

# ANGINA PECTORIS

## ACUTE CORONARY SYNDROME (ACS)



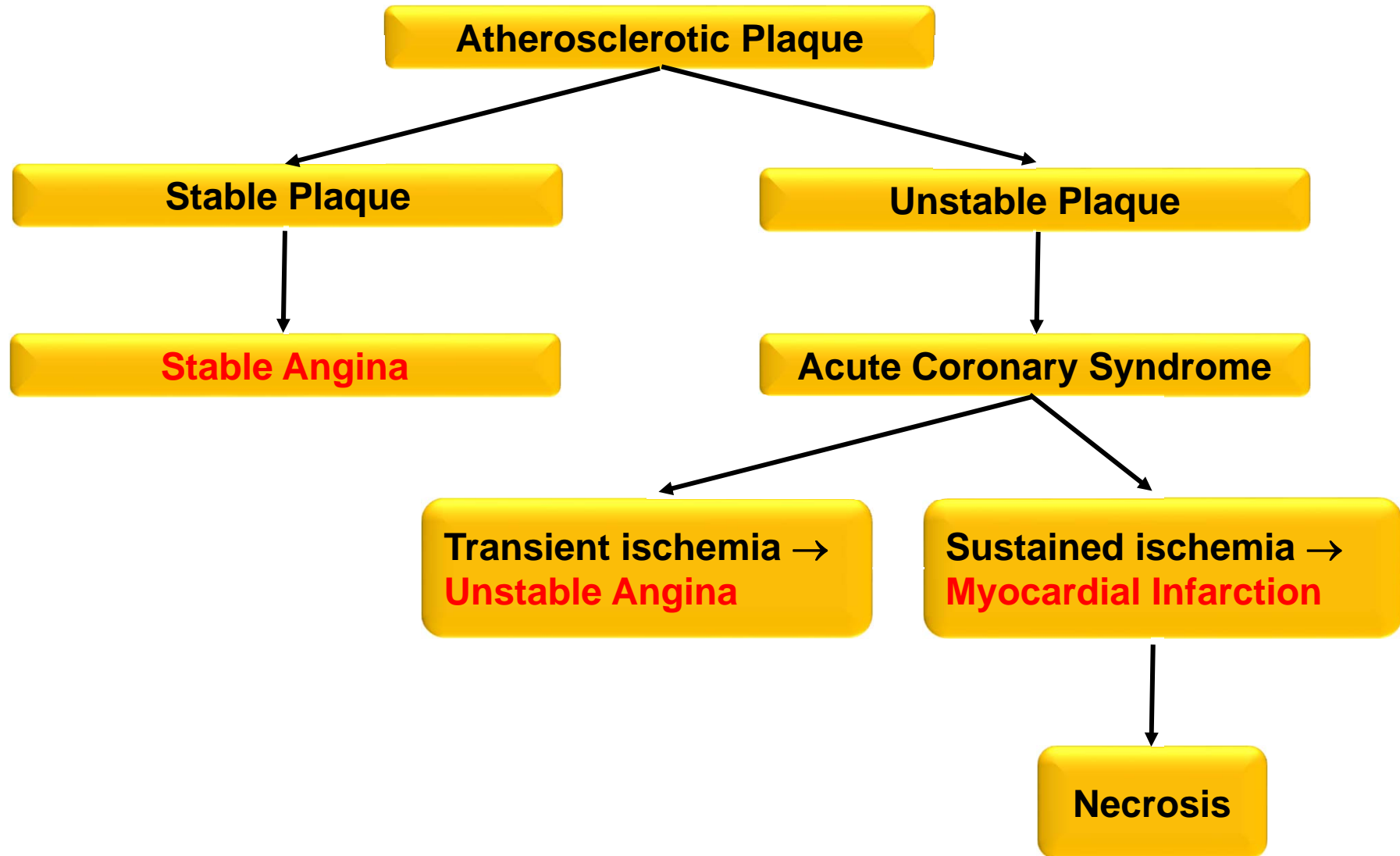
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# Acute Coronary Syndrome



