Coronary Artery Disease (CAD)

Coronary artery disease (CAD) is the most prevalent heart disease. Its complications (arrhythmia, angina pectoris, and heart attack) are the leading causes of death.

CAD is most often caused by atherosclerosis, which is when plaque (a waxy material made of cholesterol, fatty compounds, calcium, and a blood-clotting substance called fibrin) develops in the arteries and causes blockages.

High blood pressure, high cholesterol and triglycerides, and smoking can all cause plaque to form on the inner walls of your arteries.

Symptoms

The main symptom of atherosclerosis is chest pain (angina pectoris). The process of atherosclerosis may begin in youth and can cause symptoms when patients are in their 30s or not until their 50s or 60s. Chest pain does not always happen; ischemia (lack of oxygen to the heart) is called "silent" when it causes no symptoms.

Methods of diagnosis for coronary artery disease

- An **electrocardiogram (ECG or EKG),** which monitors your heart's electrical activity.
- A **nuclear stress test.** A radioactive substance is injected into your bloodstream to assess blood flow in your arteries.
- **Echocardiography**. This test uses sound waves to create an image of the heart and assess its operation.
- **Coronary angiography**, which gives doctors an x-ray "movie" of your heart's activity and the flow of blood through your valves and arteries, revealing any blockages.
- **Positron emission tomography** (PET) **scanning**, which uses data from the energy of certain elements in your body to test for damaged heart muscle tissue.

Treatments for coronary artery disease

Medicines – Many medicines are available, including:

Antiplatelet therapy (aspirin) – assists with chest pain because it reduces the risk of blood clot formation.

Nitroglycerin (nitro) – widens the arteries and increases blood flow to the heart.

Beta-blockers – "block" chemical or hormonal messages that cause your heart to work excessively.

Calcium channel blockers – keep your arteries open and decrease blood pressure by relaxing the muscles around the arteries.

Percutaneous Interventions and Surgery – Medicines cannot clear all artery blockages; sometimes, surgery or a percutaneous intervention (a minimally invasive procedure) is necessary. Which one you need is determined by the severity and location of the blockages, the number of arteries affected, the risk to the heart, and other factors such as age and health.

Percutaneous interventions (or transcatheter interventions)

Angioplasty uses a slender tube with a balloon at the end. The balloon is inflated at the blockage site to flatten the plaque against the artery wall. A stent (a mesh-like metal device) may also be inserted to keep the artery from collapsing. Newer stents can be coated with medicine to prevent the artery from ever closing again (coated stents/drug-eluting stents).

Atherectomy uses a high–speed drill on the end of a catheter to remove plaque from the artery. It is usually used in patients for whom balloon angioplasty won't work.

Laser ablation uses a metal or fiberoptic laser probe on the catheter's tip to "burn" away plaque in arteries that are completely blocked. This makes room for a balloon to open the vessel.

Surgery

In *coronary artery bypass grafting* (CABG), a surgeon bypasses blocked vessels by grafting (transplanting) a vein or artery from another area to reroute blood flow above and below the blockage. This restores regular blood flow to the heart.

Minimally invasive coronary artery bypass uses a small incision and may be done while the heart is still beating. If the perceived risk of complications is low, this procedure is optimal because it reduces recovery time.