Angina is caused by myocardial ischaemia. The classic symptom of the condition is retrosternal pressure or heaviness, which can be accompanied by pain that radiates to areas such as the neck, jaw and arms.

Stable angina
clinical features and diagnosis

By Paul Wright, MSc, MRPharmS, and Sotiris Antoniou, MSc, MRPharmS

Stable angina is a common and disabling cardiovascular condition. William Heberden, an English physician, first introduced the term “angina pectoris” in 1772 to characterise a syndrome in which there was a sense of strangling and anxiety in the chest, especially associated with exercise. However, the pathophysiology of angina pectoris was not established until some years later.1

It is estimated that, in England, about 8% of men and 3% of women aged 55–64 years have angina or a history of the condition (for men and women aged 65–74 the figures are 14% and 8%, respectively).2 Angina can have a considerable impact on quality of life, which deteriorates progressively in proportion to the severity of symptoms.3

Pathophysiology

Angina is caused by myocardial ischaemia, without cell necrosis. Myocardial ischaemia occurs when there is an imbalance between myocardial oxygen supply and consumption — supply cannot meet demand. Myocardial oxygen supply is determined by:4

- Arterial oxygen saturation and myocardial oxygen extraction — both of which are relatively constant under normal circumstances
- Coronary blood flow — this depends on the cross-sectional area of the coronary artery lumen and the tone of the coronary artery; both of these factors can be altered substantially by the presence of atherosclerotic plaques within the vessel walls, which can lead to an imbalance between oxygen supply and demand when myocardial oxygen demands rise

Factors that can increase myocardial oxygen demand (through, for example, increasing heart rate or myocardial contractility) are increased physical activity (eg, exercise, sex), emotional stress (eg, anger, fright, stress) or other factors such as cold, overeating and fever.

Clinical features

Typically, the onset of symptoms of stable angina follows activities that increase myocardial demand (eg, exercise) and these symptoms resolve with rest. This is in contrast to unstable angina, which is characterised by a sudden worsening of angina symptoms, which become more frequent, prolonged and severe, or occur at a lower threshold or at rest.5

The classic clinical feature of angina is retrosternal heaviness or pressure, with or without radiation to the top of the arms (primarily the left arm), neck, jaw, mid-abdomen or shoulders (see Figure 1, p11). The average frequency of anginal attacks is about two per week. Many patients curtail their activities to avoid attacks.6

The discomfort of exertional angina is relieved by rest within 1–5 minutes, or more rapidly with sublingual glyceryl trinitrate (see accompanying article, p13).

Patients with stable angina are at risk of developing an acute coronary syndrome, such as unstable angina, non
Diagnosis
Chest pain is common — in the UK it accounts for about 1% of GP visits, 5% of visits to emergency departments and 25% of emergency hospital admissions. Chest pain has many causes and, when the cause of the pain could be cardiac, appropriate and timely assessment and treatment are needed.

Defining the angina pain in a patient with coronary artery disease (CAD) is important and often helps guide appropriate testing and assessment. The key to accurate diagnosis lies in thorough history-taking, which should always involve obtaining information about the nature, location and duration of the pain and the activities or factors that provoke or relieve it.

In 2011, the National Institute for Health and Clinical Excellence published guidance for the assessment and diagnosis of recent-onset chest pain or discomfort of suspected cardiac origin. This clinical guideline (CG95) emphasises the importance of the initial clinical assessment of symptoms and advocates the use of set criteria for typical angina, atypical angina, and non-angina pain.

The guideline stratifies patients by age, sex, cardiovascular risk factors and electrocardiographic changes to estimate the likelihood of CAD and inform the need for further diagnostic tests. The likelihood of a diagnosis of angina increases with the number of cardiovascular risk factors, such as smoking, hypertension, diabetes, family history of CAD, raised cholesterol and other lipid dysregulation.

