Acute Myocardial Infarction (AMI): Symptoms and Treatment Guidelines

Acute Myocardial Infarction (AMI), commonly known as a heart attack, refers to myocardial necrosis due to prolonged ischemia resulting from a sudden reduction or cessation of coronary blood flow. It is part of the **acute coronary syndrome (ACS)** spectrum, which also includes **unstable angina** and **NSTEMI** .

Classification of AMI (Types of MI)

ST-Elevation MI (STEMI):

- Complete occlusion of a coronary artery.
- ECG: ST-segment elevation ? 1 mm in ? 2 contiguous leads.
- Cardiac markers: Elevated **troponin I/T** , **CK-MB** .
- Requires **immediate reperfusion therapy** (PCI or thrombolysis).

Non-ST Elevation MI (NSTEMI):

- Subendocardial infarction (partial occlusion).
- ECG: ST depression or T-wave inversion.
- Cardiac markers: Elevated **troponin** without ST elevation.
- Managed initially with antiplatelets, anticoagulants, and delayed PCI.

Unstable Angina (UA):

- Myocardial ischemia without necrosis.
- ECG: Normal or transient changes.
- Cardiac markers: Not elevated.

NSTEMI and UA are often grouped as **Non-ST Elevation ACS (NSTE-ACS)** .

Universal Classification of MI (Types 1–5):

- **Type 1** : Spontaneous MI due to plaque rupture or thrombus.
- **Type 2** : Supply-demand mismatch (e.g., anemia, hypoxia, hypotension, arrhythmias).
- **Type 3** : Sudden cardiac death before biomarkers are obtained.
- **Type 4a** : MI related to PCI.
- **Type 4b** : MI related to stent thrombosis.
- **Type 5** : MI related to CABG.

Etiology & Risk Factors

Reduced Oxygen Supply:

- Atherosclerosis (most common).
- Vasospasm (e.g., Prinzmetal angina).
- Hypoxia, anemia.
- Hypotension or decreased coronary perfusion pressure.

Increased Myocardial Demand:

- Tachyarrhythmias, hypertension.
- Fever, sepsis, hyperthyroidism.
- Drug-induced (cocaine, amphetamines).

Clinical Features of AMI

Symptoms:

- Severe, crushing **retrosternal chest pain** , radiating to left arm, neck, or jaw.
- Duration: ? 20 minutes, not relieved by rest or nitroglycerin.
- Associated: **Dyspnea** , **nausea/vomiting** , **sweating** , **lightheadedness** , **sense of impending doom** .

Signs:

- Pallor, diaphoresis, cool extremities.
- Hypotension or tachycardia.
- **S4 gallop** , **murmurs** (e.g., papillary muscle dysfunction).
- **Jugular venous distention** in RV infarction.
- Pulmonary rales or edema in LV failure.

Diagnostic Investigations

Laboratory:

- **Cardiac biomarkers:**
  - Troponin I/T (peak at 12–24h, elevated for 7–14 days).
  - CK-MB (peaks earlier, useful in reinfarction).
- **Others:** CBC, BMP, coagulation profile, glucose, LFTs, lipids, ABG.

Electrocardiogram (ECG):

- ST-elevation in STEMI.
- ST-depression or T-wave inversion in NSTEMI/UA.
- Serial ECGs every 15–30 minutes if initial ECG is non-diagnostic.

Imaging:

- **Echocardiogram** : Wall motion abnormalities.
- **Chest X-ray** : Rule out differential diagnoses (e.g., aortic dissection).
- **Coronary angiography** : Diagnostic and therapeutic in most patients.

Differential Diagnosis

- Pericarditis
- Aortic dissection
- Pulmonary embolism
- Gastroesophageal reflux
- Acute pancreatitis
- Costochondritis

Management of AMI

Initial (Prehospital or ED):

MONA-BASH-C

- **M** orphine (if pain persists)
- **O** xygen (if SpO? < 90%)
- **N** itroglycerin (sublingual or IV)
- **A** spirin (loading dose 160–325 mg)
- **B** eta-blockers (if no contraindications)
- **A** CE inhibitors (within 24 h)
- **S** tatins (high-intensity)
- **H** eparin (UFH or LMWH)
- **C** lopedogrel/ticagrelor (P2Y12 inhibitor)

Definitive Therapy:

For STEMI:

- **Primary PCI** : Gold standard if within 90 minutes.
- **Fibrinolysis** (e.g., alteplase): If PCI unavailable within 120 minutes.
- Continue DAPT (dual antiplatelet therapy) + anticoagulation.

For NSTEMI/UA:

- Risk stratify (TIMI or GRACE score).
- Early invasive strategy for high-risk patients.
- DAPT, beta-blockers, anticoagulants, statins.

Complications of AMI

- **Arrhythmias** : VF, VT, bradyarrhythmias.
- **Heart failure** , cardiogenic shock.
- **Pericarditis** , **Dressler syndrome** .
- **Mechanical** : Papillary muscle rupture, VSD, free wall rupture.
- **Recurrent MI** , **mural thrombus** , embolism.
- **Sudden cardiac death** .

Prognosis and Follow-Up

- Early revascularization improves outcomes.
- Cardiac rehab and risk factor modification (smoking cessation, weight control, BP/lipid/glucose management) are essential.

High-Yield Tip: Troponin is the most sensitive and specific biomarker for myocardial infarction. STEMI is an ECG diagnosis; do not delay treatment awaiting troponin levels.