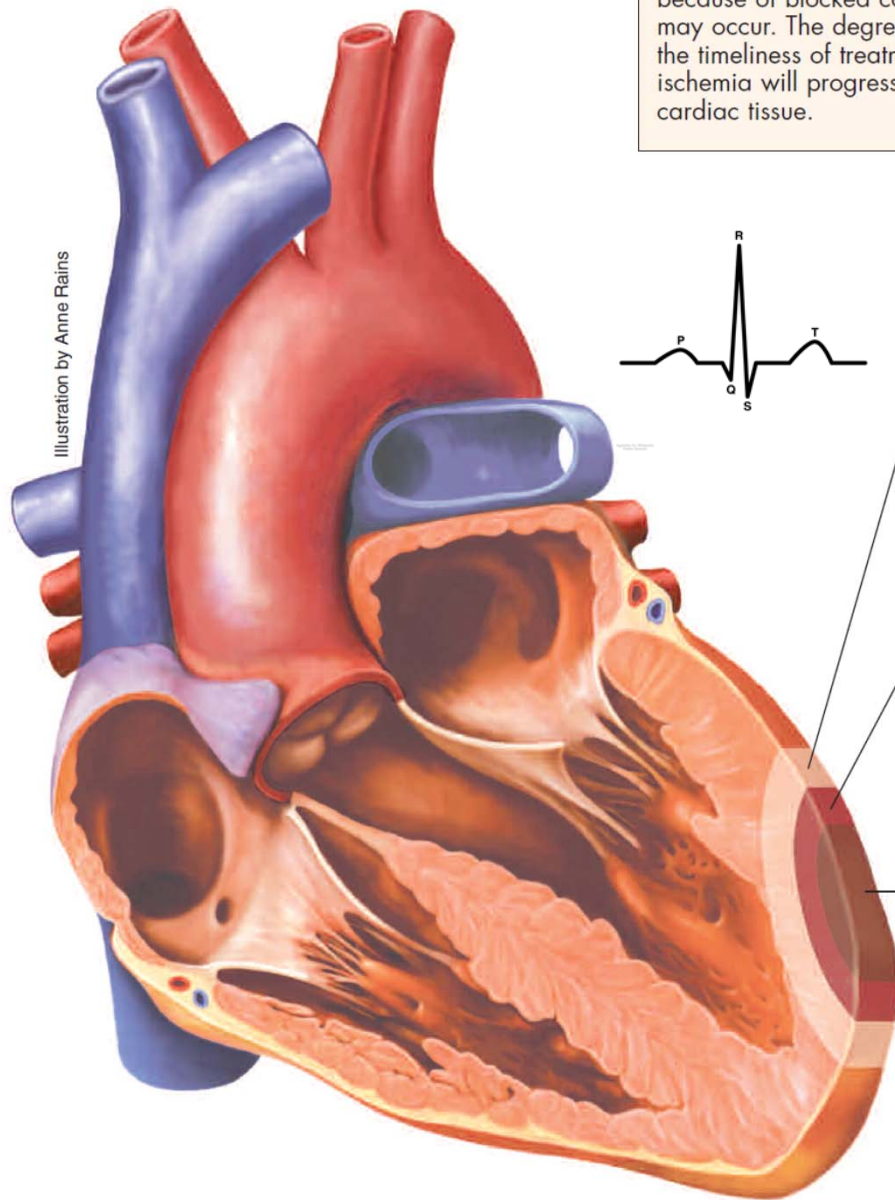


Illustration by Anne Rains

When blood flow to the heart is decreased because of blocked coronary arteries, ischemia may occur. The degree of coronary blockage and the timeliness of treatment will determine whether ischemia will progress to injury and necrosis of cardiac tissue.



**Ischemia**  
The inverted T wave is caused by altered repolarization.



**Injury**  
ST segment elevation is a sign of myocardial injury.



**Infarction**  
Abnormal Q waves result from the absence of depolarization current from dead tissue and the presence of opposing currents from other areas of the heart.

