

Management of Angina Pectoris

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Abstract

Angina pectoris is defined as substernal chest pain, pressure, or discomfort that is typically exacerbated by exertion and/or emotional stress, lasts greater than 30 to 60 seconds, and is relieved by rest and nitroglycerin. There are approximately 10 million people in the United States who have angina, and there are over 500,000 cases diagnosed per year. Several studies now show that angina itself is a predictor of major adverse cardiac events. In addition, angina is a serious morbidity that impedes quality of life and should be treated. In the United States, pharmacologic therapy for angina includes β -blockers, nitrates, calcium channel blockers, and the late sodium current blocker ranolazine. In other countries, additional pharmacologic agents include trimetazidine, ivabradine, nicorandil, fasudil, and others. Revascularization is indicated in certain high-risk individuals and also has been shown to improve angina.

Keywords: Angina; Variant; Atherosclerosis; Obesity; Stress; Electrocardiogram.

INTRODUCTION

Angina pain is often described as squeezing, pressure, heaviness, tightness or pain in the chest. It may feel like a heavy weight lying on the chest. Angina may be a new pain that needs to be checked by a health care provider, or recurring

pain that goes away with treatment. In the early 20th century, severe angina was seen as a sign of impending death. However, modern medical therapies have improved the outlook substantially. Middle age patients who experience moderate to severe angina (grading by classes II, III, and IV) have a five year survival rate of approximately 92%. There is a weak relationship between severity of angina and degree of oxygen deprivation in the heart muscle, however, the severity of angina does not always match the degree of oxygen deprivation to the heart or the risk of a myocardial infarction (heart attack). Some people may experience severe pain even though there is little risk of a heart attack.

Definition

Angina pectoris is chest pain or discomfort that occurs when a part of your heart doesn't get enough

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blood and oxygen. It is most often just called angina.

Classification

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

- ❖ **Stable angina:** Stable angina is the most common form of angina. It usually happens during activity (exertion) and goes away with rest or angina medication. For example, pain that comes on when you're walking uphill or in the cold weather may be angina. Stable angina pain is predictable and usually similar to previous episodes of chest pain. The chest pain typically lasts a short time, perhaps five minutes or less.
- ❖ **Unstable angina (a medical emergency):** Unstable angina is unpredictable and occurs at rest. Or the angina pain is worsening and occurs with less physical effort. It's 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 medications. If the blood flow doesn't improve, the heart is starved of oxygen and a heart attack occurs. Unstable angina is dangerous and requires emergency treatment.
- ❖ **Variant angina (Prinzmetal angina):** Variant angina, also called Prinzmetal angina, isn't due to coronary artery disease. It's caused by a spasm in the heart's arteries that 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 medication.
- ❖ **Refractory angina:** Angina episodes are frequent despite a combination of medications and lifestyle changes.

Causes

Angina pectoris occurs when your heart muscle (myocardium) does not get enough blood and oxygen. Not enough blood supply is called ischemia. Angina can be a symptom of coronary artery disease (CAD). This is when arteries that carry blood to your heart become narrowed and blocked. This can happen because of:

- ❖ Hardening of arteries (atherosclerosis)
- ❖ A blood clot
- ❖ Plaque in an artery that can rupture (unstable plaque)
- ❖ Poor blood flow through a narrowed heart

valve

- ❖ Lessened pumping of the heart muscle
- ❖ Coronary artery spasm

Risk Factors

- ❖ **Increasing age:** Angina is most common in adults age 60 and older.
- ❖ **Family history of heart disease:** Tell your health care provider 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 second hand smoke can damage the lining of the arteries, allowing deposits of cholesterol to collect and block blood flow.
- ❖ **Diabetes:** Diabetes increases the risk of coronary artery disease, which leads to angina and heart attacks by speeding up atherosclerosis and increasing cholesterol levels.
- ❖ **High blood pressure:** Over time, high blood pressure damages arteries by accelerating hardening of the arteries.
- ❖ **High cholesterol or triglycerides:** Too much bad cholesterol low density lipoprotein (LDL) in the blood can cause arteries to narrow. A high LDL increases the risk of angina and heart attacks. 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 contributes to high cholesterol, high blood pressure, type 2 diabetes and obesity. Talk to your health care provider 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. Surges of hormones produced during stress can narrow the arteries and worsen angina.
- ❖ **Medications:** Drugs that tighten blood vessels, such as some migraine drugs, may trigger Prinzmetal's angina.
- ❖ **Drug misuse:** Cocaine and other stimulants can cause blood vessel spasms and trigger angina.

