Meningitis and its types

- Meningitis is a medical condition characterized by inflammation of the meninges,
- which are the protective membranes surrounding the brain and spinal cord.
- Meningitis can be caused by various infectious agents, and there are several different types of meningitis.
- The three most common types of meningitis are bacterial meningitis, viral meningitis, and fungal meningitis.

Bacterial Meningitis:

- Bacterial meningitis is a serious and potentially life-threatening form of the disease.
- Usually caused by various types of bacteria, with the most common pathogens being Streptococcus pneumoniae, Neisseria meningitidis (meningococcus), and Haemophilus influenzae type b.

Some important Bacterial Meningitis

1. **Meningococcal meningitis** is a type of bacterial meningitis caused by the bacterium Neisseria meningitidis, also known as meningococcus.
   - This bacterium can cause severe and potentially life-threatening infections, including meningitis and bloodstream infections.
   - Meningococcal meningitis is a significant public health concern due to its rapid onset, potential for outbreaks, and high mortality rate if left untreated.
2. **Tuberculous meningitis (TBM),** also known as tubercular meningitis, is a severe form of meningitis caused by Mycobacterium tuberculosis, the same bacterium that causes tuberculosis (TB).
   - TBM occurs when the bacteria spread from a primary TB infection elsewhere in the body, such as the lungs, to the membranes surrounding the brain and spinal cord (the meninges).
   - This form of meningitis is relatively rare but can be life-threatening if not promptly diagnosed and treated

- Bacterial meningitis can develop rapidly and requires prompt medical treatment with antibiotics.
- Such as ceftriaxone or penicillin, are crucial to improving the chances of recovery.
- Hospitalization is often required for close monitoring and intravenous antibiotic administration
- Symptoms include fever, severe headache, stiff neck, nausea, vomiting, sensitivity to light, and confusion.
- Patients may also develop a characteristic rash of dark purple or red spots.
- The treatment and prognosis for meningitis depend on the type of infection causing it.
- Vaccines are available to prevent some types of bacterial meningitis, such as those caused by Haemophilus influenzae type b and Neisseria meningitidis

Viral Meningitis:

- Viral meningitis is generally less severe than bacterial meningitis.
- It is typically caused by various viruses, including enteroviruses (most common), herpes simplex virus, and mumps virus.
- Viral meningitis is usually a self-limiting condition and often resolves on its own without specific antiviral treatment.
- Symptoms are similar to bacterial meningitis but tend to be milder. These symptoms may include fever, headache, stiff neck, sensitivity to light, and fatigue.

Fungal Meningitis:

- Fungal meningitis is relatively rare and is caused by fungi like Cryptococcus and Histoplasma.
- It often affects people with weakened immune systems, such as those with HIV/AIDS or individuals undergoing chemotherapy.
- Symptoms are similar to bacterial meningitis but progress more slowly.
    1. Cryptococcal meningitis is a type of fungal meningitis caused by the Cryptococcus species of fungi, with Cryptococcus neoformans and Cryptococcus gattii being the most common causative agents.
        - This form of meningitis primarily affects individuals with weakened immune systems, such as those with HIV/AIDS, organ transplant recipients, and people undergoing immunosuppressive therapy.
- Fungal meningitis can be chronic and may require long-term antifungal therapy.
- In addition to these main types of meningitis, there are other less common forms, such as parasitic meningitis, which is caused by parasites like Naegleria fowleri and is extremely rare but often fatal.

Some other term for meningitis.

- "Cerebrospinal fever" is another term for meningitis. It is not a separate medical condition but rather an alternative name for the same disease.
- Meningitis is characterized by the inflammation of the meninges, which are the protective membranes that cover the brain and spinal cord.
- This inflammation can be caused by various infectious agents, including bacteria, viruses, fungi, or, in rare cases, parasites.
- The term "cerebrospinal fever" may have been used historically to describe meningitis, but in modern medical terminology, it is more commonly referred to as meningitis.
- The symptoms, causes, and treatment of cerebrospinal fever are the same as those for meningitis, and it is essential to recognize and treat the condition promptly, especially in cases of bacterial meningitis, as it can be life-threatening if not treated promptly with antibiotics.
- Viral and fungal forms of meningitis tend to be less severe and are managed differently, often with supportive care and antiviral or antifungal medications, respectively.
- Bacterial meningitis is a medical emergency and requires immediate treatment with antibiotics, while viral and fungal forms may be less severe and managed with supportive care and antiviral or antifungal medications.

