Cardiovascular Disorders

1-Acute rheumatic fever

1-Acute rheumatic fever remains an important preventable cause of cardiac disease [1]. Acute rheumatic fever **usually affects children** (most commonly between 5 and 15 years) or young adults [2].

2-The condition is triggered by **an immune-mediated response to infection with specific strains of group A streptococci**, which have antigens that may cross-react with cardiac myosin and membrane protein. Antibodies produced against the streptococcal antigens cause inflammation in **the heart as well as the joints and skin** [2].

Table 1: criteria for the diagnosis of rheumatic fever

Major manifestations	
• Carditis • Polyarthritis • Chorea	• Erythema marginatum • Subcutaneous nodules
Minor manifestations	
• Fever • Arthralgia • Previous rheumatic fever	• Raised ESR or CRP • Leucocytosis • First-degree AV block
Plus	
• Supporting evidence of preceding streptococcal infection: recent scarlet fever, raised antistreptolysin O or other streptococcal antibody titre, positive throat culture	

[2].

Clinical features

1-Acute rheumatic fever is a multisystem disorder that usually presents with **fever**, and **joint pain**, **2–6 weeks after an episode of streptococcal pharyngitis** [1, 2].

2-The presence of either two **major criteria** or one major and two **minor criteria**, along with evidence of preceding **streptococcal infection**, confirm a diagnosis of acute rheumatic fever.
[Streptococcal antibody tests, such as the antistreptolysin O (**ASO**) titer, are the most reliable laboratory evidence of prior infection].

Management of the acute attack

1-A single dose of benzyl penicillin 1.2 million U i.m. or oral phenoxymethyl penicillin for 10 days should be given on diagnosis to

eliminate any residual streptococcal infection. If the patient is penicillin-allergic, erythromycin or a cephalosporin can be used.
2-**Bed rest is important**, as it lessens joint pain and reduces cardiac workload.
3-**Aspirin:** This will usually relieve the symptoms of arthritis rapidly. The usual dose of aspirin is 100 mg/kg/24 hr divided qid PO for 3-5 days, followed by 75 mg/kg/24 hr divided qid PO for 4 wk.

4-Patients with carditis and cardiomegaly or congestive heart failure should receive **corticosteroids**.
The usual dose of prednisone is 2 mg/kg/24 hr in 4 divided doses for 2-3 wk followed by a tapering of the dose that reduces the dose by 5 mg/24 hr every 2-3 days.

5-Supportive therapies for patients with moderate-to-severe carditis include **digoxin**, **fluid** and **salt restriction**, **diuretics**, and **oxygen**.

2-Viral Hepatitis

Etiology

1-There are six primary hepatitis viruses: Hepatitis A virus (HAV), Hepatitis B virus (HBV), Hepatitis C virus (HCV), Hepatitis D virus (HDV), Hepatitis E virus (HEV) and Hepatitis G virus (HGV).

2-They differ in their transmission, severity, likelihood of persistence, and subsequent risk of hepatocellular carcinoma.

	HAV	**HBV**	**HCV**	**HDV**	**HEV**	**HGV**
Transmission	Fecal-oral	Transfusion, sexual, perinatal	Parenteral, transfusion, perinatal	Similar to HBV	Fecal-oral	Parenteral transfusion

Note - The most important risk factor for acquisition of **HBV in children is perinatal exposure to infected mother**. In most cases, transmission **occurred at the time of delivery**; virus contained in amniotic fluid or in maternal blood may be the source. However less commonly intrauterine infection occurred .

3-**HBV and HCV cause chronic infection**, which may lead to **cirrhosis** and is a significant risk factor for **hepatocellular carcinoma** .

Clinical Manifestations

1-**Asymptomatic or mild**, nonspecific illness without icterus (jaundice) **is common** with HAV, HBV, and HCV, **especially in young children**.

2-The **preicteric phase**, which lasts approximately 1 week, is characterized by headache, anorexia, malaise, abdominal discomfort, nausea, and vomiting and usually precedes the onset of clinically detectable disease.

