth and aggregation.

Crystal-cell interaction is the next step, and is also promoted by renal tubular injury. Since crystal formation is a common phenomenon in human urine and crystalluria per se is harmless, abnormal retention of formed particles most occurs when kidney stones form. Thus crystal-cell interaction may be highly relevant. The crystals that are internalized in the interstitium undergo growth and aggregation, and develop into renal stones.

Types of Renal Stones:-

① Calcium oxalate stones

The most common type of kidney stone is a calcium oxalate stone. These result when the urine contains low levels of citrate and high level of

Calcium and either oxalate or uric acid. Calcium oxalate

Stones are linked with foods high in oxalate, which is a naturally occurring substance in plants and animals. These include beets, black tea, chocolate, Nuts, potatoes and Spinach.

② Calcium phosphate Stones:-

Calcium phosphate kidney stones are caused by abnormalities in the way the urinary system functions. Your doctor may order a series of blood and urine tests to determine whether any urinary or kidney problems could be causing this type of stone, which often occurs simultaneously with calcium oxalate stones.

③ Struvite Stones:-

More common in women, struvite stones form as a result of certain types of urinary tract infections. These

Stones tend to grow quickly and become large, sometimes occupying the entire kidney. Left untreated, they can cause frequent and sometimes severe urinary tract infection and loss of kidney function.

⑤ Uric Acid Stones:-

More common in men, uric acid stones tend to occur in people who don't drink enough water or have a diet high in animal protein. They are also more likely to occur in people who have gout, a family history of this type of kidney stone, or in those who've had chemotherapy.

⑤ Cystine Stones:-

Cystine stones are caused by a hereditary genetic disorder called cystinuria that can lead to excessive amount of the amino acid cystine collecting

in the urine. This can result in the formation of stones in the kidney, bladder and ureters, which transport urine from the kidney to the bladder.

Diagnosis:-

① CT Scan:-

Your doctor may use a CT Scan to look for stones in the kidneys, ureters, and bladder to determine their size and exact location, and to evaluate the anatomy of your urinary tract.

② ultrasound:-

Your doctor may recommend an ultrasound scan to evaluate your kidney, bladder, and ureters, which are the tubes that carry urine from the kidney to the bladder. This helps your doctor to check for stones that haven't passed.

to monitor the growth of a stone and to screen for recurrence. In this test, a handheld device called a transducer is placed on the abdomen and used to produce sound waves that create image of the pelvic organs.

③ Intravenous pyelogram (IVP):-

An Intravenous pyelogram (Ivp) is a test that uses an x-ray and dye to show your kidney and urinary tract. It takes images of your kidney, bladder and ureters. The ureters are the tubes that carry urine from your kidney to your bladder. If you are having urinary tract problems or abdominal pain, your doctor might order an IVP. An IVP can be done in your doctor's office by an x-ray technician. It can also be done in a hospital.

⑤ Kidney-Ureter-Bladder x-rays:-

A Kidney-Ureter-bladder or KUB, x-ray of the abdomen and pelvic can help doctors to determine whether a kidney stone has grown, passed or returned.

⑥ Urine Tests:-

Your Doctor may analyze a sample of your urine in order to check for crystals, which can lead to the formation of kidney stones, and order a urine culture to determine if you have a urinary tract infections.

⑦ Blood Test:-

During your initial exam, your doctor may collect a small amount of blood in order to assess your kidney function, look for signs of

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infection, and test for factors that can contribute to the formation of kidney stones, such as high calcium levels, parathyroid hormones and uric acid.
