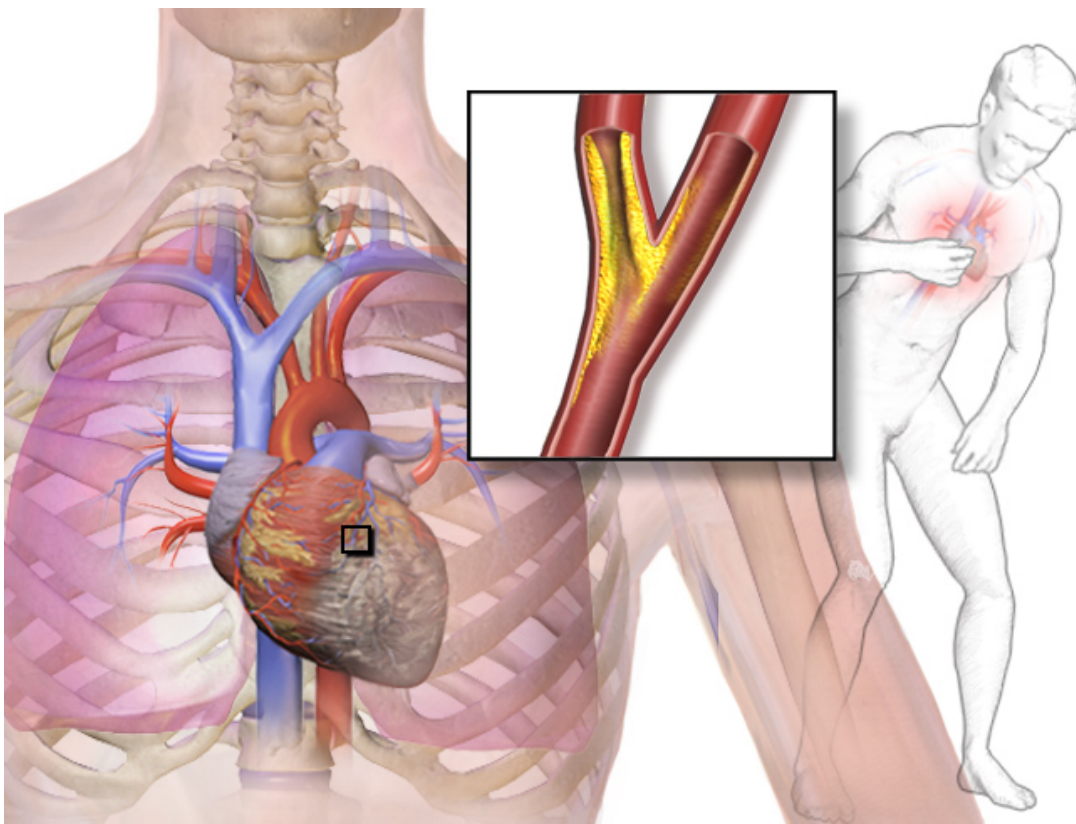


Stable and Unstable Angina Pectoris — Symptoms and Diagnosis

[See online here](#)

The main symptom of coronary heart disease is angina pectoris, either stable or unstable. In this article, prospective medicine students and readers will learn more about definition, diagnosis, examination and treatment of angina pectoris.



Definition of Stable Angina Pectoris



Image: "Pain in acute myocardial infarction (rear)" by J. Heuser. License: [CC BY-SA 3.0](https://creativecommons.org/licenses/by-sa/3.0/)

Stable angina pectoris is **episodic chest pain** due to **transient myocardial ischemia**. The pain occurs with exertion or exercise (hence, the condition is also called exertional angina) in a patient with narrow coronary arteries due to fixed atheromatous stenosis. **Stable angina can be repeatedly triggered by specific events such as physical or psychological stress. Heavy food and exposure to the cold** are also contributory factors.

Stable angina is responsive to treatment with nitrates within minutes, and pain is **always of the same intensity and quality**.

History of Stable Angina Pectoris

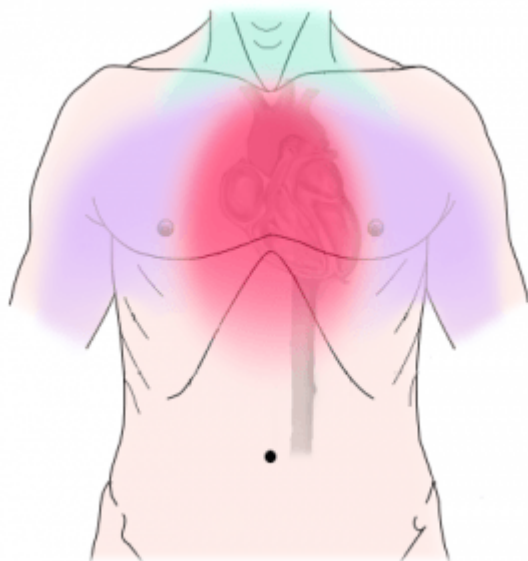


Image: "Diagram of discomfort caused by coronary artery disease. Pressure, fullness, squeezing or pain in the center of the chest. Can also feel discomfort in the neck, jaw, shoulder, back or arm." By Ian Furst. License: [CC BY-SA 3.0](https://creativecommons.org/licenses/by-sa/3.0/)

