

ACS

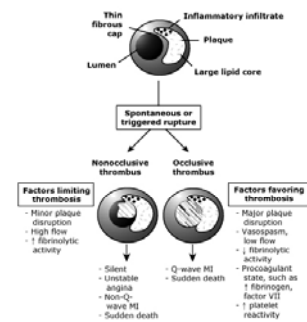
Laura Cudd D.Ph., Ph.D., CACP
 Oklahoma Heart Hospital
 VTE clinical pharmacist

Guidelines

- Where do they come from?
 - ACC/AHA 2007 Guidelines for the Management of Patients With Unstable Angina/Non-ST-Elevation Myocardial Infarction-Executive Summary (J Am Coll Cardiol, 2007; 50:652-726.)
 - 2007 Focused Update of the ACC/AHA 2004 Guidelines for the Management of Patients With ST-Elevation Myocardial Infarction (J. Am. Coll. Cardiol. 2008;51;210-247)

Initial EMS/ED assessment and care

- Monitor, support ABCs
- Meds as needed
 - ASA (chew 160-325mg, non enteric coated)
 - Consider oxygen, morphine, NTG
 - Beta blockers unless CI
- D/C NSAIDS, COX-2 inhibitors



Rackley CE and Weissman NJ. The role of plaque rupture in acute coronary syndromes. In: UpToDate, Basow, DS (17.2), UpToDate, Waltham, MA, 2009.

Medications acute care

- Anti-ischemics
- Fibrinolytics
- Anticoagulants
- Antiplatelets

Anti-ichemics

- Morphine
- Nitrates
- Beta blockers
- Calcium channel blockers

Beta-Blockers

- Start w/i 24 hrs!
 - Approx. 13% reduction in progression to AMI with BB use.
 - Core Measures
- Oral preferred
- Side effects: hypotension, bradycardia
- Other notes:
 - Heart rate in 50-60s is good unless symptomatic

Beta-Blockers

- Selectivity
 - Competitive blockade
 - Beta-1 selective (preferred in reactive airway dx)
 - Metoprolol (Lopressor®)
 - Atenolol (Tenormin®)
 - Esmolol (Brevibloc®)
 - Non-selective
 - Propranolol (Inderal®)
 - Non-selective with alpha-1 antagonism
 - Labetalol (Normodyne®)
 - Carvedilol (Coreg®)

Contraindications to Beta Blocker Therapy in Patients with STEMI

Contraindication

- Evidence of low output state
- Increased risk of cardiogenic shock
- Age > 70 years
- Sinus tachycardia > 110 beats per minute or heart rate < 60 beats per minute
- Systolic blood pressure < 120 mm Hg
- Increased time since onset of STEMI
- Signs of heart failure

Relative contraindication

- Active asthma or reactive airway disease (use beta 1 selective)
- PR interval > 0.24 seconds
- Second- or third-degree heart block

Morphine

1-15mg IV q3-4h

- Pure opioid agonist
- Useful for pain refractory to other anti-ischemic therapy (NTG)
- Causes venodilation and decreases anxiety
- NSTEMI
 - Downgraded to Class IIa recommendation
 - Use more definitive anti-ischemic therapy first
- STEMI
 - Still Class I recommendation
- Side effects: hypotension (histamine release), nausea, respiratory depression

Nitrates (NTG)

- Given sublingually, topically, orally, and intravenously
 - SL dosing first: 0.4mg q5min x3
 - Use IV if unresponsive to SL or beta blockers
 - IV 10mcg/min(max 200mcg/min)
 - Usually < 24 hrs
 - SBP reduction <25% or >110mm Hg
 - Avoid if SBP<90 mm Hg, marked bradycardia/tachycardia
- Relieves chest pain
 - No increased m/m benefits over beta-blockers
 - Occurs via vasodilation
- Side effects: Hypotension, headache
- Tolerance can develop requiring escalating doses
 - Requires nitrate free interval for oral dosing