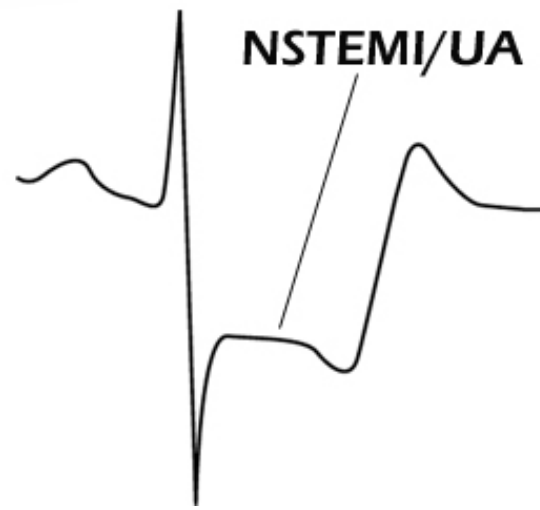
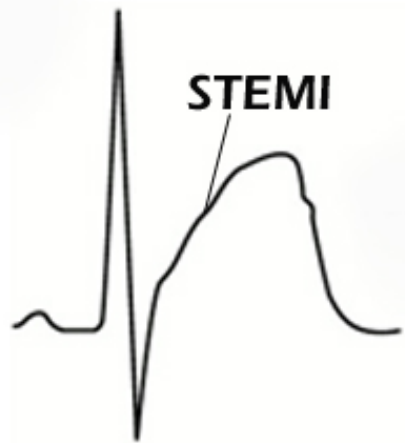
# Types of ACS?

- It includes:
  1. Unstable angina
  2. Non ST elevation myocardial infarction (Non-STEMI)
  3. ST elevation MI (STEMI).
- They are very much related but only small differences with regard to:
  1. Duration
  2. Severity
  3. Treatments

# Types of ACS

	Unstable Angina	NSTEMI	STEMI
Cause	Thrombus that partially or intermittently occludes the coronary artery		Thrombus fully occludes the coronary artery
Symptoms	Chest pain - shortness of breath - nausea (occurs at rest or with exertion)	Chest pain - shortness of breath - nausea (occurs at rest or with exertion) Longer duration - ↑ severity	Chest pain - shortness of breath - nausea (occurs at rest or with exertion) Longer duration - ↑ severity (Infarction occurs if perfusion not restored)
Findings	ST-depression or T-wave inversion	ST-depression or T-wave inversion ↑ Cardiac biomarkers (troponin)	ST-elevation ↑ Cardiac biomarkers (troponin)
Treatment	1. MONA 2. B-blockers - ACEIs - Clopidogrel - Heparin	1. MONA 2. B-blockers - ACEIs - Clopidogrel - Heparin 3. PCTA	1. MONA 2. B-blockers - ACEIs - Clopidogrel - Heparin 3. PTCA 4. Fibrinolytic therapy

## Normal ECG



# TREATMENT OF ACS

## I. MONA approach

### 1. A: Aspirin

- Taken as soon as possible from the attack
- ↓ platelet aggregation and vasoconstriction
- Contraindications: peptic ulcer - bleeding - allergy to aspirin

### 2. O: Oxygen

- ↑O<sub>2</sub> supply → ↓ pain associated with MI
- Administered by nasal canula at 2-4L/min
- Caution: hyperoxemia (confusion - restlessness)

# TREATMENT OF ACS

## I. MONA approach

### 3. N: Nitroglycerin

- Sublingually every 5 min up to 3 doses
- Arterio- and venodilator (↓ work, ↑ supply)
- I.V. if not responding to sublingual

### 4. M: Morphine sulphate

- If no improvement with nitrates
- Arterio- and venodilator (↓ work, ↑ supply)
- Strong analgesic (↓ pain and anxiety)
- Caution: may cause hypotension and respiratory depression



# TREATMENT OF ACS

## II. Beta blockers

- ↓ re-infarction rates and death from arrhythmia in NSTEMI and STEMI patients.
- Should be initiated within 24 hrs from the attack and continued after discharge from the hospital.
- Caution: monitor for hypotension, bradycardia, signs of heart failure, hypoglycemia, and bronchospasm.

