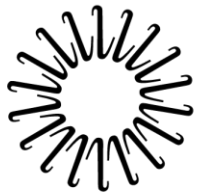
Acute Coronary Syndrome: Medications



Lifespan Cardiovascular Institute

Rhode Island Hospital • The Miriam Hospital
Newport Hospital

Delivering health with care.®

Center For Cardiac Fitness

Cardiac Rehab Program

The Miriam Hospital

Objectives

- Discuss the three syndromes which comprise ACS
- Discuss the causes of ACS (Plaque formation)
- Review the medications used to treat ACS
- Recognize and explain the importance of medications used to treat ACS

What is Acute Coronary Syndrome?

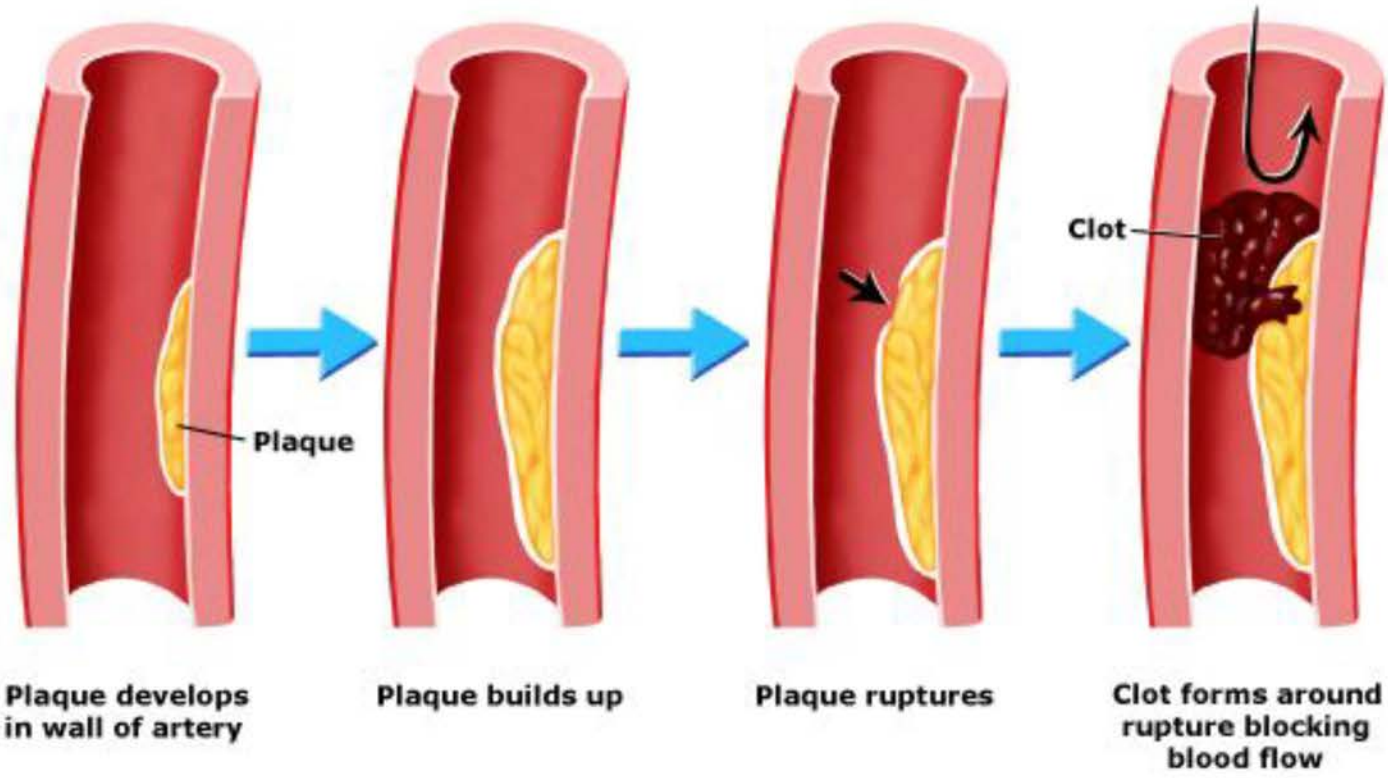
- Three Presentations of ACS
  - Unstable Angina
  - Non-ST Elevation Myocardial Infarction (NSTEMI)
  - ST Elevation Myocardial Infarction (STEMI)

Plaque Formation

- Main cause of ACS
- Plaques occlude arteries
  - Greater occlusion = Increase in severity

- Partially or nearly occluded arteries
  - Unstable angina
  - NSTEMI
- Occluded arteries
  - STEMI

Plaque formation



UpToDate

What is Unstable Angina?

