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CARDIOVASCULAR DISORDERS: ANGINA PECTORIS, CAUSES, DIAGNOSE AND TREATMENT

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Annotation: *Angina pectoris or angina is temporary chest pain or discomfort as a result of decreased blood flow to the heart muscle. Angina is not a heart attack, but it is a sign of increased risk for heart attack. Angina may be stable (develops during physical activity, lasts five minutes or less and is relieved with rest) or unstable (occurs during periods of rest, lasts longer, and symptoms may be more severe).*

Key words: *stable angina, unstable angina, Prinzmetal angina, coronary computed tomography (CT) angiography, coronary artery bypass graft surgery (CABG).*

INTRODUCTION

Angina pectoris, or just angina, is temporary chest pain or discomfort caused by decreased blood flow to the heart muscle. Because of the decreased flow of blood, there is not enough oxygen to the heart muscle resulting in chest pain. Coronary artery disease, which can result in narrowing of the coronary arteries that carry blood and oxygen to the heart muscle, is one of the most common causes of angina. While angina is not a heart attack, it does signal an increased risk for a heart attack. Seek immediate medical attention if you experience any chest pain or discomfort.

There are different types of angina. The type depends on the cause and whether rest or medicine eases symptoms.

- Stable angina. Stable angina is the most common form of angina. It usually happens during activity, also called exertion. It goes away with rest or angina medicine. Pain that starts when you're walking uphill or in the cold weather may be angina. Stable angina is predictable. It is usually similar to previous episodes of chest pain. The chest pain typically lasts a short time, perhaps five minutes or less.
- Unstable angina, which is a medical emergency. Unstable angina is unpredictable and occurs at rest. Or the pain is worsening and occurs with less physical effort. Unstable angina is typically severe and lasts longer than stable angina, maybe 20 minutes or longer. The pain doesn't go away

with rest or the usual angina medicines. If the blood flow doesn't improve, the heart doesn't get enough oxygen. A heart attack occurs. Unstable angina is dangerous and needs emergency treatment.

- Variant angina, also called Prinzmetal angina. This type of angina isn't due to coronary artery disease. It's caused by a spasm in the heart's arteries. The spasm temporarily reduces blood flow. Severe chest pain is the main symptom of variant angina. It most often occurs in cycles, typically at rest and overnight. The pain may be relieved by angina medicine.
- Refractory angina. Angina episodes are frequent despite a combination of medicines and lifestyle changes.

Angina symptoms include chest pain and discomfort. The chest pain or discomfort may feel like:

- Burning.
- Fullness.
- Pressure.
- Squeezing.

Pain also may be felt in the arms, neck, jaw, shoulder or back.

Other symptoms of angina include:

- Dizziness.
- Fatigue.
- Nausea.
- Shortness of breath.
- Sweating.

The severity, duration and type of angina can vary. New or different symptoms may signal unstable angina or a heart attack.

Causes:

Angina is caused by reduced blood flow to the heart muscle. Blood carries oxygen, which the heart muscle needs to survive. When the heart muscle isn't getting enough oxygen, it causes a condition called ischemia. The most common cause of reduced blood flow to the heart muscle is coronary artery disease (CAD). The heart arteries, called the coronary arteries, can become narrowed by fatty deposits called plaques. This condition is called atherosclerosis. Plaque in a blood vessel may rupture or cause a blood clot. These events can quickly block or reduce flow through a narrowed artery. This can suddenly and severely decrease blood flow to the heart muscle. The heart muscle may still be able to work during times of low oxygen demand without triggering angina symptoms. An example is when resting. But when the demand for oxygen goes up, such as when exercising, angina can result.

Risk factors:

The following things may increase the risk of angina:

- Increasing age. Angina is most common in adults age 60 and older.
- Family history of heart disease. Tell your healthcare team if your mother, father or any siblings have or had heart disease or a heart attack.
- Tobacco use. Smoking, chewing tobacco and long-term exposure to secondhand smoke can damage the lining of the arteries. Artery damage can let deposits of cholesterol collect and block blood flow.
- Diabetes. Diabetes increases the risk of coronary artery disease. Coronary artery disease can cause angina.
- High blood pressure. Over time, high blood pressure damages arteries by speeding up the hardening of the arteries.

- High cholesterol or triglycerides. Too much bad cholesterol, called low-density lipoprotein (LDL), in the blood can cause arteries to narrow. A high LDL level increases the risk of angina and heart attack. A high level of triglycerides in the blood also is unhealthy.
- Other health conditions. Chronic kidney disease, peripheral artery disease, metabolic syndrome or a history of stroke increases the risk of angina.
- Not enough exercise. An inactive lifestyle raises the risk of high cholesterol, high blood pressure, type 2 diabetes and obesity. Talk with your healthcare team about the type and amount of exercise that's best for you.
- Obesity. Obesity is a risk factor for heart disease, which can cause angina. Being overweight makes the heart work harder to supply blood to the body.
- Emotional stress**.** Too much stress and anger can raise blood pressure. Rushes of hormones made by the body during stress can narrow the arteries and worsen angina.
- Medicines. Some medicines tighten blood vessels, which may trigger Prinzmetal angina. An example is certain migraine medicines.
- Drug misuse**.** Cocaine and other stimulants can cause blood vessel spasms and trigger angina.
- Cold temperatures**.** Exposure to cold temperatures can trigger Prinzmetal angina.