For patients with documented CAD and predictable episodes of classic angina symptoms, diagnosis of stable angina is straightforward. Most of these patients can describe the pain — most often as a dull sensation or heaviness across the chest, with or without radiation to the jaw or left arm — and the level of exertion that will induce the symptoms.

For some patients, chest pain will have a gastrointestinal or musculoskeletal origin. When such a diagnosis is made, patients will not usually require further investigation unless their medical history raises the suspicion of cardiovascular disease.

For some patients, clinical assessment alone will not be sufficient to diagnose stable angina and diagnostic tests will be required — based on the estimated likelihood of CAD (see Figure 2). Information on the selection of tests for diagnosing angina is set out in CG95 (see Box 1).

Box 1: Diagnosing stable angina

The following are recommendations for the diagnosis of stable angina published by the National Institute for Health and Clinical Excellence:

- Stable angina can be diagnosed without the need for diagnostic testing for people with classic symptoms of angina and an estimated likelihood of coronary artery disease (CAD) greater than 90% (as per the tool provided in the clinical guideline)
- Stable angina can be excluded for people with non-cardiac chest pain, such as gastrointestinal or musculoskeletal pain (unless clinical suspicion is raised based on other aspects of their medical history and risk factors)
- For people without confirmed CAD and for whom stable angina cannot be confirmed or ruled out by clinical assessment alone, the likelihood of CAD should be estimated (also taking into account the results of a resting 12-lead electrocardiogram) and further diagnostic investigations, eg, coronary angiogram, should be arranged accordingly
- Exercise electrocardiogram should not be used to diagnose or exclude stable angina for people without known CAD
One important change to practice recommended by NICE is that exercise electrocardiogram (ECG) testing is no longer necessary for patients with no established history of CAD. This is because exercise ECGs have poor diagnostic accuracy and other investigations (eg, computed tomography calcium scoring) are more cost-effective.

Classification
The classification system of the Canadian Cardiovascular Society is commonly used to define angina severity from mild or “class I” (episodes that occur with maximal exertion) to severe “class IV” (episodes that occur with minimal or no exertion) — see Box 2.

This classification system is useful for determining functional impairment, quantifying the threshold at which symptoms occur in relation to physical activities and monitoring response to therapy.

Prognosis
Information about the prognosis of chronic stable angina is derived from long-term prospective, population-based studies, clinical trials and observational registries. However, evaluating and comparing data from various studies can be challenging because of differing selection criteria and disease definitions.

Data from the Framingham Heart Study showed that, for people with an initial presentation of stable angina, the two-year incidence of non-fatal myocardial infarction was 14.3% for men and 6.2% for women. The rate of cardiovascular death was 5.5% for men and 3.8% for women.

Large randomised clinical trials suggest that patients with stable angina have a good prognosis. In the ACTION trial, all-cause mortality was found to be 1.5% per year.

In contrast, studies in primary care and in rapid-access chest pain clinics have reported that a diagnosis of stable angina is associated with an annual rate of cardiovascular death of 1.4–6.5%.

These studies suggest that stable angina is not a benign condition, but highlight the fact that prediction of cardiovascular risk for individual patients with angina is difficult because of clinical heterogeneity.

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**Box 2: Classification of angina severity**

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<thead>
<tr>
<th>CLASS</th>
<th>DESCRIPTION OF SYMPTOMS</th>
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<tbody>
<tr>
<td>I</td>
<td>Ordinary activity does not cause angina; symptoms with strenuous, rapid or prolonged exertion only</td>
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<tr>
<td>II</td>
<td>Slight limitation of ordinary activity; angina during activities such as walking or climbing stairs rapidly or walking uphill; symptoms may also be experienced in cold weather, when under emotional stress or during the first few hours after awakening only</td>
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<tr>
<td>III</td>
<td>Marked limitation of ordinary physical activity; angina when walking one or two blocks on a flat surface, or one flight of stairs at a normal pace under normal conditions</td>
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<tr>
<td>IV</td>
<td>Inability to carry out any physical activity without discomfort, or angina at rest</td>
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References

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