Chapter- 5

Cardiovascular and Respiratory System

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Abstract

Cardiovascular diseases (CVDs) encompass a range of conditions affecting the heart and blood vessels, including hypertension, congestive heart failure, and ischemic heart disease. Hypertension, or high blood pressure, is a chronic condition where the force of the blood against the artery walls is elevated, leading to increased risk of heart attack, stroke, and kidney disease. Its pathophysiology involves genetic and environmental factors that cause increased vascular resistance. Epidemiologically, hypertension is prevalent worldwide and is often asymptomatic until complications arise. Symptoms include headaches, shortness of breath, and nosebleeds. Diagnosis is primarily through regular blood pressure measurements, and treatment includes lifestyle changes and antihypertensive medications. Congestive heart failure (CHF) occurs when the heart is unable to pump blood efficiently, causing fluid buildup in the lungs and other tissues. Pathophysiology includes impaired myocardial function due to ischemic damage or chronic hypertension. Symptoms include shortness of breath, fatigue, and edema. Diagnosis involves clinical evaluation, imaging studies, and biomarkers like B-type natriuretic peptide. Treatment focuses on managing symptoms and underlying causes with medications, lifestyle modifications, and sometimes surgical interventions. Ischemic heart disease (IHD), including angina and myocardial infarction, results from reduced blood flow to the heart muscle due to atherosclerosis or arteriosclerosis. Angina presents as chest pain due to transient ischemia, while myocardial infarction (heart attack) is characterized by prolonged ischemia leading to myocardial damage. Pathophysiology involves plaque formation and rupture, leading to arterial blockage. Symptoms range from chest pain to shortness of breath and nausea. Diagnosis is through clinical history, electrocardiograms, and biomarkers like troponin. Treatment includes medications, revascularization procedures, and lifestyle changes. Preventive measures for all these conditions emphasize risk factor management, including blood pressure control, healthy diet, regular exercise, and smoking cessation to reduce the burden of cardiovascular diseases.

I. INTRODUCTION

Cardiovascular System

Anatomy
1. **Heart:** A muscular organ located in the thoracic cavity, consisting of four chambers:
    a. **Right Atrium:** Receives deoxygenated blood from the body via the superior and inferior vena cavae.
    b. **Right Ventricle:** Pumps deoxygenated blood to the lungs via the pulmonary arteries.
    c. **Left Atrium:** Receives oxygenated blood from the lungs via the pulmonary veins.
    d. **Left Ventricle:** Pumps oxygenated blood to the rest of the body via the aorta.

2. **Blood Vessels**:
    a. **Arteries:** Carry blood away from the heart (e.g., aorta, pulmonary arteries).
    b. **Veins:** Return blood to the heart (e.g., superior and inferior vena cavae, pulmonary veins).
    c. **Capillaries:** Microscopic vessels where gas and nutrient exchange occurs.

3. **Blood:** Composed of plasma, red blood cells, white blood cells, and platelets.

Physiology
1. **Circulatory Routes**
    a. **Systemic Circulation:** Delivers oxygen-rich blood from the left side of the heart to the body and returns deoxygenated blood to the right side of the heart.
    b. **Pulmonary Circulation:** Carries deoxygenated blood from the right side of the heart to the lungs for oxygenation and returns oxygenated blood to the left side of the heart.

2. **Cardiac Cycle**
    a. **Systole:** Contraction phase of the heart where blood is pumped out of the ventricles.
    b. **Diastole:** Relaxation phase where the heart chambers fill with blood.

3. **Regulation**
    a. **Autonomic Nervous System:** Regulates heart rate and force of contraction via sympathetic (increases) and parasympathetic (decreases) input.
    b. **Hormonal Control:** Includes hormones like adrenaline and aldosterone that affect heart function and blood pressure.

Respiratory System

Anatomy
1. **Upper Respiratory Tract**
    a. **Nose/Nasal Cavity:** Filters, warms, and moistens air.
    b. **Pharynx:** Passageway for air and food.
    c. **Larynx:** Voice box containing vocal cords.