ACS classifications

- Non cardiac?
- Chronic stable angina?
- Possible ACS?
- Definite ACS?
 - NSTEMI
 - STEMI

Define ACS* (TIMI, GRACE, PURSUIT)

- | | |
|--|---|
| <p>US/NSTEMI</p> <ul style="list-style-type: none"> • ECG <ul style="list-style-type: none"> • ST segment depression • Prominent T wave inversion • nondiagnostic • cardiac biomarker <ul style="list-style-type: none"> • positive without ST elevation • negative • Chest pain, anginal equivalent • Hemodynamic abnormalities | <p>STEMI</p> <ul style="list-style-type: none"> • Elevated ST • Positive cardiac biomarkers • Evaluate for reperfusion therapy <ul style="list-style-type: none"> • Core measure time frame |
|--|---|

*there's an app for that!

UA/NSTEMI Invasive or Conservative tx

- | | |
|---|--|
| <p>Initial Invasive Tx</p> <ul style="list-style-type: none"> • Recurrent angina • Elevated cardiac biomarkers • 'new' ST depression • s/s ADHF, mitral regurg • High risk from other tests • Hemodynamic instability • Sust v. tach • PCI w/i last 6 mo • High risk TIMI/GRACE score • LVEF <40% | <p>Initial Conservative Tx</p> <ul style="list-style-type: none"> • Low risk score (TIMI/GRACE) • Pt or physician preference in absence of high risk features |
|---|--|

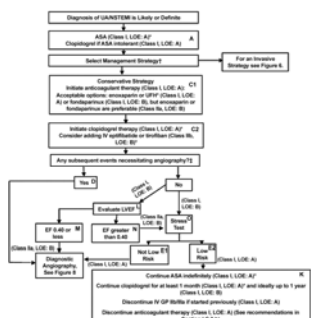
STEMI

- Reperfusion
 - Fibrinolytics
 - Facilitated PCI
 - Facility/physician dependent
 - PCI
 - 1-2 vessel disease
 - 3 vessel disease/2 vessel disease with proximal LAD
 - CABG
 - Left main disease
 - 3 vessel disease/2 vessel disease with proximal LAD
 - With DM
 - With LV dysfunction

Core measures AMI admission (or documentation)

- ASA 24 hours before or after hospital arrival
- Beta blockers 24 hrs of arrival
- If ST Elevation or left bundle branch block
 - Door to Balloon in 120 minutes or less.
 - Door to thrombolysis 30 minutes or less
- Adult smoking history

Algorithm for Patients With UA/NSTEMI Managed by an Initial Conservative Strategy

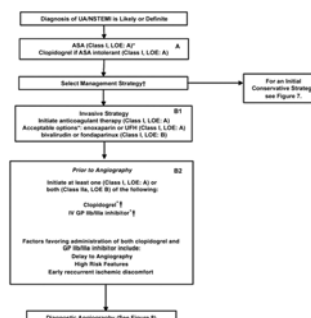


Anderson, J. L. et al. J Am Coll Cardiol 2007;50:652-726

Copyright ©2007 American College of Cardiology Foundation. Restrictions may apply.



Algorithm for Patients With UA/NSTEMI Managed by an Initial Invasive Strategy

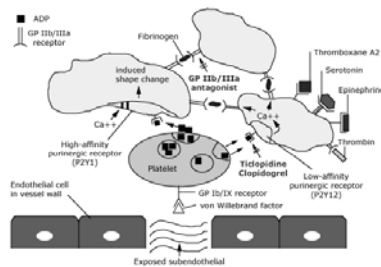
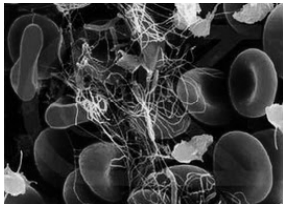


Anderson, J. L. et al. J Am Coll Cardiol 2007;50:652-726

Copyright ©2007 American College of Cardiology Foundation. Restrictions may apply.