Typically, patients present with **episodes of chest discomfort**, described as a sense of pressure, choking, heaviness, or tightness in the chest.

Onset, course, and duration

The pain usually starts gradually, with **intensity increasing and decreasing** (crescendo-decrescendo in nature) within minutes; events typically last 2–5 minutes. The pain generally does not last for 20–30 minutes, unless the patient has an acute coronary

syndrome.

Site of pain

Coronary pain is usually described as **central substernal discomfort**, in which the patient cannot localize the site of pain and typically places a hand or clenched fist over the **sternum**.

Radiation

The pain radiates to any dermatome **from C8 to T4**, most often to the left shoulder and left arm (especially the ulnar surface). It can also radiate to the interscapular region, back, epigastrium, and lower jaw.

Precipitating and relieving factors

Episodes of angina are **provoked by physical exertion and intense emotion** and relieved within minutes by rest and sublingual nitroglycerin.

Associated symptoms

Angina is usually associated with shortness of breath, diaphoresis, dizziness, lightheadedness, and fatigue.

Examination of Stable Angina Pectoris

Physical examination is usually unremarkable in patients with stable angina when they are asymptomatic, but clinicians should search for:

1. Important risk factors, such as hypertension and diabetes mellitus
2. Evidence of atherosclerosis at other sites, such as carotid bruits and peripheral vascular disease
3. Evidence of valvular diseases and left ventricular dysfunction

Investigations of Stable Angina Pectoris

Resting ECG

Resting ECG is normal between attacks and may show evidence of previous myocardial infarction. During episodes of pain, reversible ST-segment depression or elevation, with or without T-wave inversion, is suggestive of myocardial ischemia.

Exercise ECG

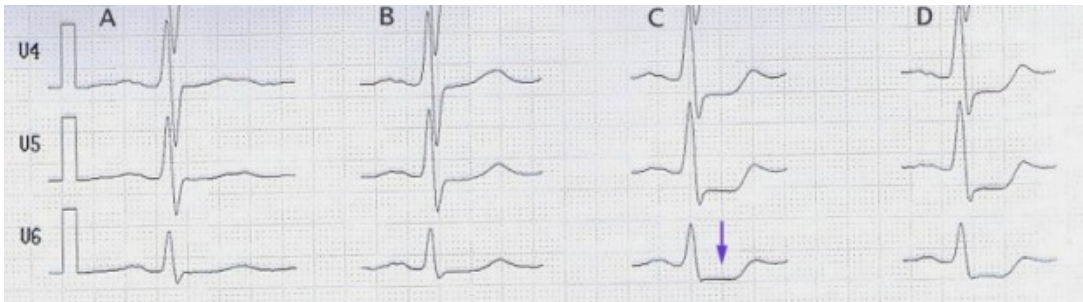


Image: "stress-ecg with st-segment-depression (arrow) beginning at 100 W (column C)" by J. Heuser. License: [CC BY-SA 3.0](https://creativecommons.org/licenses/by-sa/3.0/)

Ischemia that is not present at rest is detected by chest pain through having the patient use a treadmill. Planar or downsloping ST-segment depression of 1 mm or more is indicative of ischemia.

Isotope scanning

Thallium scan can show areas of diminished uptake of radioactive isotope by coronary myocardium either at rest or during exercise.

Angiography

Angiography visualizes the location, number, and severity of coronary artery stenosis, and is indicated when coronary revascularization is being considered.

Treatment of Stable Angina Pectoris

General measures

1. Lifestyle modification and controlling for the above-noted risk factors
2. Assessment of the extent and severity of atherosclerosis affecting different organs

Medical treatment

1. Antiplatelet therapy: Low-dose aspirin or clopidogrel (if patient is aspirin intolerant) should be prescribed for all patients.

2. Antianginal therapy:

▪ **Nitrates:**

- Causes venous and arterial dilatation, thus lowering myocardial oxygen demand by reducing the preload and afterload on the heart.
- Sublingual glyceryl trinitrate should be taken during an attack, as it relieves pain within 2–3 minutes.
- Should be taken prophylactically before strenuous exercise.