Emphysema

- It is characterized by abnormal permanent enlargement of lung air spaces with the destruction of their walls without any fibrosis and destruction of lung parenchyma with loss of elasticity.
- It is a chronic lung disease that primarily affects the air sacs (alveoli) in the lungs.
- The damage to the alveoli reduces their ability to expand and contract effectively during breathing.
- This results in air becoming trapped in the alveoli, making it difficult for the person to exhale properly.
- Over time, the walls of the alveoli can become weakened and lose their structure, leading to a decrease in the overall surface area available for oxygen and carbon dioxide exchange.

➢ **There are two main types of emphysema based on the location and distribution of the lung damage**

1. Centriacinar Emphysema (Centrilobular Emphysema):
   - This is the most common type of emphysema.
   - It primarily affects the central or proximal parts of the acini (the functional units of the lung).
   - Often associated with cigarette smoking.
   - It tends to start in the respiratory bronchioles and then spreads to the alveoli.
2. Panacinar Emphysema (Panlobular Emphysema):
   - This type of emphysema affects the entire acinus uniformly.
   - It is often associated with a genetic condition called alpha-1 antitrypsin deficiency, which leads to a lack of a protective protein in the lungs.
   - People with alpha-1 antitrypsin deficiency are more prone to developing this type of emphysema even without smoking.

❖ It's important to note that these two types of emphysema are not mutually exclusive, and some individuals may exhibit a combination of both centriacinar and panacinar emphysema.

Emphysema can also be classified based on its severity:

1. Mild Emphysema: Lung function is only mildly impaired, and symptoms may not be very noticeable.
2. Moderate Emphysema: Lung function is moderately affected, and symptoms like shortness of breath become more pronounced during physical activity.
3. Severe Emphysema: Lung function is significantly impaired, leading to significant breathing difficulties even at rest.
4. Very Severe Emphysema: The most advanced stage, where lung function is severely compromised, and individuals may require supplemental oxygen therapy or lung transplantation.

Causes:-

- Cigarette smoking
- Secondhand smoke
- Air pollution
- Occupational dust
- Chemicals
- A genetic deficiency known as alpha-1 antitrypsin deficiency can also lead to emphysema.

Symptoms:-

1. Shortness of breath, especially during physical activity
2. Chronic cough
3. Wheezing
4. Chest tightness
5. Increased production of mucus.

Investigation:-

- Lung function tests (spirometry), and imaging studies (such as chest X-rays or CT scans).
- These tests help assess lung function and confirm the presence and severity of the condition.

Treatment:-

- Emphysema is a chronic and progressive disease, its symptoms can be managed and its progression slowed through various treatments.

Common approaches include:

a. Smoking cessation: Stopping smoking is the most critical step in preventing further damage.
b. Medications: Bronchodilators and inhaled corticosteroids can help alleviate symptoms and improve lung function.

c. Pulmonary rehabilitation: Exercise programs and education aimed at improving lung function and overall quality of life.
d. Oxygen therapy: Supplemental oxygen may be prescribed for individuals with severe emphysema to improve oxygen levels in the blood.
e. Surgical options: In some cases, lung volume reduction surgery or lung transplantation may be considered for severe emphysema.

Bronchiectasis

- It is a chronic respiratory condition characterized by the irreversible widening and thickening of the airways (bronchi) in the lungs.
- This abnormal widening of the bronchi is often accompanied by inflammation and an excessive buildup of mucus in the affected airways.
- As a result, the airways become less effective at clearing mucus and debris, leading to recurrent infections and breathing difficulties.

