

ARTERIOSCLEROSIS



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

By

Ms. RUPALI RUPASMITA ROUT
ASSISTANT PROFESSOR

INTRODUCTION:

Arteriosclerosis is a general term used to describe the thickening and hardening of the arteries. It is a chronic condition that involves structural changes in the arterial walls, leading to reduced elasticity and narrowing of the blood vessels. Arteriosclerosis can affect arteries throughout the body, including those supplying the heart, brain, kidneys, and limbs.

The process of arteriosclerosis involves the accumulation of various substances within the arterial walls, including cholesterol, fats, calcium, cellular waste products, and connective tissue. These deposits cause the arteries to become stiff, less flexible, and narrower, impairing blood flow to organs and tissues.

ETIOLOGY/CAUSES:

- + High cholesterol levels: High levels of LDL (low-density lipoprotein) cholesterol, also known as "bad" cholesterol, can cause fatty deposits to accumulate in the arteries.**
- + High blood pressure: High blood pressure can damage the artery walls, making them more susceptible to plaque buildup.**
- + Smoking: Smoking can damage the lining of the arteries and increase the risk of plaque buildup.**
- + Diabetes: High blood sugar levels can damage the lining of the arteries and increase the risk of plaque buildup.**
- + Obesity: Being overweight or obese can increase the risk of developing atherosclerosis.**
- + Lack of exercise: Regular physical activity can help maintain healthy cholesterol levels, blood pressure, and weight, reducing the risk of atherosclerosis.**

- ✚ **Genetics:** Some people may be genetically predisposed to developing atherosclerosis.

PATHOPHYSIOLOGY:

- ✚ **Endothelial injury:** The inner lining of the arteries, called the endothelium, can become damaged or injured due to various factors, including high blood pressure, smoking, high cholesterol levels, and inflammation. Endothelial injury disrupts the normal function of the arterial wall.
- ✚ **Lipid accumulation:** Once the endothelium is injured, low-density lipoprotein (LDL) cholesterol particles in the bloodstream can penetrate the damaged endothelium and accumulate within the arterial wall. LDL cholesterol is oxidized and taken up by immune cells, primarily macrophages, forming foam cells.
- ✚ **Formation of fatty plaques:** The accumulation of foam cells, along with smooth muscle cells and connective tissue, leads to the formation of fatty plaques within the arterial wall. These plaques contain cholesterol, fats, calcium, cellular waste products, and inflammatory cells.
- ✚ **Plaque growth and inflammation:** Over time, the plaques can grow in size, further narrowing the arterial lumen and impeding blood flow. The plaques also trigger an inflammatory response, involving immune cells and the release of inflammatory substances.
- ✚ **Plaque complications:** The fibrous cap covering the plaque can become weak or rupture, exposing the plaque's contents to the bloodstream. This can trigger the formation of blood clots (thrombosis) at the site of the plaque. A blood clot can partially or completely block the artery, leading to a sudden reduction or cessation of blood flow. If the blood clot completely occludes a coronary artery, it can result in a heart attack. If it occurs in a cerebral artery, it can cause a stroke.

- ✚ **Progression and consequences:** As the atherosclerotic process continues, multiple plaques can develop in different arteries throughout the body, limiting blood flow to various organs and tissues.

CLINICAL MANIFESTATION/ SIGN & SYMPTOMS:

- ✚ **Chest pain or discomfort (angina):** This can be a sign of reduced blood flow to the heart.
- ✚ **Shortness of breath:** This can occur when plaque buildup reduces blood flow to the lungs.
- ✚ **Numbness or weakness in the arms or legs:** This can occur when plaque buildup reduces blood flow to the arms or legs.
- ✚ **Slurred speech or difficulty speaking:** This can occur when plaque buildup reduces blood flow to the brain.
- ✚ **Erectile dysfunction:** Reduced blood flow to the penis can cause difficulty achieving or maintaining an erection.
- ✚ **Vision problems:** Plaque buildup in the carotid arteries can cause vision problems, such as blurred or double vision.

CLINICAL EVALUATION/DIAGNOSIS:

- ✚ **Blood tests:** Blood tests can be used to measure cholesterol and triglyceride levels, as well as other markers of inflammation and cardiovascular health.
- ✚ **Electrocardiogram (ECG or EKG):** This test measures the electrical activity of the heart and can detect any abnormalities, such as reduced blood flow or damage to the heart muscle.