- Angina
  - Chest pain
  - Heart's demand for oxygen > Oxygen supply
- Characteristics
  - Incomplete blockage of coronary arteries
  - Cardiac enzymes remain normal
  - Not a medical emergency
  - No ECG changes

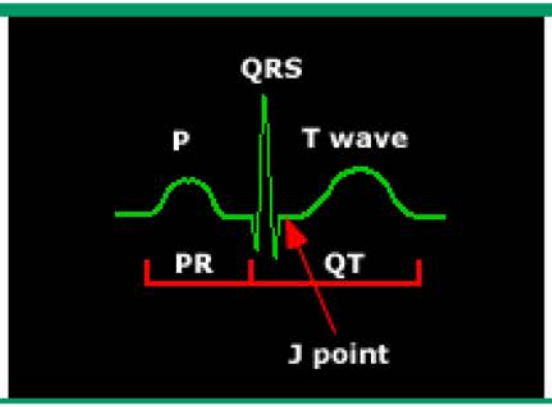
What is Unstable Angina?

- Stable vs. Unstable
  - Predictable vs. Unpredictable
- Treatment
  - Medications vs. Medications + Surgical Intervention

What are NSTEMI & STEMI?

- NSTEMI
  - Non-ST segment Elevation Myocardial Infarction
  - Incomplete blockage of coronary artery
    - Similar to unstable angina
  - Not always an emergency
  - Cardiac enzymes elevated

ECG complexes and intervals



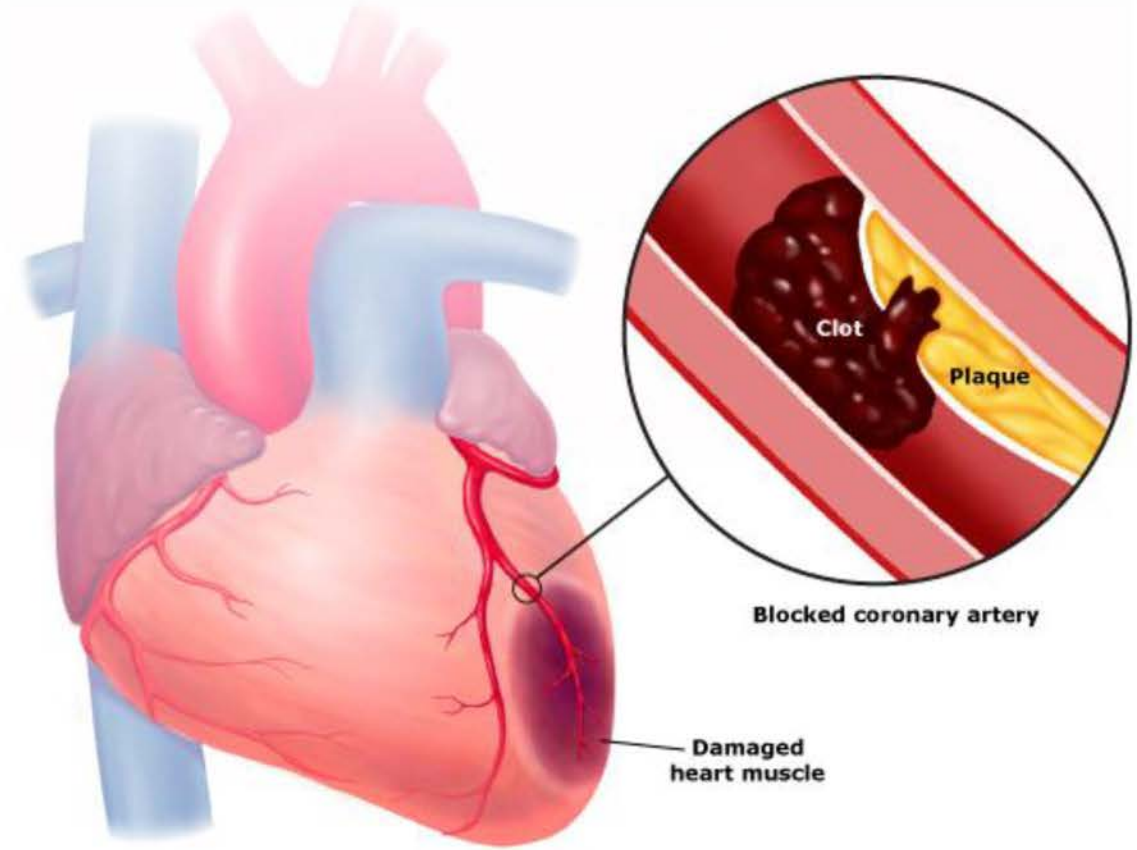
ECG waves are labeled alphabetically starting with the P wave, followed by the QRS complex, and the ST-T complex (ST segment and T wave). The J point is the junction between the end of the QRS and the beginning of the ST segment. The PR interval is measured from the beginning of the P wave to the first part of the QRS complex. The QT interval consists of the QRS complex which represents only a brief part of the interval, and the ST segment and T wave which are of longer duration.

