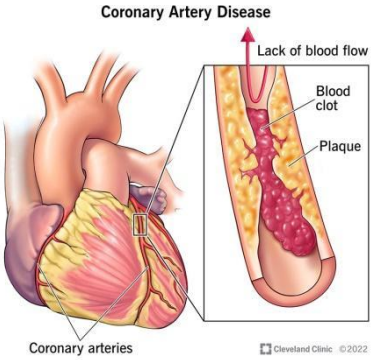
Coronary Artery Disease (DAC)

Introduction:

Definition and overview:

Heart disease is the leading cause of death in the United States. Coronary heart disease is a type of heart disease where the arteries of the heart cannot deliver enough oxygen-rich blood to the heart. It is also sometimes called coronary artery disease or ischemic heart disease.



Historical Context:

The American College of Cardiology reports that the earliest documented case of coronary atherosclerosis – a build-up of plaque in the arteries that can cause a heart attack – was in an Egyptian princess who lived between 1580 and 1550 B.C. The study found that heart disease was more common in ancient times

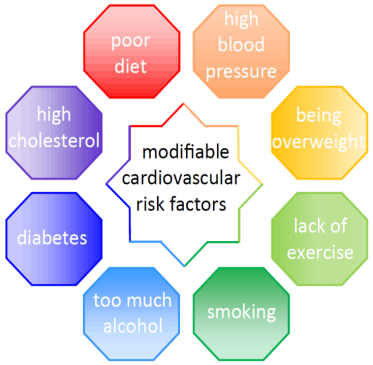
Epidemiology:

Epidemiologic studies have identified numerous risk factors for CAD. Some risk factors-including smoking, hypertension, dyslipidemia, and physical inactivity-are decreasing within the US population while others, including advanced age, diabetes, and obesity are increasing.

Etiology:

Causes and risk factors:

The common risk factors for the disease are smoking, hypertension, diabetes, hyperlipidemia, male sex, physical inactivity, family obesity, and poor nutritional practices.



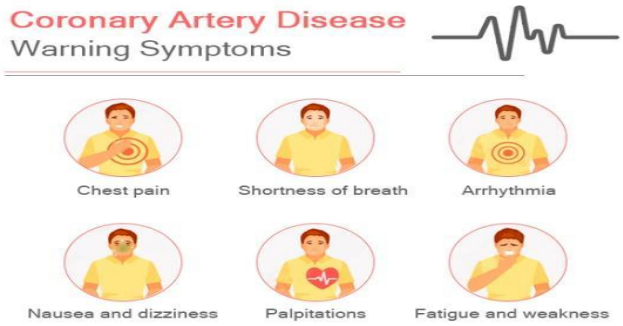
Genetic and Environmental Influences:

Many different lifestyle factors, such as poor diet and insufficient exercise, can increase a person's risk of developing CAD. Additionally, growing evidence is highlighting the role of genetics, as having certain genes may increase a person's susceptibility to CAD

Clinical Features:

Signs and Symptoms:

- Chest pain that may feel like pressure, tightness, squeezing or aching.
- Pain or discomfort that spreads to the shoulder, arm, back, neck, jaw, teeth
- Cold sweats.
- Fatigue.
- Heartburn.
- Nausea.
- Shortness of breath.
- Lightheadedness or sudden dizziness.



Disease Stages and Progression:

Stages are defined as normal (no plaque), mild, moderate, and severe plaque and the Coronary artery disease progression tend to be slow in most people, but it does vary from person to person.

Complications:

Complications of coronary artery disease may include:

- Chest pain, also called angina. This is a symptom of coronary artery disease. ...
- Heart attack. ...
- Heart failure. Narrowed arteries in the heart or high blood pressure can slowly make the heart weak or stiff
- Irregular heart rhythms, called arrhythmias.

Diagnosis:

Diagnostic Criteria:

Dyspnea should be evaluated for rest and also on activity. The patient should also be asked about syncope, palpitations, tachypnea, lower extremity edema, orthopnea, and exercise capacity. A family history of ischemic heart diseases should be obtained along with dietary, smoking, and lifestyle habits

Diagnostic Tests and Procedures:

A number of different tests are used to diagnose heart-related problems, including:

-Electrocardiogram (ECG) -Exercise stress tests.

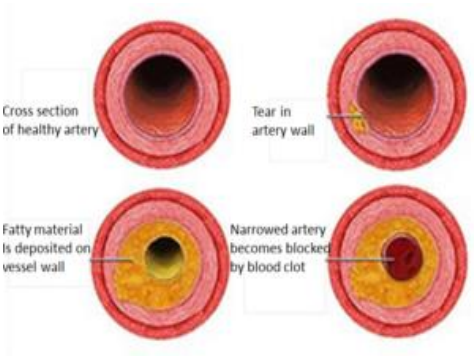
-X-rays -Echocardiogram.

-Blood tests. - Coronary angiography.

-MRI scans - CT scans.