Antithrombotics



Lincoff, A.M. Antiplatelet agents in acute ST elevation myocardial infarction. In: UpToDate, Basow, DS (17.2), UpToDate, Waltham, MA, 2009.

Fibrinolytics

- Agents
 - Tenecteplase (TNKase®)
 - Reteplase (Retevase®)
- STEMI patients who are not candidates for PCI
- Side effects:
 - Bleeding/ICH
- Must monitor EKG
 - resolution of ST elevations
 - May need rescue PCI
- Time to administration
 - Core measure: 30 min from door-to-needle,
 - within 12 hours of onset s/s

Fibrinolytic Therapy Contraindications

Absolute Contraindications

- Any prior intracranial hemorrhage
- Known structural cerebral vascular lesion (eg, AVM)
- Known malignant intracranial neoplasm (primary or metastatic)
- Ischemic stroke within 3 months EXCEPT acute ischemic stroke within 3 hours
- Suspected aortic dissection
- Active bleeding or bleeding diathesis (excluding menses)
- Significant closed head trauma or facial trauma within 3 months

Relative Contraindications

- History of chronic, severe, poorly controlled hypertension
- Severe uncontrolled hypertension on presentation (SBP 180 mm Hg or DBP 110 mm Hg)†
- History of prior ischemic stroke 3 months, dementia, or known intracranial pathology not covered in contraindications
- Traumatic or prolonged (10 minutes) CPR or major surgery (3 weeks)
- Recent (within 2 to 4 weeks) internal bleeding
- Noncompressible vascular punctures
- For streptokinase/anistreplase: prior exposure (5 days ago) or prior allergic reaction to these agents
- Pregnancy
- Active peptic ulcer
- Current use of anticoagulants: the higher the INR, the higher the risk of bleeding

antiplatelets

- Aspirin
- Thienopyridines
- GP IIb/IIIa inhibitors

ASA

- Irreversible platelet inhibition (COX2)
- All/suspected MI patients indefinitely
- Side effects: GI intolerance, bleeding
- Core Measures:
 - At arrival
 - 162-325mg initial chewed
 - At discharge
 - 81-162mg daily (EC or NEC)
 - BMS:325mg x30d
 - DES: 162-325 mg x90-180d

Thienopyridines

- Platelet ADP receptor inhibition (*Irreversible*)
 - Hold 5-7 days prior to surgery/invasive procedure
- Dosing:
 - Clopidogrel: 300-600 mg load; 75 mg daily
 - Prasugrel: 60 mg load; 10 mg daily
 - Brilinta: 180mg po load; 90mg po bid (low dose 75-100 ASA)

- Side effects: bleeding
- Drug interaction
 - PPI (Protonix, Prevacid, Aciphex)
 - Increased risk of thrombosis
 - inhibits prodrug conversion
- Plavix resistance due to genetic influences
 - Genetic prodrug conversion deficient (P2Y12)
 - Tests not useful in clinical practice
 - Verify Now
 - Verify Before

Glycoprotein IIb/IIIa

- Agents
 - Eptifibatid (Integrilin®)
 - Abciximab (ReoPro®)
 - Tirofiban (Aggrastat®)
- *Reversible* Platelet inhibition
- Monitoring: Hgb, Hct, Plt, sx/sx bleeding
- Side effects: bleeding, thrombocytopenia

anticoagulants

- Heparin
- LMWH
- Direct thrombin inhibitors
- Factor Xa inhibitors
- VKA

Heparin

- Dosing: per protocol (wt and aPTT based)
- Monitoring:
 - aPTT or anti-factor Xa levels
 - Hgb
 - Hct
 - Plt
 - sx/sx of bleeding
- Side effects: Bleeding, thrombocytopenia, HIT
- Reversible with protamine (1 mg per 100 units of heparin)

