Coronary Artery Disease: Its Etiology, Epidemiology, Clinical Course And Modern Methods Of Treatment

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ABSTRACT

This article is about the treatment of patients with coronary artery disease. The article discusses the types of coronary artery disease, its causes, complications observed in patients with the disease, measures to prevent them, its etiology, epidemiology, clinical course, and modern methods of treatment.

Keywords: Coronary artery, acute coronary syndrome, atherosclerotic plaque, electrocardiogram (ECG), ischemic heart disease

Coronary artery disease is a narrowing of the crown arteries that is asymptomatic in the early stages of the disease but can later lead to stable stenocardia, non-stable stenocardia or myocardial infarction. This occurs as a result of blockage of the coronary arteries and leads to an incompatibility of oxygen demand and supply. Patients may experience suppressive pain, shortness of breath, nausea, and diaphoresis (profuse sweating). Sometimes pain in the left hand, lower jaw or neck area, discomfort in the upper abdomen is observed. There are two main trunks of the coronary blood supply – the right and left coronary arteries. These two arteries arise directly above the aortic valve from the initial part of the aorta. The left coronary artery exits the left aortic sinus, and the right coronary artery exits the right aortic sinus. The right coronary artery supplies a large portion of the right ventricle of the heart, part of the heart septum, and the back wall of the left ventricle of the heart. The rest of the heart is supplied by the left coronary artery. The left coronary artery is divided into two or three, rarely four arteries, of which clinically the most important are the anterior descending and circumflex branches. The anterior descending branch is a direct continuation of the left coronary artery and descends to the apex of the heart. The circumflex branch emerges from the left coronary artery at approximately right angles to the head, bends from front to back around the heart, sometimes reaching the posterior wall of the interventricular arch.

Etiology. Coronary artery disease is a multifactorial phenomenon. We can divide etiological factors into factors that cannot be changed and that can be changed. Factors that cannot be changed include gender, age, genetics.

Risk factors that can be changed include smoking, obesity, lipid levels. Smoking remains the first cause of cardiovascular disease. In 2016, the prevalence of smoking among adults in the United States was 15.5%. [1]

Epidemiology. Coronary artery disease is very common in the developed and developing world. One study estimated that CAD accounted for 2.2 percent of global diseases and 32.7 percent of cardiovascular diseases. It invests over $ 200 billion annually in the healthcare system in the United States. According to a national health survey conducted by the American Heart Association (AHA), 7.6 percent of men and 5.0 percent of women in the United States were estimated to have had coronary artery disease between 2009 and 2012. This is 15.5 million Americans who have suffered from the disease during this time.[2] the incidence of CAD is observed to increase with age, regardless of gender. In France, the incidence of CAD was about 1% in the 45-to 65-year-old group, an age group that rose to about 4% between the ages of 75 and 84. [3]

Pathophysiology. A characteristic sign of CAD pathophysiology is the development of atherosclerotic plaque. The first step in the process is the formation of the "fat line". The adipose line is formed by subendothelial deposition of lipid-filled macrophages, also known as foam cells. When vascular damage occurs, the intima layer breaks down and the monocytes move into the subendothelial space and they become macrophages. These macrophages take oxidized low-density lipoprotein (LDL) particles to form foam cells. T cells are activated, which release cytokines only to aid the pathological process. Released growth factors activate smooth muscles, which also take oxidized LDL particles and collagen and precipitate along with activated macrophages, increasing the foamy cell population. This process leads to the formation of subendothelial plaques. [4]

Clinical course. Coronary artery disease can manifest as stable ischemic heart disease or acute coronary syndrome. While the first is in a chronic state, the second is more pronounced in acute conditions.

1. Stable heart ischemic disease-manifests as stable angina. Stable angina usually manifests itself as pain or pressure under the chest, which is aggravated by tension or emotional stress and is relieved by rest or nitroglycerin and lasts for 2 months. It is important to know that classic anginal symptoms can be absent and it can manifest differently in some demographic groups, including women, elderly and diabetic patients, with atypical symptoms and stressful shortness of breath. Treatment of stable cardiac ischemic disease involves non-pharmacological and pharmacological interventions. Lifestyle changes include quitting smoking, regular exercise, weight loss, good control of diabetes and hypertension, and a healthy diet. Pharmacological interventions include cardioprotective and antianginal drugs. [5]

2. Acute coronary syndrome-sudden chest pain that appears or usually manifests as pressure that spreads to the neck and left arms and can be accompanied by shortness of breath, palpitations, dizziness, fainting, cardiac arrest or newly initiated congestive heart failure. Acute coronary syndrome (ACS) characterizes the range of myocardial ischemic States, which include unstable angina (UA), non-ST elevated myocardial infarction (NSTEMI), or ST elevated myocardial infarction (STEMI). Diagnosis and classification of acute coronary syndrome (ACS) is based on a thorough review of clinical features, including electrocardiogram (ECG) results and biochemical signs of myocardial necrosis. [6]

Diagnostic methods. There are several methods for evaluating coronary artery disease, including ECG, EXO, cxr, Stress test, cardiac catheterization, and blood test to name the main ones. These tests are carried out according to the context that patients present. The following is a detailed overview of the various diagnostic methods available to assess coronary artery disease:

Electrocardiogram (ECG): ECG is a very simple but very useful test in assessing coronary artery

disease. It measures electrical activity in the heart conduction system and measures with 10 wires attached to the skin at standardized locations. It provides information on the physiology and anatomy of the heart. Important information to pay attention to in the ECG is the heart rate, rhythm and arrow. After that, information about acute and chronic pathological processes can be obtained. In acute coronary syndrome, changes in the ST segment and changes in the T wave can be seen. EKG is also a cost-effective and easily available test method that is not user-dependent. [7]

Exocardiography (EXO): Exocardiography is mainly cardiac ultrasound. This valuable and non-invasive test method can be performed in acute, chronic, inpatient and outpatient settings. Exocardiography determines wall movement, cap failure and stenosis in acute conditions, and chamber dimensions. This tool also helps in the diagnosis of acute pulmonary pathologies such as pulmonary embolism. In addition, echocardiography assesses the pericardium cavity. In chronic cases, exocardiography can be performed to visually monitor cardiac activity and response to therapy. The test is also used on an outpatient basis as part of a stress test. [8]

Stress test; Stress test is a relatively non-invasive test for coronary artery disease. This method is used in cases where the equivalent of angina or angina is suspected, and helps to identify coronary pathology when interpreted under appropriate circumstances. During the test, the heart is artificially stressed. The test is stopped if the patient is diagnosed with anginal symptoms or abnormal ECG changes, especially in the St segments and coronary artery. Before, during and after the procedure, an ECG is taken and constantly monitored for any symptoms in the patient. [9]

Cardiac catheterization: cardiac catheterization is the gold standard and most accurate way to assess cardiac ischemic coronary disease. Coronary angiography is used to assess the type and number of affected vessels and the severity of stenosis, which is important in determining the appropriate approach to coronary intervention. However, this invasive procedure has potentially serious complications and not everyone is a candidate for it. [10]

Treatment: the basis of treatment is aimed at reducing the amount of cardiovascular diseases and deaths, relieving symptoms and improving the quality of life. Antianginal drugs such as beta blockers, calcium channel blockers, or nitrates can be used as pharmacotherapy. The main purpose of using Antianginal drugs is to reduce the need for oxygen in the myocardium. As a secondary prophylaxis, antithrombotic agents aspirin, clopidogrel are used. [11]

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