UpToDate

What are NSTEMI & STEMI?

- STEMI
  - ST segment Elevation Myocardial Infarction
  - Emergency situation
  - Clot completely blocks coronary artery
    - EKG changes (ST elevation)
  - Cardiac enzymes elevated

Heart attack



Plaques inside the coronary arteries sometimes break open or "rupture." This is what causes most heart attacks. When a plaque breaks open, it causes a blood clot to form inside the artery. As the clot grows, it can completely block off the flow of blood through the artery. That means that the tissue on the other end of the clogged artery does not get the blood and oxygen it needs, so it gets damaged or dies.

UpToDate

Risk Factors (ACS)

- Family history
  - ACS
  - Coronary Artery Disease (CAD)
- Hyperlipidemia
  - Elevated LDL
- Hypertension
  - Elevated blood pressure
- Smoking
- Diabetes

NSTEMI

- No ST segment elevation
- Cardiac enzymes present
- Partially-blocked artery
- May be an emer

STEMI

- ST segment elevation
- Cardiac enzymes present
- Completely-blocked artery
- an emergency

Unstable Angina

- No ECG changes
- No cardiac enzymes present
- Partially-blocked artery
- Not an emergency

Acute Coronary Syndrome:

MEDICATIONS

Statins

- Examples:
  - Simvastatin, pravastatin, atorvastatin, rosuvastatin, lovastatin
- Uses
  - Decrease LDL + inflammation
- Directions
  - Take once daily (sometimes at bedtime)
- Side effects
  - Muscle cramping
- Monitoring
  - Liver function tests
  - Cholesterol panel
  - CPK (at baseline)

Statins

- Drug interactions
  - Grapefruit juice
    - < 8 oz or < ½ grapefruit
  - Macrolides
  - Calcium channel blockers
    - Nicardipine, amlodipine, diltiazem
  - Gemfibrozil

Beta Blockers

- Examples:
  - Atenolol, metoprolol, propranolol, bisoprolol, carvedilol, labetolol
- Uses
  - Decrease blood pressure + heart rate
- Directions
  - Take 1-2x/day
- Side effects
  - Dizziness
  - Low blood pressure/heart rate

Beta Blockers

- Monitor
  - Blood pressure
  - Heart rate
- Counseling points
  - Do not abruptly stop

ACE-Is & ARBs

- Examples:
  - ACE-Is – Lisinopril, ramipril, captopril, enalapril, benazepril, quinapril, fosinopril
  - ARBs – Losartan, candasartan, irbesartan, valsartan, olmesartan, telmisartan
- Uses
  - Decrease blood pressure
  - Protect kidneys
  - Cardiac remodeling
- Directions
  - Take 1-3x/day

ACE-Is & ARBs

- Side effects
  - Dizziness/drowsiness
  - Low blood pressure
  - ACE-Is
    - Dry cough (common)
    - Angioedema (RARE)
      - Call 911!
- Monitor
  - Blood pressure
  - Potassium
- Drug interactions
  - Potassium supplements
  - Potassium-sparing diuretics

Diuretics

- Examples:
  - Hydrochlorothiazide (HCTZ), chlorthalidone
  - Furosemide, torsemide, bumetonide
  - Spironolactone, eplenirone, triamterene, amiloride (potassium-sparing)
- Uses
  - Remove fluid
  - Decrease blood pressure
- Directions
  - Take once daily in the morning

Diuretics

- Side effects
  - Dizziness/drowsiness
  - Increase urination
- Monitor
  - Blood pressure
  - Electrolytes
    - Potassium, sodium, serum creatinine
- Drug interactions
  - Potassium supplements
    - Potassium-sparing diuretics only

Nitrates

- Examples:
  - Isosorbide **MONO**nitrate
  - Isosorbide **DI**nitrate
  - Nitroglycerin
- Uses
  - Relieve chest pain
  - Dilate arteries
- Directions
  - Take 1-3x/day
  - Sublingual – Take 1 tab every 5 mins x3
    - Call 911 after 2nd tab

Nitrates

- Side effects
  - Dizziness/drowsiness
  - Low blood pressure
  - Headache (sublingual)
- Monitoring
  - Blood pressure
- Drug interactions
  - Numerous
  - Phosphodiesterase-5 enzyme inhibitors
    - Erectile dysfunction drugs
    - CONTRAINDICATED!