The chest pain that occurs with angina can make doing some activities, such as walking, uncomfortable. However, the most dangerous complication is a heart attack.

Warning symptoms of a heart attack include:

- Pressure, fullness or a squeezing pain in the center of the chest that lasts for more than a few minutes.
- Pain extending beyond the chest to the shoulder, arm or back, or even to the teeth and jaw.
- Fainting.
- Threatening sense of doom.
- Increasing episodes of chest pain.
- Nausea and vomiting.
- Continued pain in the upper belly area.
- Shortness of breath.
- Sweating.

Diagnosting methods:

- Electrocardiogram (ECG): This test records the electrical activity of the heart, which is used to diagnose heart abnormalities such as arrhythmias or to show ischemia (lack of oxygen and blood) to the heart.
- Stress test without imaging: This heart-monitoring test is used to help evaluate how well the heart performs with activity. During a stress test, you will usually be asked to perform physical exercise, like walking on a treadmill. An ECG is recorded during the period of exercise. The ECG is assessed by your doctor to see if your heart reached an appropriate heart rate and if there were any changes to suggest decreased blood flow to your heart. If you are unable to perform exercise, medications that mimic the heart's response to exercise may be used.
- Blood tests: The tests can identify certain enzymes such as troponin that leak into the blood after your heart has suffered severe angina or a heart attack. Blood tests can also identify elevated cholesterol, LDL and triglycerides that place you at higher risk for coronary artery disease and therefore angina.

Additionally, the following imaging tests may be performed:

- Chest x-ray: This noninvasive imaging test helps your doctor rule out other sources of chest pain such as pneumonia. Imaging with x-rays involves exposing the chest to a small dose of radiation to produce pictures of the chest and heart.
- CT of the chest*:* Chest CT is a more sensitive test than chest x-ray that can identify other causes of chest pain such as aortic disease or blood clots in the blood vessels of the lungs. This imaging test combines special x-ray equipment with sophisticated computers to produce multiple images of the chest and heart.
- Coronary computed tomography (CT) angiography: This exam evaluates the coronary arteries (blood vessels that supply blood and oxygen to the heart) to determine the extent of narrowing of the arteries due to plaque without the need for an invasive catheter feed through the arteries into the heart. Contrast material is injected through a small line in the arm vein, similar to the ones used to draw blood.
- Magnetic resonance (MR) imaging: The primary purpose of this exam is to determine whether there is good blood flow to the heart muscle. If there are areas with decreased blood flow, this could indicate plaque with blood vessel narrowing. This blood flow evaluation may be done twice during the exam with the use of a contrast material. The first time may be performed after the administration of a pharmaceutical, which stresses the heart like exercise. The second time will be at rest. Performing the evaluation both with stress and rest helps determine if the decreased blood flow only occurs with exercise. This exam can also assess function of the heart and determine if there is any scar in the heart muscle. MRI machines use a powerful magnetic field, radio waves and a computer to produce detailed images.
- Catheter angiography: in this invasive imaging test, a thin, long plastic tube, called a catheter, is inserted into an artery in your groin or hand using a needle. The catheter is guided with a wire into the coronary arteries and is used to inject contrast material directly into the coronary arteries to determine whether there is any narrowing of the blood vessels. Images of the contrast material in the blood vessels are captured using x-rays. Narrowed portions of the vessels can be reopened using either a balloon or stents.
- Echocardiogram: During this test, a transducer that produces high-frequency sound waves is used to create moving images of the heart. The motion of the walls of the heart is evaluated. If there is decreased motion within a portion of the wall of the heart, this could indicate decreased blood flow from narrowing of the coronary artery. Imaging can also be performed with a pharmaceutical agent stressing the heart to detect decreased motion in a portion of the heart muscle with stress.
- Myocardial Single Photon Emission Computed Tomography (SPECT): This stress test with imaging is performed with a nuclear medicine tracer. During an imaging stress test, the patient is usually asked to perform some kind of physical exercise like walking on a treadmill. If the patient is unable to perform exercise for any reason, drugs that mimic the heart's response to exercise may be used. A radioactive tracer will be injected into the blood during the peak of exercise and images of the heart will be taken. The radioactive tracer flows with the blood and will show whether there is an area of the heart with decreased blood flow.

Treatment includes:

Many doctors may recommend certain lifestyle changes such as maintaining a healthy weight, consuming a balanced diet low in fats, discontinuing the use of tobacco products and finding ways to reduce stress.

Additionally, you may also be treated with:

- Medications such as aspirin, statins, beta-blockers, calcium channel blockers, or nitrates, as well as newer lipid-lower agents such as PCSK9 inhibitors.
- Angioplasty and coronary stenting: In selected cases, following appropriate testing, your doctor may perform angioplasty and stenting. This procedure, which uses balloons and/or stents, is performed to open the blockage in the coronary arteries and improve blood flow to the heart.
- Coronary artery bypass graft surgery (CABG): This surgery increases blood flow to the heart by using a vein, or an artery from elsewhere in the body to divert blood flow around the area of narrowing or blockage in the coronary arteries of the heart.

Conclusion, angina is chest pain or discomfort that happens when your heart isn't receiving enough oxygen-rich blood. As a result, your heart may beat faster and harder to gain more blood, causing you noticeable pain. Angina isn't a disease. It's a symptom and a warning sign of heart disease.

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