# TREATMENT OF ACS

## III. ACE inhibitors

- Should be administered within **24** hrs from the attack.
- ↓ risk for left ventricular dysfunction and death in ACS patients.
- Caution: **watch for hypotension, hyperkalemia and cough (use ARBs instead).**

# TREATMENT OF ACS

## IV. Statins

- In ACS patients with low density lipoprotein-cholesterol (LDL-C) > 100 mg/dL.
- E.g.: Atorvastatin (Lipitor®)
- Caution: monitor liver functions & myopathy

## V. Clopidogrel (Plavix®)

- ↓ platelet aggregation in aspirin-sensitive patients (but same C.Is: i.e. ulcers - bleeding)
- May be added to aspirin in patients undergoing diagnostic angiography.
- Caution: stopped 5-7 days before coronary artery bypass surgery as it increases bleeding tendency

# TREATMENT OF ACS

## VI. Anticoagulant therapy

- E.g.: Enoxaparin
- Recommended for patients who choose conservative treatment.
- Caution: monitor complete blood count & kidney function

# TREATMENT OF ACS

## VII. Reperfusion therapy

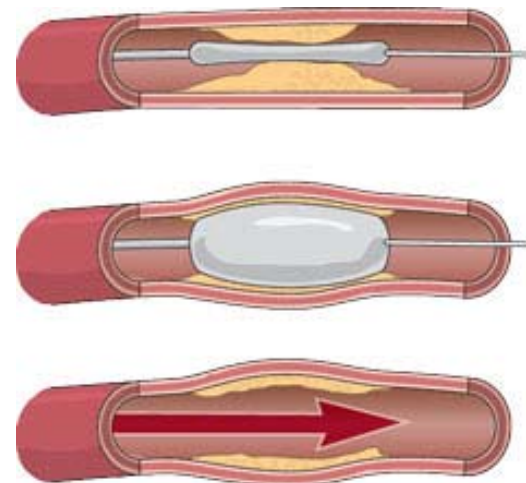
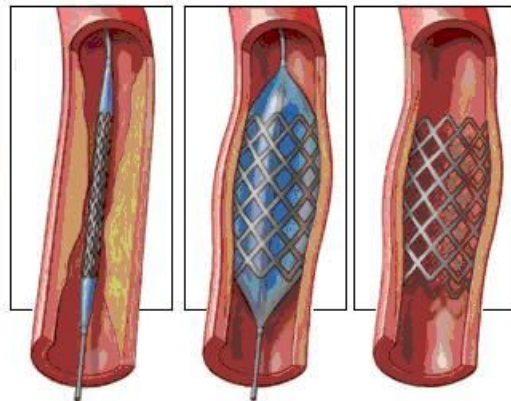
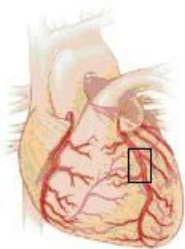
- For patients diagnosed with STEMI
- It aims to restore the blood flow to ischemic myocardial tissue
- Should be initiated as early as possible
- It includes:
  - a. Percutaneous transluminal coronary angioplasty (PTCA)
  - b. Fibrinolytic therapy

# TREATMENT OF ACS

## VII. Reperfusion therapy

### a. PTCA

- It is the insertion of a catheter with a balloon tip that's inflated to open the artery.
- A metal mesh device known as a coronary stent can also be inserted after angioplasty to keep the artery open.
- Complications: hematoma - bleeding - acute renal failure



# TREATMENT OF ACS

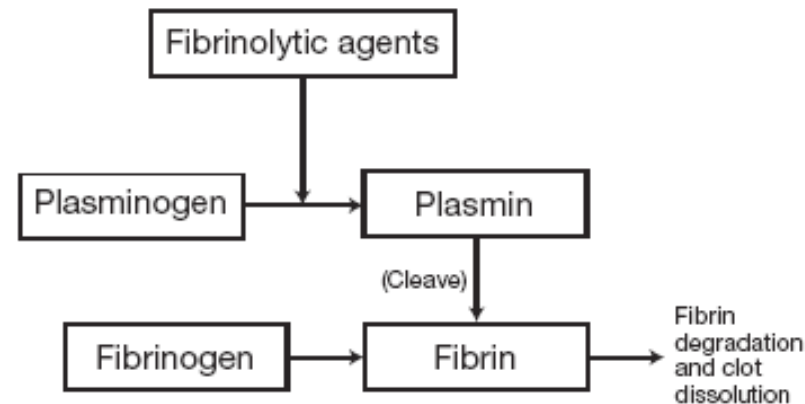
## VII. Reperfusion therapy

### b. Fibrinolytic therapy

- Drugs which dissolve the existing thrombi.
- E.g.: alteplase - reteplase
- Most effective within 3 hrs from symptoms

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