Calcium Channel Blockers

- Examples:
  - Amlodipine, nifedipine, felodipine, nicardipine
  - Diltiazem (non-dihydropyridine)
  - Verapamil (non-dihydropyridine)
- Uses
  - Decrease blood pressure
  - Dilate arteries
  - Relieve chest pain
- Directions
  - Take 1-4x/day

Calcium Channel Blockers

- Side effects
  - Dizziness/drowsiness
  - Low blood pressure
  - Fluid retention
    - EXCEPTIONS: Amlodipine, felodipine
- Monitoring
  - Blood pressure
  - Heart rate
  - Fluid retention
- Drug interactions
  - Simvastatin (amlodipine, diltiazem, verapamil)

Acute Coronary Syndrome: Medications

ANTI-COAGULANTS

Anti-Platelets

- Examples:
  - Clopidogrel, prasugrel
  - Ticlopidine
  - Ticagrelor*
  - Aspirin
- Uses
  - Clot prevention
- Directions
  - Take once or twice daily
  - Ticlopidine
    - High-fat meals increase levels, antacids decrease levels
    - Take w/food to decrease stomach upset

*Max dose of aspirin w/ticagrelor = 100 mg/day

Anti-Platelets

- Monitoring
  - Signs & symptoms of bleeding
  - Absence of clots
  - Serum creatinine, low heart rate (ticagrelor)
- Side effects
  - Bleeding
  - Gout, shortness of breath (ticagrelor)
- Drug interactions
  - Numerous
  - Clopidogrel > Other anti-platelets

Vitamin K Antagonists

- Example:
  - Coumadin (warfarin)
- Uses
  - Clot prevention & treatment
- Directions
  - Take once daily in the afternoon/evening
- Side effects
  - Bleeding
- Monitoring
  - INR (in the morning)
- Drug & food interactions
  - Numerous!
  - Vitamin K

Direct Factor XA Inhibitors

- Example:
  - Rivaroxaban (Xarelto), apixaban (Eliquis)
- Uses
  - Clot prevention
- Directions
  - Take once daily
    - Dose >/= 15 mg – Take w/food
- Side effects
  - Bleeding
- Monitoring
  - Signs & symptoms of bleeding
  - Serum creatinine
- Drug interactions
  - Numerous!
  - Grapefruit

Direct Thrombin Inhibitors

- Example:
  - Dabigatran (Pradaxa)
- Uses
  - Clot prevention
- Directions
  - Take twice daily
    - Do NOT open capsules!
- Side effects
  - Bleeding
  - Heartburn (dyspepsia)
- Monitoring
  - Signs & symptoms of bleeding
  - Serum creatinine
- Drug interactions
  - Numerous

Oral Anti-Coagulants

	Coumadin (warfarin)	Xarelto (rivaroxaban)	Eliquis (apixaban)	Pradaxa (dabigatran)
Mechanism of Action	Inhibits vitamin K	Inhibits Factor XA	Inhibits Factor XA	Inhibits Thrombin
Indication	Prevent/treat clots	Prevent/treat clots	Prevent/treat clots	Prevent/treat clots
Dosing	1 tab every afternoon	1 tab once or twice daily* *≥15 mg dose w/a meal	1 tab twice daily	1 cap twice daily
Side Effects	Bleeding	Bleeding	Bleeding	Bleeding, heartburn, gout
Monitoring	INR (goal typically 2-3)	Serum creatinine	Serum creatinine	Serum creatinine
Drug/Food Interactions	Numerous; vitamin K-rich foods	Numerous; grapefruit	Numerous	Numerous

Oral Anti-Coagulants

	Coumadin (warfarin)	Xarelto (rivaroxaban) Eliquis (apixaban) Pradaxa (dabigatran)
Pros	• Inexpensive • "Tried & True" • Reversible	• No dietary limits (except for grapefruit) • No blood work
Cons	• Maintain consistent vitamin K intake • Regular blood work	• Expensive • Very new • Irreversible

Summary

- ACS is comprised of three disorders
  - Vary in degree of severity
- ACS can be a medical emergency
- Many medications are used to treat ACS
- Goals of treatment are to:
  - Decrease blood pressure
  - Prevent clots
- Many of these medications interact w/other medications
  - Talk w/your doctor or pharmacist!

Thank you!

QUESTIONS?