2. **Lower Respiratory Tract**
    a. **Trachea:** Main airway leading to the bronchi.
    b. **Bronchi:** Two main branches from the trachea that lead to each lung.
    c. **Bronchioles:** Smaller branches of the bronchi.
    d. **Alveoli:** Tiny air sacs in the lungs where gas exchange occurs.

3. **Lungs:** Paired organs in the thoracic cavity responsible for gas exchange. Each lung has lobes (three in the right lung, two in the left).

Physiology
1. **Ventilation**
   a. **Inspiration:** The process of inhaling air into the lungs, driven by the contraction of the diaphragm and intercostal muscles.
   b. **Expiration:** The process of exhaling air out of the lungs, typically a passive process driven by the relaxation of these muscles.

2. **Gas Exchange**
   a. **External Respiration:** Exchange of gases (oxygen and carbon dioxide) between the alveoli and the blood in the pulmonary capillaries.
   b. **Internal Respiration:** Exchange of gases between the blood in systemic capillaries and the body's tissues.

3. **Regulation**
   a. **Medullary Respiratory Centers:** Located in the brainstem, these centers regulate the rate and depth of breathing based on CO_2 levels and pH in the blood.
   b. **Chemoreceptors:** Located in the carotid arteries and aorta, they detect changes in blood pH, CO_2, and O_2 levels and adjust respiratory rate accordingly.

Interrelation between Cardiovascular and Respiratory Systems
1. **Gas Exchange:** The cardiovascular and respiratory systems work together to deliver oxygen to tissues and remove carbon dioxide from the body.
2. **Circulatory Support:** The heart pumps oxygenated blood from the lungs to the body and deoxygenated blood back to the lungs for gas exchange.
3. **Regulatory Feedback:** Both systems have feedback mechanisms that help maintain homeostasis, such as adjusting heart rate and breathing rate in response to changes in blood gas levels.

II. CARDIOVASCULAR SYSTEM

Hypertension

Hypertension, commonly known as high blood pressure, is a chronic medical condition in which the blood pressure in the arteries is persistently elevated. It is a significant risk factor for cardiovascular and respiratory diseases.

Introduction

Hypertension is defined as having a systolic blood pressure (SBP) of 130 mmHg or higher, or a diastolic blood pressure (DBP) of 80 mmHg or higher. It is a major cause of morbidity and mortality worldwide and is often referred to as the "silent killer" because it frequently has no warning signs or symptoms.

Pathophysiology

1. **Blood Pressure Regulation**
   a. Blood pressure is determined by cardiac output (CO) and peripheral vascular resistance (PVR).
   b. Factors influencing these include the autonomic nervous system, the renin-angiotensin-aldosterone system (RAAS), and the balance of sodium and water.

2. **Mechanisms Leading to Hypertension**
   a. **Genetic Factors:** Family history and genetic predisposition.
   b. **Environmental Factors:** High salt intake, obesity, physical inactivity, and excessive alcohol consumption.
   c. **Renal Dysfunction:** Impaired excretion of sodium, leading to increased blood volume and pressure.
   d. **Endothelial Dysfunction:** Reduced production of vasodilators like nitric oxide.
   e. **Sympathetic Nervous System Overactivity:** Increased heart rate and vasoconstriction.
   f. **RAAS Activation:** Increased levels of angiotensin II, causing vasoconstriction and aldosterone secretion, leading to sodium and water retention.

Epidemiology
1. **Prevalence**
   a. Hypertension affects approximately 1.3 billion people worldwide.
   b. It is more common in older adults, with prevalence increasing with age.
   c. Higher prevalence in certain populations, such as African Americans.

2. **Risk Factors**
   a. **Non-Modifiable:** Age, family history, race/ethnicity, gender.
   b. **Modifiable:** Diet (high salt intake), obesity, sedentary lifestyle, alcohol and tobacco use, stress, and other comorbid conditions like diabetes.