Differential Diagnosis:

Differential diagnosis is made based on the presenting signs and symptoms. Other conditions presenting as chest pain and mimicking CAD could be musculoskeletal pains, pleural inflammation, diaphragmatic symptoms, GERD, dysphagia, panic attacks, and neuralgia from neck and shoulder

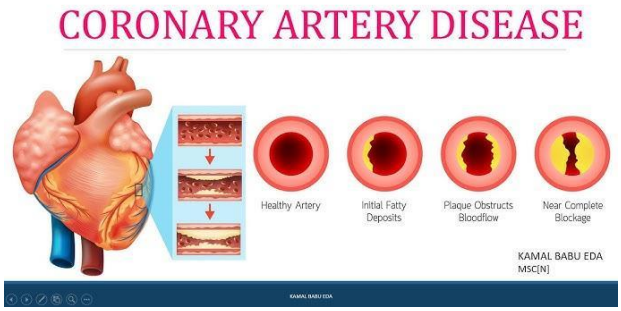


Pathophysiology:

Mechanisms of Disease Development:

The exact mechanism is unclear but may involve endothelial cell abnormalities of nitric oxide production or an imbalance between endothelium-derived contracting and relaxing factors. In arteries with atheroma, the atheroma causes endothelial dysfunction, possibly resulting in local hyper contractility. Coronary arteries develop

through transformation of the plexus vessels following stem formation in a process called developmental arterial remodeling.



Cellular and Molecular Changes:

Irreversibly damage the cardiomyocytes, the heart muscle cells impairment in blood flow and thus oxygen delivery to the myocardium

Impact on Body Systems:

Heart attack damage can affect how electrical signals move through the heart, causing heartbeat changes. Some may be serious and can be deadly. Cardiogenic shock. This rare condition occurs when the heart is suddenly and abruptly unable to pump blood

Medical and Surgical Treatments:

Coronary artery bypass grafting (CABG) is also known as bypass surgery, a heart bypass, or coronary artery bypass surgery. It's carried out in people whose arteries are narrowed or blocked. A coronary angiogram will determine if you're suitable for treatment.

Pharmacological Therapies:

Such medicines include statins, niacin, fibrates and bile acid sequestrates. Aspirin. Aspirin helps thin the blood and prevent blood clots. Daily low-dose aspirin therapy may be recommended for the primary prevention of heart attack or stroke in some people

Lifestyle and Dietary Modifications:

Don't smoke, vape or use any tobacco products. Eat heart-healthy foods low in sodium, saturated fat, Trans fat and sugar. The Mediterranean diet is a proven way to lower your risk of a heart attack or stroke. Exercise: Aim for 30 minutes of walking (or other activities) five days a week.

Rehabilitation and Supportive Care: exercise, education, counseling to improve physical fitness, adherence to prescribed protocols, and psychosocial support.

Prevention and Control:

Primary prevention is for the people with risk factors but has not developed clinical manifestation of CAD. This is the prevention of CAD before it occurs. Secondary prevention is for people with established CAD. Tertiary prevention is to soften the impact of CAD.

Public Health Interventions:

Percutaneous coronary intervention (PCI) is a non-surgical procedure used to treat the blockages in a coronary artery; it opens up narrowed or blocked sections of the artery, restoring blood flow to the heart

Vaccination and Screening Programs:

Electrocardiography (ECG or EKG) measures the electrical activity of the heart and records information on heart rate and rhythm. Exercise cardiac stress test involves walking on a treadmill or pedaling a stationary bike at increasing levels of difficulty

Prognosis:

Disease outcomes and survival rates:

Round 12 percent of people that have a heart attack will end up dying from it, and it is more prevalent in men than women.

Factors Influencing Prognosis:

Smoking or having high blood pressure, high cholesterol, diabetes, obesity or a strong family history of heart disease

Quality of Life:

The quality of life (QOL) of patients with coronary artery disease (CAD) is known to be impaired. Non-cardiac chest pain referrals are often under-diagnosed and untreated, and there are hardly any studies comparing the QOL of CAD and panic disorder related (non-cardiac) chest pain referrals (PDRC)

Current research and future directions:

Recent advances and discoveries:

Advances in invasive procedures, like percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG), have revolutionized coronary revascularization, substantially improved long-term outcomes, and reduced restenosis rates

Ongoing clinical trials:

Understanding how the molecular pathways of cholesterol affect the disease mechanism for atherosclerosis and plaque buildup in the blood vessels of the heart can lead to new therapeutic approaches for the treatment of coronary heart disease

Future Research Needs:

Coronary angioplasty and stent placement.
This treatment opens clogged blood vessels in the heart. A tiny balloon on a thin tube, called a catheter, is used to widen a clogged artery and improve blood flow. A small wire mesh tube called a stent may be placed to keep the artery open

Case studies

Example cases:

Patient Profile:

Age: 55

Gender: Male

Risk Factors: Hypertension, high cholesterol, family history of heart disease, sedentary lifestyle.

Presentation:

The patient is asymptomatic but undergoes routine screening (e.g., stress test or coronary CT angiography) due to his risk factors. Imaging reveals significant narrowing in the left anterior descending artery.

Management:

- Lifestyle modifications (diet, exercise) - Statin therapy to manage cholesterol levels.

- Regular follow-up with a cardiologist. - Consideration for further evaluation.