3-**Jaundice** and tender **hepatomegaly** are the most common physical findings and are characteristic of the **icteric phase**. Hepatic enzymes may increase 15- to 20-fold.

4-Resolution of the hyperbilirubinemia and normalization of the transaminases may take 6 to 8 weeks .

Complications

1-Most cases of acute viral hepatitis resolve without specific therapy, with less than 0.1% of cases progressing to **fulminant hepatic necrosis** which is associated with a high mortality rate.

2-**HAV and HEV cause acute infection only**. HBV, HCV, and HDV may persist as **chronic infection** with chronic inflammation, fibrosis, and **cirrhosis and the associated risk of hepatocellular carcinoma** .

Diagnosis

The diagnosis of viral hepatitis is confirmed by **serologic testing**.

Treatment

1-The treatment of acute hepatitis (**except HCV**) is largely supportive and involves rest, hydration, and adequate nutrition. Hospitalization is indicated for severe cases .

2-**Chronic HBV** infection may be treated with **interferon alfa-2b or lamivudine**, and HCV may be treated with interferon alfa usually in combination with Ribavirin .

Respiratory Disorders

1-Cystic Fibrosis

Background

1-Cystic fibrosis (CF) is an autosomal recessive multisystem disorder caused by mutations in the *cystic fibrosis transmembrane regulator* **(CFTR**) gene.

2- CFTR is important for the proper movement of salt and water across epithelial cell membranes especially in the airways, liver, and pancreas . The term *cystic fibrosis* arises from the fibrotic scar tissue that replaces the destroyed pancreas .

Pathophysiology

A-Pulmonary System

1-In CF, there are reduced chloride secretion with excessive sodium resorption which lead to dehydration of the airway lining leading to airway obstruction. This, in turn, leads to colonization with bacteria especially *Staphylococcus aureus* and *Pseudomonas aeruginosa* .

2-Chronic lung disease is a hallmark of CF, leading to death in 90% of patients . CF patients will usually experience **chronic respiratory infections** .

B-Gastrointestinal Involvement

1- Approximately 10% of patients with CF are born with intestinal obstruction caused by inspissated meconium (**meconium ileus**). In older patients, intestinal obstruction may result from thick inspissated mucus in the intestinal lumen .

C-Hepatic Involvement

1-In patients with CF, there is reduction in water and sodium movement into the bile. **The resulting decrease in the volume and flow of bile leads to stasis and obstruction of the biliary tree**. With chronic obstruction, this leads to **biliary cirrhosis** .

D-Pancreatic Involvement

1-The obstruction of the pancreatic ducts result in the inability to excrete pancreatic enzymes into the intestine. This leads to malabsorption of proteins, sugars (to a lesser extent), and **especially fat**. Fat malabsorption manifests clinically as **steatorrhea** (large foul-smelling stools), **deficiencies of fat-soluble vitamins** (A, D, E, and K), and **failure to thrive**.

E-Sweat Gland

In the sweat duct, CFTR reabsorbs chloride from sweat. Dysfunctional CFTR results in a **nearly fivefold elevation in sweat chloride concentrations**. This is the principal laboratory criterion for diagnosis of CF (**sweat chloride test**) .

Diagnosis

CF is most commonly diagnosed on the basis of typical **signs and symptoms** and an abnormal sweat chloride concentration (>60 mEq/L) (**sweat chloride test**).

Treatment

The treatment of CF is multifactorial, but it is primarily directed toward the gastrointestinal and pulmonary complications.

A-Gastrointestinal System

1-**Pancreatic enzyme replacement** (lipase, protease, and amylase) is the mainstay of gastrointestinal therapy .

2-**Fat-soluble vitamins (A, D, E, and K) supplementation** is usually required in

pancreatic insufficiency.

3-The use **of ursodeoxycholic acid (UDCA)** may improves bile flow, prevent obstruction and slow progression of liver disease .