Causes:-

- Chronic respiratory infections, such as recurrent pneumonia or tuberculosis.
- Cystic fibrosis, a genetic condition that affects the production of mucus.
- Inhalation of foreign objects.
- Immunodeficiency disorders.
- Autoimmune conditions.
- Allergic bronchopulmonary aspergillosis (ABPA).
- Chronic obstructive pulmonary disease (COPD).

Symptoms:-

- Chronic cough, which often produces large amounts of mucus
- Shortness of breath
- Wheezing
- Chest pain, and recurring respiratory infections.
- Over time, bronchiectasis can lead to progressive lung damage and decreased lung function.

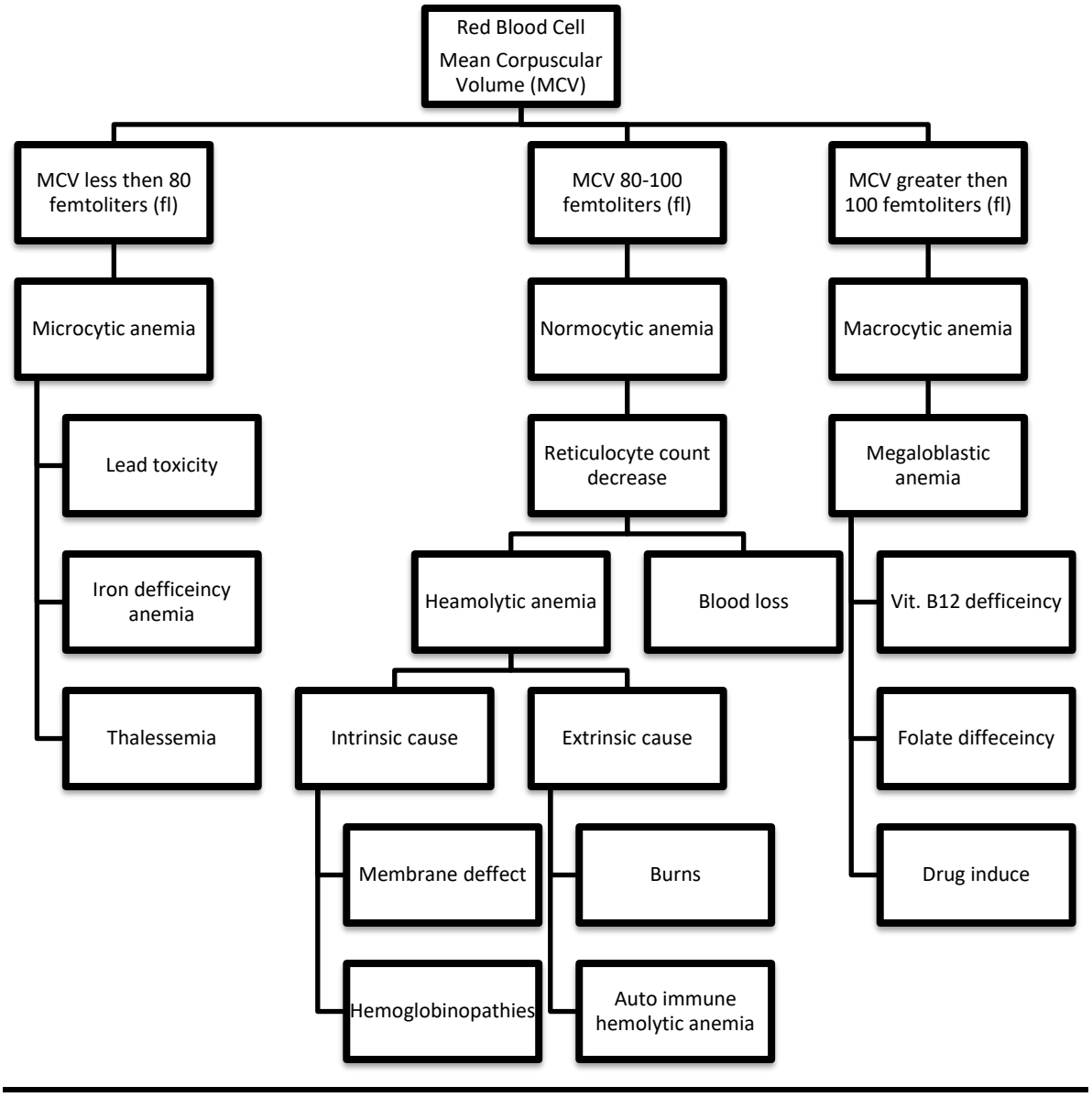
Investigations:-

- Chest X-rays, CT scans, pulmonary function tests, and sputum cultures to identify any underlying causes or infections.