- ❖ **Cold temperatures:** Exposure to cold temperatures can trigger Prinzmetal angina.

Symptoms

These are the most common symptoms of angina:

- ❖ A pressing, squeezing, or crushing pain, usually in the chest under your breastbone
- ❖ Pain that may also occur in your upper back, both arms, neck, or ear lobes
- ❖ Chest pain that spreads to your arms, shoulders, jaw, neck, or back
- ❖ Shortness of breath
- ❖ Weakness
- ❖ Tiredness (fatigue)
- ❖ Feeling faint

Diagnosis

Your healthcare provider will ask about your medical history. He or she will give you a physical exam. A healthcare provider can often diagnose angina from symptoms and how and when they occur. Tests used to diagnose and confirm angina include:

- ❖ **Electrocardiogram (ECG or EKG):** This quick and painless test measures the electrical activity of the heart. Sticky patches (electrodes) are placed on the chest and sometimes the arms and legs. Wires connect the electrodes to a computer, which displays the test results. An ECG can show if the heart is beating too fast, too slow or not at all. Your health care provider also can look for patterns in the heart rhythm to see if blood flow through the heart has been slowed or interrupted.
- ❖ **Chest X-ray:** A chest X-ray shows the condition of the heart and lungs. A chest X-ray may be done to determine if other conditions are causing chest pain symptoms and to see if the heart is enlarged.
- ❖ **Blood tests:** Certain heart enzymes enter the bloodstream when the heart muscle is damaged, such as from a heart attack. A cardiac enzyme blood test can help detect these substances.
- ❖ **Stress test:** Sometimes angina is easier to diagnose when the heart is working harder. A stress test typically involves walking on a treadmill or riding a stationary bike while the heart is monitored. Other tests may be done at the same time as a stress test. If you can't exercise, you may be given drugs that mimic the effect of exercise on the heart.

- ❖ **Echocardiogram:** An echocardiogram uses sound waves to create images of the heart in motion. These images can show how blood flows through the heart. An echocardiogram may be done during a stress test.

- ❖ **Nuclear stress test:** A nuclear stress test helps measure blood flow to the heart muscle at rest and during stress. It is similar to a routine stress test, but during a nuclear stress test, a radioactive tracer is injected into the bloodstream. A special scanner shows how the tracer moves through the heart arteries. Areas that have little or no amounts of the tracer suggest poor blood flow.

- ❖ **Cardiac computerized tomography (CT):** For this test, you typically lie on a table inside a doughnut shaped machine. An X-ray tube inside the machine rotates around the body and collects images of the heart and chest. A cardiac CT scan can show if the heart is enlarged or if any heart's arteries are narrowed.

- ❖ **Cardiac magnetic resonance imaging (MRI):** This test uses magnetic fields and radio waves to create detailed images of the heart. You typically lie on a table inside a long, tubelike machine that produces detailed images of the heart's structure and blood vessels.

- ❖ **Coronary angiography:** Coronary angiography uses X-ray imaging to examine the inside of the heart's blood vessels. It's part of a general group of procedures known as cardiac catheterization. A health care provider threads a thin tube (catheter) through a blood vessel in the arm or groin to an artery in the heart and injects dye through the catheter. The dye makes the heart arteries show up more clearly on an X-ray. Your health care provider might call this type of X-ray an angiogram.

MANAGEMENT

I-Medical Management

- ❖ **Nitrates:** Nitrates are often used to treat angina. Nitrates relax and widen the blood vessels so more blood flows to the heart. The most common form of nitrate used to treat angina is nitroglycerin. The nitroglycerin pill is placed under the tongue. Your health care provider might recommend taking a nitrate before activities that typically trigger angina (such as exercise) or on a long-term preventive basis.