Symptoms and Complications

Symptoms
   a. Often asymptomatic, especially in the early stages.
   b. When present, symptoms may include headaches, dizziness, shortness of breath, chest pain, and visual disturbances.

Complications
   a. **Cardiovascular System**
      - Heart disease (left ventricular hypertrophy, coronary artery disease, heart failure).
      - Stroke (ischemic and hemorrhagic).
   b. **Respiratory System**
      - Pulmonary hypertension (leading to right heart failure).
      - Increased risk of obstructive sleep apnea.
   c. **Renal System**
      - Chronic kidney disease.
      - Nephrosclerosis.
   d. **Vascular System**
      - Atherosclerosis.

- Peripheral artery disease.

e. Eyes:
- Hypertensive retinopathy.

Diagnosis
1. Blood Pressure Measurement
  a. Multiple readings on different occasions.
  b. Use of proper techniques and equipment (sphygmomanometer).
  c. Ambulatory blood pressure monitoring (ABPM) or home blood pressure monitoring (HBPM) for accurate assessment.

2. Laboratory Tests
  a. Blood tests (electrolytes, renal function, lipid profile).
  b. Urinalysis (to check for proteinuria).
  c. Electrocardiogram (ECG) and echocardiography (to assess cardiac effects).

3. Additional Assessments
  a. Evaluation of secondary causes (e.g., endocrine disorders, renal artery stenosis).
  b. Assessment of target organ damage (e.g., retinal examination, urine albumin-to-creatinine ratio).

Treatment
1. Lifestyle Modifications
  a. **Diet:** DASH (Dietary Approaches to Stop Hypertension) diet, reducing salt intake, increasing potassium intake, limiting alcohol consumption.
  b. **Physical Activity:** Regular aerobic exercise.
  c. **Weight Management:** Achieving and maintaining a healthy weight.
  d. **Smoking Cessation:** Eliminating tobacco use.
  e. **Stress Management:** Techniques like relaxation therapy and mindfulness.

2. Pharmacologic Therapy
  a. **First-Line Medications**
   - **Diuretics:** Thiazide diuretics (e.g., hydrochlorothiazide).
   - **ACE Inhibitors:** (e.g., enalapril, lisinopril).
   - **ARBs:** Angiotensin II receptor blockers (e.g., losartan, valsartan).
   - **Calcium Channel Blockers:** (e.g., amlodipine, diltiazem).
   - **Beta-Blockers:** (e.g., metoprolol, atenolol) - not first-line for primary hypertension but useful in certain populations.

  b. **Second-Line Medications:**
   - **Aldosterone Antagonists:** (e.g., spironolactone).
   - **Direct Renin Inhibitors:** (e.g., aliskiren).
   - **Alpha-Blockers:** (e.g., prazosin).
   - **Central Alpha Agonists:** (e.g., clonidine).

3. Treatment Goals
  a. Generally, target BP < 130/80 mmHg.
  b. Individualized targets based on age, comorbidities, and risk factors.

Complications
1. **Medication Side Effects**
   a. **Diuretics:** Electrolyte imbalances (e.g., hypokalemia), hyperuricemia.
   b. **ACE Inhibitors/ARBs:** Cough, hyperkalemia, renal impairment.
   c. **Calcium Channel Blockers:** Edema, bradycardia.
   d. **Beta-Blockers:** Fatigue, bradycardia, worsening asthma.

2. **Non-Adherence**
   a. Due to side effects, cost, complexity of regimens, lack of symptoms.

Prevention
1. **Primary Prevention**
   a. Public health strategies to reduce risk factors (e.g., reducing salt intake in processed foods).
   b. Promoting healthy lifestyle choices from a young age.
   c. Screening and early detection in high-risk populations.

2. **Secondary Prevention**
   a. Regular monitoring and follow-up for individuals diagnosed with hypertension.
   b. Patient education on the importance of adherence to lifestyle modifications and medications.