B-Treatment of Cystic Fibrosis Airway Disease

Treatment of CF airway disease involves the use of medications and techniques to mobilize pulmonary secretions, and antibiotics to manage infection .

1-Mucociliary Clearance

A-Physical Therapy: Airway clearance can be performed using various techniques. These techniques are recommended **on a daily basis to help mobilize secretions** .

B-Mucolytic Therapy: Sputum viscosity is increased by the large quantities of extracellular DNA that result from chronic airway inflammation and degradation of neutrophils. **Inhaled recombinant human deoxyribonuclease** (rhDNase, dornase alpha) cleaves extracellular DNA in sputum.

C-Airway Hydration Therapies : Inhalation of hypertonic saline rehydrates the airways through osmotic flow of water.

D-Bronchodilators: β-Agonists keep airways open and facilitate airway clearance

2-Antibiotics

1-Antibiotics are used to treat lung infection. *Typical regimens for severe infections include an antipseudomonal β-lactam plus an aminoglycoside for added synergy and delay of resistance development*

2-**Fluoroquinolone** use is common among CF patients infected with ***P. aeruginosa,*** even in children.

3-**Chronic maintenance antibiotic therapy may be used in patients with *Pseudomonas* colonization** in an attempt to prevent bacterial overgrowth. **Inhaled tobramycin** has been studied the most extensively

Pharmacokinetic Considerations

CF patients have **larger volumes of distribution of many antibiotics** and also have an enhanced total body clearance. As a result of these pharmacokinetic changes, **higher doses of antibiotics** (e.g. aminoglycosides, and β-lactam antibiotics) are needed

Lung transplantation

Lung transplantation is currently the only definitive treatment for advanced cystic fibrosis

Prognosis

The longevity of patients with cystic fibrosis is increasing, and the median survival age is over 35 years. Death occurs mostly from pulmonary complications

Endocrinology

1-Diabetic ketoacidosis (DKA)

1-**Definition**: Arterial pH <7.30, bicarbonate <15 meq/L, glucose >250 mg/dL, and Urinary ketones

2-DKA is a major **medical emergency** and remains a serious cause of morbidity, principally in people **with type 1 diabetes** (**More common in type 1 DM** but can occur in type 2 DM)

3-A significant number of **newly diagnosed diabetic children** present with DKA. In children with known diabetes, DKA occurs in patient who omit insulin doses or who do not successfully manage an intercurrent illness

Risk Factors

1-**Omission of insulin** is the most common precipitant of DKA

2-**Infections**, acute medical illnesses, and stress of recent surgical procedures can contribute to the development of DKA

Pathophysiology

1-The **hyperglycaemia** causes a profound **osmotic diuresis** leading to **dehydration**, hyperosmolarity, and **electrolyte loss**, particularly of sodium and potassium

2-Owing to increased lipolysis and decreased lipogenesis, free fatty acids are converted to ketone bodies and lead to **metabolic acidosis**

3- **Electrolyte abnormalities** occur through a loss of electrolytes in the urine In addition, The resulting metabolic acidosis causes efflux of potassium from cells, results in intracellular potassium depletion

Clinical Presentation

1-Patients with DKA present initially with **polyuria**, **polydipsia**, **nausea**, and **vomiting**. **Abdominal pain** occurs frequently

2-Respiratory compensation for acidosis results in **tachypnea with deep**

(Küssmaul) respirations. The **fruity odor of acetone** frequently can be detected on the patient's breath
3-An altered mental status can occur, ranging from disorientation to coma

Management

1-DKA is a **medical emergency** which should be treated in hospital. The principal components of treatment are :
• The administration of **short-acting** (soluble) insulin
• **Fluid** replacement
• **Potassium** replacement
• The administration of **antibiotics** if infection is present
Note: for more detailed about for the management of ketoacidosis , there is **a Diabetic Ketoacidosis Treatment Protocol**

Complications

The most concerning complication of DKA is **cerebral oedema** (Treatment by Mannitol 1 g/kg IV)