- ❖ **Aspirin:** Aspirin reduces blood clotting, making it easier for blood to flow through narrowed heart arteries. Preventing blood clots can reduce the risk of a heart attack. Don't start taking a daily aspirin without talking to your health care provider first.
- ❖ **Clot preventing drugs:** Certain medications such as clopidogrel (Plavix), prasugrel (Effient) and ticagrelor (Brilinta) make blood platelets less likely to stick together, so blood doesn't clot. One of these medications may be recommended if you can't take aspirin.
- ❖ **Beta blockers:** Beta blockers cause the heart to beat more slowly and with less force, which lowers blood pressure. These medicines also relax blood vessels, which improves blood flow.
- ❖ **Statins:** Statins are drugs used to lower blood cholesterol. High cholesterol is a risk factor for heart disease and angina. Statins block a substance that the body needs to make cholesterol. They help prevent blockages in the blood vessels.
- ❖ **Calcium channel blockers:** Calcium channel blockers, also called calcium antagonists, relax and widen blood vessels to improve blood flow.
- ❖ **Other blood pressure medications:** Other drugs to lower blood pressure include angiotensin converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs). If you have high blood pressure, diabetes, signs of heart failure or chronic kidney disease, your health care provider may prescribe one of these types of medications.
- ❖ **Ranolazine (Ranexa):** This medication may be prescribed for chronic stable angina that doesn't get better with other medications. It may be used alone or with other angina medications, such as calcium channel blockers, beta blockers or nitroglycerin.

II - Therapies

Sometimes, a nondrug option called *enhanced external counterpulsation (EECP)* may be recommended to increase blood flow to the heart. With EECP, blood pressure type cuffs are placed around the calves, thighs and pelvis. EECP requires multiple treatment sessions. EECP may help reduce symptoms in people with frequent, uncontrolled angina (refractory angina).

III - Surgery and Procedures

If lifestyle changes, medications or other therapies don't reduce angina pain, a catheter procedure or open heart surgery may be needed. Surgeries and procedures used to treat angina and coronary artery disease include:

- ❖ **Angioplasty with stenting:** During an angioplasty also called a percutaneous coronary intervention (PCI) a tiny balloon is inserted into the narrowed artery. The balloon is inflated to widen the artery, and then a small wire mesh coil (stent) is usually inserted to keep the artery open. Angioplasty with stenting improves blood flow in the heart, reducing or eliminating angina. Angioplasty with stenting may be a good treatment option for those with unstable angina or if lifestyle changes and medications don't effectively treat chronic, stable angina.
- ❖ **Open heart surgery (coronary artery bypass surgery):** During coronary artery bypass surgery, a vein or artery from somewhere else in the body is used to bypass a blocked or narrowed heart artery. Bypass surgery increases blood flow to the heart. It's a treatment option for both unstable angina and stable angina that has not responded to other treatments.

PREVENTION

- ❖ Heart disease is often the cause of angina. Making lifestyle changes to keep the heart healthy is an important part of angina treatment. Try these strategies:
- ❖ Don't smoke and avoid exposure to secondhand smoke. If you need help quitting, talk to your health care provider about smoking cessation treatment.
- ❖ Exercise and manage weight. As a general goal, aim to get at least 30 minutes of moderate physical activity every day. If you're overweight, talk to your health care provider about safe weight loss options. Ask your health care provider what weight is best for you.
- ❖ Eat a healthy diet low in salt and saturated and trans fats and rich in whole grains, fruits and vegetables.
- ❖ Manage other health conditions. Diabetes, high blood pressure and high blood cholesterol can lead to angina.
- ❖ Practice stress relief. Getting more exercise,

practicing mindfulness and connecting with others in support groups are some ways to reduce emotional stress.

- ❖ Avoid or limit alcohol. If you choose to drink alcohol, do so in moderation. For healthy adults, that means up to one drink a day for women and up to two drinks a day for men.

CONCLUSION

Angina pectoris continues to cause significant morbidity and is associated with major adverse cardiovascular events. Therapy should be geared to not only treating the risk factors for atherosclerotic disease, many of which have shown reductions in major adverse cardiovascular events, but also geared to minimize or eliminate angina itself. Standard therapies such as nitrates, β -blockers, calcium blockers, and ranolazine work, but even these agents do not always fully eliminate angina.

Revascularization is indicated in certain high-risk cases and in situations where guideline directed medical therapy is not fully working to eliminate angina. There is a need for newer, novel antianginal agents, because even after revascularization, a significant percentage of patients will have angina 1 year later.

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