

Angina pectoris

Angina pectoris, commonly known as angina, is severe chest pain due to ischemia (a lack of blood, hence a lack of oxygen supply) of the heart muscle, generally due to obstruction or spasm of the coronary arteries (the heart's blood vessels). Coronary artery disease, the main cause of angina, is due to atherosclerosis of the cardiac arteries.

There is a weak relationship between severity of pain and degree of oxygen deprivation in the heart muscle (i.e., there can be severe pain with little or no risk of a heart attack, and a heart attack can occur without pain).

Angina attacks, sudden-onset angina at rest, and angina lasting more than 15 minutes are symptoms of unstable angina (usually grouped with similar conditions as the acute coronary syndrome). As these may herald myocardial infarction (a heart attack), they require urgent medical attention and are generally treated as a presumed heart attack.

Classification

- **Stable angina**

Also known as effort angina, this refers to the more common understanding of angina related to myocardial ischemia. Typical presentations of stable angina is that of chest discomfort and associated symptoms precipitated by some activity (running, walking, etc.) with minimal or non-existent symptoms at rest. Symptoms typically abate several minutes following cessation of precipitating activities and resume when activity resumes. In this way, stable angina may be thought of as being similar to claudication symptoms (impairment in walking, or a "painful, aching, cramping, uncomfortable, or tired feeling in the legs that occurs during walking and is relieved by rest)

- **Unstable angina**

Unstable angina (UA) (also "crescendo angina;" this is a form of acute coronary syndrome) is defined as angina pectoris that changes or worsens.

It has at least one of these three features:

1. it occurs at rest (or with minimal exertion), usually lasting >10 min;
2. it is severe and of new onset (i.e., within the prior 4–6 weeks); and/or
3. it occurs with a crescendo pattern (i.e., distinctly more severe, prolonged, or frequent than previously).

What differentiates stable angina from unstable angina (other than symptoms) is the pathophysiology of the atherosclerosis. The pathophysiology of unstable angina is the reduction of coronary flow due to transient platelet aggregation on apparently normal endothelium, coronary artery spasms or coronary thrombosis.

- **Microvascular angina**

Microvascular Angina or Angina Syndrome X is characterized by angina-like chest pain, but have different causes. The cause of Microvascular Angina is unknown, but it appears to be the result of poor function in the tiny blood vessels of the heart, arms and legs. Since microvascular angina isn't characterized by arterial blockages, it's harder to recognize and diagnose, but its prognosis is excellent.

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Signs and symptoms

Most patients with angina complain of chest discomfort rather than actual pain: the discomfort is usually described as a pressure, heaviness, tightness, and squeezing, burning, or choking sensation. Apart from chest discomfort, anginal pains may also be experienced in the epigastrium (upper central abdomen), back, neck area, jaw, or shoulders.

Typical locations for referred pain are arms (often inner left arm), shoulders, and neck into the jaw. Angina is typically precipitated by exertion or emotional stress. It is exacerbated by having a full stomach and by cold temperatures. Pain may be accompanied by breathlessness, sweating and nausea in some cases. In this case, the pulse rate and the blood pressure increase. The pain usually lasts for about 3 to 5 minutes but the symptoms actually starts 15 to 20 minutes before the cardiac arrest and the pain is relieved by rest or specific anti-angina medication. Chest pain lasting only a few seconds is normally not angina.

Myocardial ischemia comes about when the myocardia (the heart muscles) receive insufficient blood and oxygen to function normally either because of increased oxygen demand by the myocardia or by decreased supply to the myocardia. This inadequate perfusion of blood and the resulting reduced delivery of oxygen and nutrients are directly correlated to blocked or narrowed blood vessels.

Major risk factors for angina include cigarette smoking, diabetes, high cholesterol, high blood pressure, sedentary lifestyle and family history of premature heart disease.