3. **Tertiary Prevention:**
   a. Managing and preventing complications through comprehensive care (e.g., regular cardiovascular assessments, controlling comorbid conditions like diabetes).

III. CONGESTIVE HEART FAILURE

Congestive heart failure (CHF) is a chronic progressive condition where the heart is unable to pump sufficient blood to meet the body's needs. This leads to a buildup of fluid in the lungs and other tissues.

Introduction

Congestive Heart Failure (CHF), also known simply as heart failure, is a syndrome characterized by the heart's inability to provide adequate blood flow to the body, leading to a range of symptoms and systemic effects. It can result from various underlying cardiovascular conditions.

Pathophysiology
1. **Heart's Pumping Ability**
   a. CHF can result from systolic dysfunction (reduced contractility) or diastolic dysfunction (impaired filling).

2. **Mechanisms Leading to CHF**
   a. **Systolic Dysfunction:** Decreased ejection fraction due to weakened heart muscle, often caused by conditions like myocardial infarction (heart attack) or dilated cardiomyopathy.

   b. **Diastolic Dysfunction:** Normal ejection fraction but impaired ventricular filling due to stiff or thickened heart muscle, often seen in hypertensive heart disease and hypertrophic cardiomyopathy.
   c. **Increased Afterload:** Conditions like hypertension and aortic stenosis increase resistance against which the heart must pump.
   d. **Increased Preload:** Conditions like valvular regurgitation increase the volume of blood returning to the heart, causing volume overload.

3. **Compensatory Mechanisms**
   a. **Neurohormonal Activation:** Activation of the sympathetic nervous system and the renin-angiotensin-aldosterone system (RAAS) increases heart rate and blood pressure but can lead to further heart damage over time.
   b. **Ventricular Remodeling:** Structural changes in the heart, such as dilation and hypertrophy, occur in response to chronic pressure and volume overload.

Epidemiology
1. **Prevalence**
   a. CHF affects over 6 million adults in the United States.
   b. It is more common in older adults, with prevalence increasing with age.

2. **Risk Factors**
   a. **Non-Modifiable:** Age, family history, gender (higher incidence in men), and race (higher incidence in African Americans).
   b. **Modifiable:** Hypertension, coronary artery disease, diabetes, obesity, smoking, and sedentary lifestyle.

Symptoms and Complications

Symptoms
   a. **Left-Sided Heart Failure:** Pulmonary congestion and edema, leading to symptoms such as shortness of breath (dyspnea), orthopnea (difficulty breathing while lying flat), paroxysmal nocturnal dyspnea (PND), and cough.
   b. **Right-Sided Heart Failure:** Systemic congestion, leading to symptoms such as peripheral edema, ascites (abdominal swelling), hepatomegaly (enlarged liver), and jugular venous distension (JVD).

Complications
   a. **Cardiovascular System**
   - Arrhythmias (e.g., atrial fibrillation).
   - Myocardial infarction.
   - Sudden cardiac death.
   b. **Respiratory System**
   - Pulmonary edema.
   - Pleural effusion.
   - Increased risk of respiratory infections.
   c. **Renal System**
   - Worsening renal function (cardiorenal syndrome).
   d. **Others**
   - Cachexia (severe weight loss and muscle wasting).
   - Depression and anxiety due to chronic illness.

Diagnosis

1. **Clinical Evaluation**
   a. Detailed medical history and physical examination.
   b. Assessment of symptoms and functional status (e.g., New York Heart Association (NYHA) classification).

2. **Diagnostic Tests**
   a. **Echocardiography:** Key test for evaluating heart structure and function, including ejection fraction.
   b. **Electrocardiogram (ECG):** To assess heart rhythm and identify ischemic changes.
   c. **Chest X-ray:** To detect pulmonary congestion and cardiomegaly.
   d. **Blood Tests**
      - B-type natriuretic peptide (BNP) or N-terminal proBNP (NT-proBNP): Elevated levels indicate heart failure.
      - Complete blood count, kidney function tests, electrolytes, and thyroid function tests.
   e. **Other Imaging**
      - Cardiac MRI or CT scan for detailed structural and functional assessment.
      - Coronary angiography if ischemic heart disease is suspected.