Treatment:-

a. Treatment for bronchiectasis aims to manage symptoms, prevent further lung damage, and address any underlying causes or infections. Common treatment approaches include:
b. Antibiotics: To treat and prevent respiratory infections.
c. Chest physiotherapy: Techniques that help clear mucus from the airways.
d. Bronchodilators: Medications that can help open the airways and improve breathing.
e. Mucus-thinning medications.
f. Vaccinations: Such as the flu vaccine and pneumococcal vaccine to reduce the risk of infections.
g. Lifestyle modifications: Smoking cessation, avoiding respiratory irritants, and maintaining good overall health.

ANEMIAS



Iron deficiency anemia

- It is characterized by decreased serum iron, percent saturation of iron, with increased total iron-binding capacity (TIBC), transferrin levels, and soluble transferrin receptor

Thalassemia

- It is characterized by RBC count may be normal/high, low MCV, target cells, and basophilic stippling are on peripheral smear.
- Alpha thalassemia is differentiated from beta-thalassemia by a normal Hgb electrophoresis in alpha thalassemia.
- Elevated Hgb A2/HgbF is seen in the beta-thalassemia trait.

Lead Toxicity

- It is characterized by basophilic stippling on the peripheral blood smear, ringed sideroblasts in bone marrow, elevated lead levels

Vitamin B12 deficiency

- It is characterized by an elevated methylmalonic and homocysteine level

Folate deficiency anemia

- It is characterized by elevated homocysteine level in folate deficiency.
- Methylmalonic levels are relatively normal.

Steps to evaluate for hemolytic anemia

1) Confirm the presence of hemolysis- elevated LDH, corrected reticulocyte count >2%, elevated indirect bilirubin and decreased/low haptoglobin

2) Determine extra vs. intravascular hemolysis-

- Extravascular
    - Spherocytes present
    - Urine hemoglobin negative
- Intravascular
    - Urine hemosiderin elevated
    - Urine hemoglobin elevated

Clinical Features of anemia

- Weakness
- Tiredness
- Lethargy
- Shortness of breath, especially on exertion, near syncope
- Chest pain and reduced exercise tolerance- with more severe anemia
- Pica- desire to eat unusual and nondietary substances
- Mild anemia may otherwise be asymptomatic
- Skin may be cool to touch
- Tachypnea
- Hypotension (orthostatic)
- HEENOT: (Head, Ears, Eyes, Nose, Oral, Throat examination)
    - Eye Examination
    - Pallor of the conjunctiva
    - Jaundice- elevated bilirubin is seen in several hemoglobinopathies, liver diseases and other forms of hemolysis

    - Glossitis (inflammation of the tongue) and cheilitis (swollen patches on the corners of the mouth): iron/folate deficiency, alcoholism, pernicious anemia

- Abdominal exam:
    - Splenomegaly: hemolysis, lymphoma, leukemia, myelofibrosis
    - Hepatomegaly: alcohol, myelofibrosis
    - Scar from gastrectomy: decreased absorptive surface with the loss of the terminal ileum leads to vitamin B12 deficiency
- Cardiovascular:
    - Tachycardia
    - Systolic flow murmur
    - Severe anemia may lead to high output heart failure
- Neurologic exam: Decreased proprioception/vibration: vitamin B12 deficiency
- Skin:
    - Pallor of the mucous membranes/nail bed or palmar creases: suggests hemoglobin < 9 mg/dL
    - Petechiae: thrombocytopenia, vasculitis
    - Dermatitis herpetiformis (in iron deficiency due to malabsorption- Celiac disease)
    - Koilonychia (spooning of the nails): iron deficiency