Acute Coronary Syndrome

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Acute coronary syndrome (ACS) refers to a spectrum of clinical presentations ranging from those for ST-segment elevation myocardial infarction (STEMI) to presentations found in non–ST-segment elevation myocardial infarction (NSTEMI) or in unstable angina. It is almost always associated with rupture of an atherosclerotic plaque and partial or complete thrombosis of the infarct-related artery.

**Essential update: Baseline hyperglycemia may be independent prognostic marker for suspected acute coronary syndrome**

Baseline blood glucose levels appear to be an independent risk factor for a major adverse cardiac event (MACE) in emergency department (ED) patients with suspected ACS. In an analysis of data from 1708 Australian and New Zealand patients in a prospective observational study, investigators noted a MACE occurred within 30 days of presentation in 15.3% of patients whose ED admission blood glucose levels were below 7 mmol/L (about 126 mg/dL); however, in the same time period, a MACE occurred in twice as many patients (30.9%) whose blood glucose levels were above 7 mmol/L. After controlling for various factors, patients who had admission blood glucose levels of 7 mmol/L or higher were at 51% higher risk of experiencing a MACE compared with patients who had lower baseline blood glucose levels. Other significant predictors of MACE included male sex, older age, family history, hypertension, dyslipidemia, ischemic findings on ECG, and positive troponintests.

**Signs and symptoms**

Atherosclerosis is the primary cause of ACS, with most cases occurring from the disruption of a previously nonsevere lesion. Complaints reported by patients with ACS include the following:

- Palpitations
- Pain, which is usually described as pressure, squeezing, or a burning sensation across the precordium and may radiate to the neck, shoulder, jaw, back, upper abdomen, or either arm
- Exertional dyspnea that resolves with pain or rest
- Diaphoresis from sympathetic discharge
- Nausea from vagal stimulation
- Decreased exercise tolerance

Physical findings can range from normal to any of the following:

- Hypotension: Indicates ventricular dysfunction due to myocardial ischemia, myocardial infarction (MI), or acute valvular dysfunction
Hypertension: May precipitate angina or reflect elevated catecholamine levels due to anxiety or to exogenous sympathomimetic stimulation
Diaphoresis
Pulmonary edema and other signs of left heart failure
Extracardiac vascular disease
Jugular venous distention
Cool, clammy skin and diaphoresis in patients with cardiogenic shock
A third heart sound (S₃) and, frequently, a fourth heart sound (S₄)
A systolic murmur related to dynamic obstruction of the left ventricular outflow tract
Rales on pulmonary examination (suggestive of left ventricular dysfunction or mitral regurgitation)

Potential complications include the following:

- Ischemia: Pulmonary edema
- Myocardial infarction: Rupture of the papillary muscle, left ventricular free wall, and ventricular septum

**Diagnosis**

Guidelines for the management of non-ST-segment elevation ACS were released in 2011 by the European Society of Cardiology (ESC).\(^{[1]}\) The guidelines include the use of the CRUSADE risk score (Can Rapid risk stratification of Unstable angina patients Suppress ADverse outcomes with Early implementation of the ACC/AHA guidelines).

In the emergency setting, electrocardiography (ECG) is the most important diagnostic test for angina. ECG changes that may be seen during anginal episodes include the following:

- Transient ST-segment elevations
- Dynamic T-wave changes: Inversions, normalizations, or hyperacute changes
- ST depressions: These may be junctional, downsloping, or horizontal

Laboratory studies that may be helpful include the following:

- Creatine kinase isoenzyme MB (CK-MB) levels
- Cardiac troponin levels
- Myoglobin levels
- Complete blood count
- Basic metabolic panel

Diagnostic imaging modalities that may be useful include the following:

- Chest radiography
- Echocardiography
- Myocardial perfusion imaging
- Cardiac angiography
Computed tomography, including CT coronary angiography and CT coronary artery calcium scoring

Management

Initial therapy focuses on the following:

- Stabilizing the patient’s condition
- Relieving ischemic pain
- Providing antithrombotic therapy

Pharmacologic anti-ischemic therapy includes the following:

- Nitrates (for symptomatic relief)
- Beta blockers (eg, metoprolol): These are indicated in all patients unless contraindicated

Pharmacologic antithrombotic therapy includes the following:

- Aspirin
- Clopidogrel
- Prasugrel
- Ticagrelor
- Glycoprotein IIb/IIIa receptor antagonists (abciximab, eptifibatide, tirofiban)

Pharmacologic anticoagulant therapy includes the following:

- Unfractionated heparin (UFH)
- Low-molecular-weight heparin (LMWH; dalteparin, nadroparin, enoxaparin)
- Factor Xa inhibitors (rivaroxaban, fondaparinux)

Additional therapeutic measures that may be indicated include the following:

- Thrombolysis
- Percutaneous coronary intervention (preferred treatment for ST-elevation MI)

Current guidelines for patients with moderate- or high-risk ACS include the following:

- Early invasive approach
- Concomitant antithrombotic therapy, including aspirin and clopidogrel, as well as UFH or LMWH
A 62-year-old woman with a history of chronic stable angina and a "valve problem" presents with new chest pain. She is symptomatic on arrival, complaining of shortness of breath and precordial chest tightness. Her initial vital signs are blood pressure = 140/90 mm Hg and heart rate = 98. Her electrocardiogram (ECG) is as shown. She is given nitroglycerin sublingually, and her pressure decreases to 80/palpation. Right ventricular ischemia should be considered in this patient.