Treatment

1. **Lifestyle Modifications**
   a. **Diet:** Low-sodium diet to reduce fluid retention.
   b. **Exercise:** Regular physical activity as tolerated to improve cardiovascular fitness.
   c. **Weight Management:** Maintaining a healthy weight to reduce cardiac workload.
   d. **Smoking Cessation:** Eliminating tobacco use.
   e. **Alcohol Restriction:** Limiting alcohol intake.

2. **Pharmacologic Therapy**
   a. **First-Line Medications**
      - **ACE Inhibitors/ARBs:** Reduce afterload and improve survival (e.g., enalapril, losartan).
      - **Beta-Blockers:** Reduce heart rate, improve ejection fraction, and reduce mortality (e.g., metoprolol, carvedilol).
      - **Diuretics:** Manage fluid overload and reduce symptoms (e.g., furosemide, spironolactone).
      - **Aldosterone Antagonists:** Reduce morbidity and mortality in severe heart failure (e.g., spironolactone, eplerenone).
   b. **Other Medications**
      - **Vasodilators:** Improve symptoms and reduce afterload (e.g., hydralazine, isosorbide dinitrate).
      - **Digoxin:** Improves symptoms and reduces hospitalization in select patients.

3. **Advanced Therapies**
   a. **Device Therapy**
      - **Implantable Cardioverter-Defibrillator (ICD):** Prevents sudden cardiac death in patients with reduced ejection fraction.
      - **Cardiac Resynchronization Therapy (CRT):** Improves symptoms and survival in patients with heart failure and ventricular dyssynchrony.

b. **Surgical Interventions**
- **Coronary Artery Bypass Grafting (CABG):** For patients with ischemic heart disease.
- **Heart Valve Surgery:** For patients with significant valvular disease.
- **Left Ventricular Assist Device (LVAD):** Mechanical pump for patients with end-stage heart failure.
- **Heart Transplant:** For select patients with refractory heart failure.

Complications
1. Medication Side Effects
a. **Diuretics:** Electrolyte imbalances (e.g., hypokalemia, hyponatremia).
b. **ACE Inhibitors/ARBs:** Hyperkalemia, renal impairment, cough (with ACE inhibitors).
c. **Beta-Blockers:** Bradycardia, fatigue.
d. **Digoxin:** Digoxin toxicity (nausea, visual disturbances, arrhythmias).

2. Disease Progression
a. Worsening heart failure despite optimal treatment.
b. Frequent hospitalizations and reduced quality of life.

Prevention
1. Primary Prevention
a. Addressing modifiable risk factors early (e.g., hypertension, diabetes, obesity).
b. Promoting healthy lifestyle choices from a young age.
c. Screening and early detection in high-risk populations.

2. Secondary Prevention
a. Regular monitoring and follow-up for individuals with known cardiovascular disease.
b. Aggressive management of comorbid conditions (e.g., diabetes, hypertension).
c. Patient education on the importance of adherence to lifestyle modifications and medications.

3. Tertiary Prevention
a. Comprehensive care to manage and prevent complications.
b. Regular cardiovascular assessments.
c. Multidisciplinary approach involving cardiologists, primary care physicians, dietitians, and exercise physiologists.

IV. ISCHEMIC HEART DISEASE (ANGINA, MYOCARDIAL INFARCTION, ATHEROSCLEROSIS AND ARTERIOSCLEROSIS)

Ischemic heart disease (IHD), also known as coronary artery disease (CAD), is a condition characterized by reduced blood flow to the heart muscle due to narrowing or blockage of the coronary arteries. This leads to various clinical manifestations, including angina pectoris and myocardial infarction (heart attack).

Introduction

Ischemic Heart Disease (IHD) encompasses conditions resulting from reduced coronary blood flow and oxygen supply to the heart muscle, primarily due to atherosclerosis of the

coronary arteries. The most common forms of IHD are angina pectoris and myocardial infarction.