- ✚ **Echocardiogram:** This test uses sound waves to create images of the heart and can help detect any abnormalities, such as reduced blood flow or heart valve problems.
- ✚ **Stress test:** This test involves exercising or taking medication to increase the heart rate and blood flow, while monitoring the heart's response.
- ✚ **CT angiography:** This test uses a special dye and X-rays to create detailed images of the blood vessels, which can help detect any blockages or narrowing caused by plaque buildup.
- ✚ **Magnetic resonance angiography (MRA):** This test uses a magnetic field and radio waves to create detailed images of the blood vessels, which can help detect any blockages or narrowing caused by plaque buildup.
- ✚ **Angiogram:** This test involves injecting a special dye into the blood vessels and taking X-rays to create detailed images of the blood vessels, which can help detect any blockages or narrowing caused by plaque buildup.

PHARMACOLOGICAL MANAGEMENT:

- ✚ **Statins:** Statins are a type of cholesterol-lowering medication that can reduce the amount of LDL (bad) cholesterol in the blood, which can help prevent the formation of new plaques and reduce the size of existing plaques.
- ✚ **Antiplatelet agents:** These drugs, such as aspirin or clopidogrel, can help prevent blood clots from forming on the surface of plaques, reducing the risk of heart attack or stroke.
- ✚ **Angiotensin-converting enzyme (ACE) inhibitors or angiotensin receptor blockers (ARBs):** These medications can help lower blood pressure and reduce the risk of cardiovascular events. (Lisinopril, Enalapril, Ramipril, Benazepril)

- ✚ **Beta blockers:** Beta blockers can help reduce blood pressure and slow the heart rate, reducing the workload on the heart and improving overall cardiovascular health.(Atenolol, Bisoprolol, Carvedilol)
- ✚ **Calcium channel blockers:** These medications can help relax the blood vessels and improve blood flow, reducing the risk of cardiovascular events. (Amlodipine, Diltiazem, Verapamil)
- ✚ **Nitrates:** Nitrates can help relax the blood vessels and improve blood flow, reducing the risk of cardiovascular events.

SURGICAL MANAGEMENT:

- ✚ **Angioplasty and stenting:** This procedure involves inserting a small balloon into the affected artery and inflating it to compress the plaque against the artery wall, followed by the placement of a small wire mesh stent to keep the artery open.
- ✚ **Coronary artery bypass grafting (CABG):** This procedure involves taking a healthy blood vessel from another part of the body, such as the leg or chest, and using it to bypass the blocked or narrowed coronary artery, restoring blood flow to the heart.
- ✚ **Endarterectomy:** This procedure involves removing the plaque from the inner lining of the artery, restoring blood flow through the affected vessel.
- ✚ **Thrombectomy:** This procedure involves removing a blood clot from a blocked artery, restoring blood flow to the affected area.
- ✚ **Atherectomy:** This procedure involves using a specialized catheter to remove the plaque from the artery, restoring blood flow through the affected vessel.

PREVENTION/NON-PHARMACOLOGICAL MANAGEMENT:

- ✚ **Adopting a healthy diet:** A diet rich in fruits, vegetables, whole grains, lean proteins, and healthy fats can help reduce the risk of atherosclerosis by reducing cholesterol levels and promoting heart health.
- ✚ **Maintaining a healthy weight:** Being overweight or obese can increase the risk of atherosclerosis, so maintaining a healthy weight through regular exercise and healthy eating habits is important.
- ✚ **Getting regular exercise:** Regular physical activity can help improve cardiovascular health and reduce the risk of atherosclerosis, heart disease, and other health conditions.
- ✚ **Managing cholesterol levels:** High levels of LDL (bad) cholesterol and triglycerides can contribute to the development of atherosclerosis, so managing cholesterol levels through diet, exercise, and medication if necessary is important.
- ✚ **Managing blood pressure:** High blood pressure can damage the arteries and contribute to the development of atherosclerosis, so managing blood pressure through lifestyle changes and medication if necessary is important.
- ✚ **Managing diabetes:** High blood sugar levels can contribute to the development of atherosclerosis, so managing diabetes through diet, exercise, and medication if necessary is important.