▪ **Beta-Blockers:**

- Lower myocardial oxygen demand by reducing heart rate and force of contraction.
- Aim of therapy is to relieve angina and ischemia and reduce mortality and reinfarction rates after myocardial infarction.

▪ **Calcium channel antagonists:**

- Lower myocardial oxygen demand by reducing blood pressure and

Coronary revascularization

Although treatment of stable angina should begin with medical treatment, coronary revascularization should be considered in cases of:

1. Low exercise capacity or ischemia at a low workload
2. Large areas of coronary myocardium
3. Impaired left ventricular function with ejection fraction <40 %

Percutaneous coronary intervention is mainly used in patients with single- or two-vessel disease with suitable anatomy, whereas **coronary artery bypass grafting** is mainly used in patients with three-vessel or left main stem disease.

Definition of Unstable Angina Pectoris

Unstable angina refers to chest pain that persists **longer than 20 minutes, is of increasing intensity, and occurs even at rest**. Together with myocardial infarction, unstable angina pectoris is referred to as an acute coronary syndrome.

Unstable angina is characterized by the absence of myocardial damage, in contrast to non-ST-elevation myocardial infarction (NSTEMI), which presents with evidence of myocardial necrosis.

Diagnosis of Unstable Angina Pectoris

The diagnosis of unstable angina/NSTEMI depends mainly on the patient's history, abnormalities on ECG, and cardiac biomarkers.

History

Chest pain is similar in character to stable angina pectoris, but is characterized by at least one of the following three features:

1. It is severe and of new onset.
2. It occurs on minimal exertion or even at rest and lasts longer than stable angina pectoris.
3. It is more intense and rapidly worsening (crescendo angina), and not fully relieved by rest or nitroglycerin.

Unstable angina is usually preceded by vigorous exercise or emotional stress, which results in an imbalance between oxygen supply and myocardial demands.

Abnormalities on ECG

- Transient or persistent ST-segment depression and/or T-wave inversion in 30%–50% of patients.
- ST segment elevations and Q waves are absent in both unstable angina and NSTEMI.
- ECG can be normal.

Cardiac biomarkers

Cardiac enzymes are used to differentiate between unstable angina and NSTEMI:

- Unstable angina → no myocardial damage → thus, normal cardiac enzymes
- NSTEMI → evidence of myocardial damage → elevated cardiac enzymes such as CK-MB and troponin I and T (more specific and sensitive marker)

Treatment of Unstable Angina Pectoris

Since **initial ECG is not diagnostic**, patients with unstable angina/NSTEMI should be placed on bed rest with serial ECG monitoring for any ST segment deviation until pain resolves or definitive diagnosis is made.

Medical treatment

Treatment involves simultaneous administration of **anti-coronary and antithrombotic agents**.

1. Anticoronary treatment:

- **Nitrates:**
 - Sublingual nitroglycerin, which may be repeated at 3–5 minutes if chest discomfort persists. If no response after 3 doses, consider IV nitroglycerin.
- **Beta-Blockers:**
 - Metoprolol is given with a target heart rate of 50–60 beats/minute.
 - If a beta-blocker is contraindicated, calcium channel blockers such as verapamil or diltiazem should be considered.

2. Antithrombotic treatment:

- **Aspirin:**
 - High dose (375 mg/day) should be given initially, then lower doses (75 mg/day) for long-term treatment.
- **Clopidogrel:**
 - Should be given as early as possible in addition to aspirin unless there is a risk of bleeding.
 - Pretreatment with clopidogrel is recommended prior to percutaneous coronary intervention.
- **Anticoagulants:**
 - In addition to aspirin and clopidogrel, four anticoagulant options are available:
 - **Unfractionated heparin (UFH).**
 - **Low-molecular-weight heparin (LMWH)** such as enoxaparin is superior to UFH, with a lower risk of hemorrhage.
 - **Fondaparinux** is an indirect factor Xa inhibitor that is as effective as enoxaparin but with a lower risk of bleeding.
 - **Bivalirudin** is a direct thrombin inhibitor that is as effective as UFH and LMWH.

Early invasive strategy

Only high-risk patients can benefit from coronary revascularization (percutaneous coronary intervention or coronary artery bypass grafting):

- Age > 65 years
- > 3 coronary artery disease risk factors
- ST deviation
- > 2 anginal events < 24 h
- Elevated cardiac markers

Since the outcomes of conservative treatment are similar to those after invasive treatment in low-risk patients, invasive treatment is not recommended in these patients.

References

Harrison's Principles of Internal Medicine- 18th edition, section 5, chapters 343, 244, 245.

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