Pathophysiology
1. Atherosclerosis
    a. Development: Begins with endothelial injury due to factors like hypertension, smoking, and high LDL cholesterol.
    b. Progression: Formation of fatty streaks, development of fibrous plaques, and eventual plaque rupture or erosion leading to thrombosis.

2. Arteriosclerosis
    a. General term for the thickening and hardening of arterial walls, often associated with aging and hypertension.
    b. Includes atherosclerosis as a specific type.

3. Angina Pectoris
    a. Stable Angina: Predictable chest pain triggered by physical exertion or stress due to fixed atherosclerotic plaques.
    b. Unstable Angina: Unpredictable chest pain, occurring at rest or with minimal exertion, indicating plaque instability and risk of myocardial infarction.

4. Myocardial Infarction (MI)
    a. Mechanism: Complete or near-complete occlusion of a coronary artery by a thrombus following plaque rupture, leading to ischemia and necrosis of heart muscle.

Epidemiology
1. Prevalence
    a. Leading cause of death globally, affecting millions annually.
    b. Higher prevalence in older adults, with men typically affected earlier than women.

2. Risk Factors
    a. **Non-Modifiable:** Age, male gender, family history, and genetic predisposition.
    b. **Modifiable:** Hypertension, hyperlipidemia, diabetes, smoking, obesity, physical inactivity, and unhealthy diet.

Symptoms and Complications

Symptoms
    a. Angina Pectoris: Chest pain or discomfort, often described as pressure, squeezing, or burning. It may radiate to the shoulders, arms, neck, jaw, or back.
    b. Myocardial Infarction: Severe, prolonged chest pain not relieved by rest or nitroglycerin, associated with symptoms like shortness of breath, nausea, sweating, and lightheadedness.

Complications
    a. Cardiovascular System
- Heart failure.
- Arrhythmias (e.g., ventricular fibrillation, atrial fibrillation).
- Cardiogenic shock.
- Sudden cardiac death.

b. Other Systems:
- Left ventricular aneurysm.
- Mitral regurgitation due to papillary muscle dysfunction or rupture.
- Pericarditis (inflammation of the pericardium).

Diagnosis
1. Clinical Evaluation
   a. Detailed medical history and physical examination.
   b. Assessment of risk factors and symptomatology.

2. Diagnostic Tests
   a. Electrocardiogram (ECG): To detect ischemic changes, ST-segment abnormalities, and arrhythmias.
   b. Cardiac Biomarkers: Elevated troponin levels indicate myocardial damage.
   c. Echocardiography: To assess cardiac structure and function.
   d. Stress Testing: Exercise or pharmacologic stress tests to evaluate myocardial perfusion and ischemic response.
   e. Coronary Angiography: Gold standard for visualizing coronary artery stenosis and blockages.
   f. Non-invasive Imaging
   - Coronary computed tomography angiography (CTA).
   - Cardiac magnetic resonance imaging (MRI).

Treatment
1. Lifestyle Modifications:
   a. Diet: Heart-healthy diet rich in fruits, vegetables, whole grains, and lean proteins. Reduce intake of saturated fats, trans fats, and sodium.
   b. Exercise: Regular physical activity, such as brisk walking or aerobic exercises.
   c. Weight Management: Achieving and maintaining a healthy weight.
   d. Smoking Cessation: Complete elimination of tobacco use.
   e. Alcohol Moderation: Limiting alcohol intake.

2. Pharmacologic Therapy
   a. **Antiplatelet Agents:** Aspirin, clopidogrel to prevent thrombosis.
   b. **Statins:** To lower LDL cholesterol and stabilize plaques.
   c. **Beta-Blockers:** To reduce myocardial oxygen demand and improve survival post-MI.
   d. **ACE Inhibitors/ARBs:** To reduce blood pressure and myocardial workload.
   e. **Nitrates:** To relieve angina by dilating coronary arteries.
   f. **Calcium Channel Blockers:** To reduce angina and lower blood pressure.
   g. **Ranolazine:** For refractory angina.

