

Acute coronary syndrome | Symptoms, Types and Treatment

Acute Coronary Syndrome (ACS) is an umbrella term for conditions caused by sudden, reduced blood flow to the heart due to myocardial ischemia. It includes:

- **Unstable angina (UA)**
- **Non–ST-segment elevation myocardial infarction (NSTEMI)**
- **ST-segment elevation myocardial infarction (STEMI)**

ACS is a medical emergency requiring prompt diagnosis and management to prevent myocardial necrosis, heart failure, or death.

Classification of ACS

Type	ECG Changes	Cardiac Biomarkers	Pathology
STEMI	ST elevation	? Troponins	Transmural infarction due to complete coronary occlusion
NSTEMI	ST depression/Normal	? Troponins	Subendocardial infarction due to partial occlusion
Unstable Angina	ST depression/Normal	Normal	Myocardial ischemia without necrosis

Etiology & Risk Factors

- **Atherosclerotic plaque rupture** (most common)
- Coronary artery spasm (e.g., Prinzmetal angina)
- Thromboembolism
- Cocaine use
- Severe hypertension
- Aortic dissection (can occlude coronary ostia)

Risk Factors : Hypertension, hyperlipidemia, diabetes mellitus, smoking, sedentary lifestyle, family history of CAD.

Pathophysiology

1. **Plaque rupture or erosion** ? exposure of subendothelial matrix
2. **Platelet adhesion & aggregation**
3. **Thrombus formation** :
 - **White clot** (platelet-rich): partial occlusion (NSTEMI/UA)
 - **Red clot** (fibrin-rich): complete occlusion (STEMI)

4. ? Coronary perfusion ? myocardial ischemia ? infarction

Types of Myocardial Infarction (MI)

(Fourth Universal Definition of MI)

Type	Description
Type 1	Spontaneous MI due to atherosclerotic plaque rupture (classic MI)
Type 2	MI secondary to ? demand or ? supply (e.g., anemia, hypotension)
Type 3	Sudden cardiac death with ECG/angiographic evidence of ischemia
Type 4a	MI related to percutaneous coronary intervention (PCI)
Type 4b	MI due to stent thrombosis
Type 5	MI related to coronary artery bypass grafting (CABG)

Clinical Features

Typical Presentation (SOCRATES)

- **S**ite: Central chest
- **O**nsset: Sudden
- **C**haracter: Crushing, tight
- **R**adiation: Left arm, jaw, neck
- **A**ssociated: Dyspnea, diaphoresis, nausea
- **T**iming: Lasts >15–20 minutes
- **E**xacerbating: Exertion, emotion
- **S**everity: Severe

Atypical Presentations

- Common in elderly, women, diabetics
- Dyspnea, fatigue, syncope
- Silent MI: no pain, seen in 20–30% of diabetics

Physical Findings

- Pallor, diaphoresis
- Bradycardia or tachycardia
- Hypotension or hypertension
- S3 or S4 gallop
- Crackles (if heart failure)
- Pericardial rub (if pericarditis)

Diagnostic Workup

Electrocardiogram (ECG)

- **First-line test** : within 10 minutes of presentation
- Repeat at 15–30 min intervals if initial ECG is nondiagnostic but suspicion is high

Cardiac Biomarkers

- **Troponin I/T** : Most sensitive and specific
 - Elevated within 3–6 hrs, peak at 12–24 hrs
 - Persist elevated for 7–10 days
- **CK-MB**: Useful for reinfarction (rises and falls quicker)

Other Lab Tests

- **CBC** : Anemia, baseline before anticoagulation
- **Urea & Electrolytes** : Renal function
- **Blood Glucose** : Stress hyperglycemia
- **Lipid Profile** : Check within 24 hours
- **BNP** : Elevated if heart failure

Imaging

- **Chest X-ray** : Rule out pneumonia, aortic dissection
- **Echocardiography** : Assess wall motion, EF, complications
- **Coronary angiography** : Definitive test for diagnosis and intervention

Management

Immediate (MONA-BASH)

Treatment	Purpose
M orphine	Pain and anxiety relief
O xygen	If O2 sat < 90%
N itrates	Vasodilation to reduce preload/afterload
A spirin	Antiplatelet (chewable, 300 mg)
B eta-blockers	Reduce oxygen demand (e.g., metoprolol)
A ntiplatelets (P2Y12 inhibitor)	Clopidogrel, ticagrelor
S tatins	High-intensity (e.g., atorvastatin 80 mg)
H eparin	Anticoagulation (UFH, LMWH, or fondaparinux)

Definitive Treatment

STEMI

- **Primary PCI** within 120 minutes of first medical contact
- If PCI unavailable: **Fibrinolysis** (alteplase, tenecteplase) within 30 min

NSTEMI / Unstable Angina

- Risk stratify (TIMI or GRACE)
- **Early invasive strategy** (angiography within 24–72 hrs)
- Continue dual antiplatelets + anticoagulants

Complications of ACS

Type	Examples
Cardiac	Heart failure, cardiogenic shock, arrhythmias, reinfarction
Mechanical	Ventricular septal rupture, papillary muscle rupture, free wall rupture
Pericardial	Pericarditis (early or Dressler syndrome)
Embolic	Stroke, systemic embolism
Others	Acute mitral regurgitation, ventricular aneurysm

Prognosis & Long-Term Management

- Risk stratification and secondary prevention are critical
- Lifestyle modification: Smoking cessation, diet, exercise
- Long-term medications:
 - **Aspirin + P2Y12 inhibitor** for 12 months
 - **Beta-blocker**
 - **ACE inhibitors / ARBs**
 - **Statins**

Mnemonic for ACS Management: "BAANS"

- **B** eta-blockers
- **A** CE inhibitors/ARBs
- **A** spirin + P2Y12 inhibitor
- **N** itrates
- **S** tatins

High-Yield

- STEMI diagnosis is based on ECG to prevent treatment delay.
- NSTEMI is defined by **positive troponin** without ST elevation.
- Troponin elevation ? MI always; consider other causes (HEART DIES mnemonic).
- Fibrinolytics contraindicated in active bleeding, recent stroke, or aortic dissection.
- Monitor for **mechanical complications** post-MI in the first 3–5 days.