Cause

Major risk factors

- Age (≥ 55 yo for men, ≥ 65 for women)
- Cigarette smoking
- Diabetes mellitus (DM)
- Dyslipidemia
- Family History of premature Cardiovascular Disease (men <55 yo, female <65)
- Hypertension (HTN)
- Kidney disease (microalbuminuria or $GFR < 60$ mL/min)
- Obesity (BMI ≥ 30 kg/m²)
- Physical inactivity

Conditions that exacerbate or provoke angina

- Medications
- vasodilators
- excessive thyroid replacement
- vasoconstrictors

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Other medical problems

- profound anemia
- uncontrolled HTN
- hyperthyroidism
- hypoxemia

Other cardiac problems

- tachyarrhythmia
- bradyarrhythmia
- valvular heart disease
- hypertrophic cardiomyopathy

Myocardial ischemia can result from:

- 1) A reduction of blood flow to the heart that can be caused by stenosis, spasm, or acute occlusion (by an embolus) of the heart's arteries.
- 2) Resistance of the blood vessels. This can be caused by narrowing of the blood vessels; a decrease in radius. Blood flow is inversely proportional to the radius of the artery to the fourth power [20]
- 3) Reduced oxygen-carrying capacity of the blood, due to several factors such as a decrease in oxygen tension and hemoglobin concentration. This decreases the ability of hemoglobin to carry oxygen to myocardial tissue.

Atherosclerosis is the most common cause of stenosis (narrowing of the blood vessels) of the heart's arteries and, hence, angina pectoris. Some people with chest pain have normal or minimal narrowing of heart arteries; in these patients, vasospasm is a more likely cause for the pain, sometimes in the context of Prinzmetal's angina and syndrome X.

Myocardial ischemia also can be the result of factors affecting blood composition, such as reduced oxygen-carrying capacity of blood, as seen with severe anemia (low number of red blood cells), or long-term smoking.

Treatment

The most specific medicine to treat angina is nitroglycerin. It is a potent vasodilator that makes more oxygen available to the heart muscle. Beta-blockers and calcium channel blockers act to decrease the heart's workload, and thus its requirement for oxygen. Nitroglycerin should not be given if certain inhibitors such as Viagra, Cialis, and Levitra have been taken by the casualty within the previous 12 hours as the combination of the two could cause a serious drop in blood pressure.

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The main goals of treatment in angina pectoris are relief of symptoms, slowing progression of the disease, and reduction of future events, especially heart attacks and, of course, death. Beta blockers (e.g., carvedilol, propranolol, atenolol) have a large body of evidence in morbidity and mortality benefits (fewer symptoms, less disability and longer life) and short-acting nitroglycerin medications have been used since 1879 for symptomatic relief of angina. Calcium channel blockers (such as nifedipine (Adalat) and amlodipine), isosorbide mononitrate and nicorandil are vasodilators commonly used in chronic stable angina. A new therapeutic class, called If inhibitor, has recently been made available: ivabradine provides pure heart rate reduction leading to major anti-ischemic and antianginal efficacy. ACE inhibitors are also vasodilators with both symptomatic and prognostic benefit and, lastly, statins are the most frequently used lipid/cholesterol modifiers which probably also stabilize existing atheromatous plaque, Low-dose aspirin decreases the risk of heart attack in patients with chronic stable angina, and was previously part of standard treatment, however it has since been discovered that the increase in haemorrhagic stroke and gastrointestinal bleeding offsets this gain so they are no longer advised unless the risk of myocardial infarction is very high.

Exercise is also a very good long term treatment for the angina (but only particular regimens - gentle and sustained exercise rather than intense short bursts), probably working by complex mechanisms such as improving blood pressure and promoting coronary artery collateralisation.

Identifying and treating risk factors for further coronary heart disease is a priority in patients with angina. This means testing for elevated cholesterol and other fats in the blood, diabetes and hypertension (high blood pressure), encouraging stopping smoking and weight optimisation.

The calcium channel blocker nifedipine prolongs cardiovascular event- and procedure-free survival in patients with coronary artery disease. New overt heart failures were reduced by 29% compared to placebo; however, the mortality rate difference between the two groups was statistically insignificant.