3. Revascularization Procedures
   a. Percutaneous Coronary Intervention (PCI): Balloon angioplasty with stent placement to open blocked arteries.
   b. Coronary Artery Bypass Grafting (CABG): Surgical bypass of occluded coronary arteries using grafts.

Complications
1. **Medication Side Effects**
   a. **Antiplatelets:** Increased risk of bleeding.
   b. **Statins:** Muscle pain, liver dysfunction.
   c. **Beta-Blockers:** Bradycardia, fatigue.
   d. **ACE Inhibitors/ARBs:** Cough (ACE inhibitors), hyperkalemia, renal impairment.

2. **Procedure-Related Complications**
   a. **PCI:** Restenosis, stent thrombosis.
   b. **CABG:** Graft occlusion, wound infections.

3. **Disease Progression**
   a. Recurrent angina or myocardial infarction.
   b. Worsening heart failure.

Prevention
1. **Primary Prevention**
   a. Addressing modifiable risk factors early (e.g., controlling hypertension, hyperlipidemia, diabetes).
   b. Promoting healthy lifestyle choices from a young age.
   c. Screening and early detection in high-risk populations.

2. **Secondary Prevention**
   a. Regular monitoring and follow-up for individuals with known cardiovascular disease.
   b. Aggressive management of comorbid conditions (e.g., diabetes, hypertension).
   c. Patient education on the importance of adherence to lifestyle modifications and medications.

3. **Tertiary Prevention**
   a. Comprehensive care to manage and prevent complications.
   b. Regular cardiovascular assessments.
   c. Multidisciplinary approach involving cardiologists, primary care physicians, dietitians, and exercise physiologists.

Specific Conditions under Ischemic Heart Disease
1. **Angina Pectoris**
   a. **Stable Angina:** Managed with lifestyle changes, medications, and possibly revascularization.
   b. **Unstable Angina:** Requires urgent medical evaluation and treatment to prevent myocardial infarction.

2. **Myocardial Infarction (MI)**
   a. **Acute Management:** Immediate reperfusion therapy (PCI or thrombolysis), antiplatelet agents, anticoagulants, and supportive care.
   b. **Post-MI Care:** Long-term medications (beta-blockers, ACE inhibitors, statins), lifestyle modifications, and cardiac rehabilitation.

3. **Atherosclerosis and Arteriosclerosis**
   a. **Management:** Focus on reducing risk factors (e.g., hyperlipidemia, hypertension), lifestyle changes, and medications (statins, antihypertensives).

Short Answer Type Questions (Subjective)

1. Describe the main functions of the heart in the cardiovascular system.
2. Explain the process of gas exchange in the alveoli.
3. What factors influence blood pressure regulation?
4. How does hypertension affect the cardiovascular system?
5. Describe the pathophysiology of congestive heart failure.
6. What is the role of the autonomic nervous system in regulating heart function?
7. What are the primary causes of myocardial infarction?
8. Describe the diagnostic tests used to assess chronic kidney disease (CKD).
9. What lifestyle modifications can help manage hypertension?
10. Describe the complications associated with untreated hypertension.
11. Describe the preventive measures for cardiovascular diseases.

Long Answer Type Questions (Subjective)

1. Discuss the structure and functions of the heart, including its chambers, valves, and blood vessels.
2. Explain the pathophysiology, symptoms, and treatment options for hypertension.
3. Describe the mechanisms of congestive heart failure and its impact on the body.
4. Discuss the interrelation between the cardiovascular and respiratory systems in maintaining homeostasis.
5. Describe the pathophysiology, symptoms, and treatment of myocardial infarction.
6. Explain the differences between asthma and COPD, including their causes, symptoms, and treatments.
7. Explain the role of lifestyle modifications and pharmacologic therapy in the management of cardiovascular diseases.