Low Molecular Weight Heparins

- Agents
 - Enoxaparin (Lovenox®)
 - 1mg/kg BID (Qday if GRF<30)
 - Dalteparin (Fragmin®)
 - 120 units/kg SQ q12h
- Similar to heparin with a higher affinity for factor Xa than IIa
- Monitoring: Hgb, Hct, Plt, sx/sx bleeding
- Side effects: bleeding, HIT (less likely than heparin)
- Duration: length of hospital stay (up to 8 days)

Fondaparinux (Arixtra®)

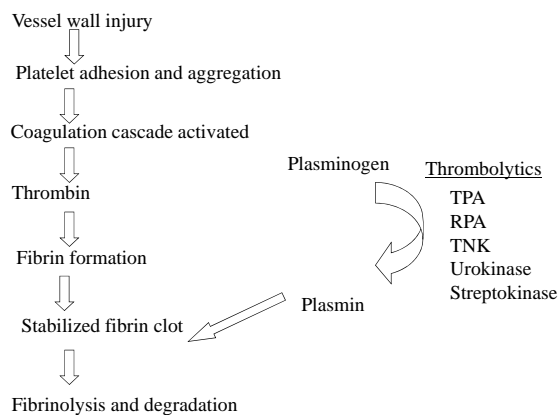
- Selective factor Xa inhibitor
- Monitoring: Hgb, Hct
- Issues with renal impairment (Scr < 3 mg/dl)
- Dosing: 2.5 mg subcutaneously once daily
- Give for length of hospital stay (or up to 8 days)

Bivalirudin (Angiomax®)

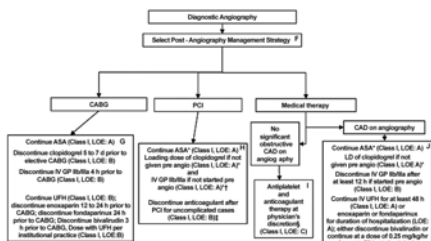
- Direct thrombin inhibitor
- Short half life
- Use:
 - PCI (HIT)
 - instead of GP IIb/IIIa inhibitors
- Dosing:
 - 0.75 mg/kg IV bolus
 - 1.75 mg/kg/hr infusion for duration of procedure or up to 4 hours post procedure
 - 0.2 mg/kg/hr infusion may be used for up to 20 hours

Oral anticoagulants

- Coumadin (Warfarin)
 - Gold standard
- Pradaxa (dabigatran)
 - Non valvular atrial fibrillation only
- Xarelto (rivaroxaban)
 - DVT prevention in ortho
 - Atrial fibrillation pending FDA approval
- Eliquis (apixaban)
 - Not FDA approved



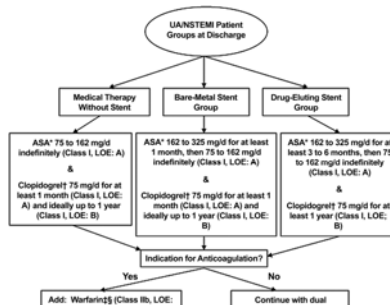
Management After Diagnostic Angiography in Patients With UA/NSTEMI



Anderson, J. L. et al. J Am Coll Cardiol 2007;50:652-726



Long-Term Anticoagulant Therapy at Hospital Discharge After UA/NSTEMI



Anderson, J. L. et al. J Am Coll Cardiol 2007;50:652-726



Medications at discharge (*core measures)

- Antihypertensives
 - Beta blockers*
 - ACE inhibitors*
 - ARB*
- Lipid management*
- Diabetes
- Smoking cessation*
- Anticoagulation
- Antiplatelets*
- Influenza vaccination

Core measures AMI discharge (or documentation)

- ASA (chest pain as well)*
- If ejection fraction less than 40%
 - ace inhibitor(ACEI) or
 - angiotensin receptor blocker (ARB)
- If smoker or admits to quitting in last year
 - smoking cessation advice/counseling
- beta blocker at discharge
- Statin/antihyperlipidemia prescription

Statins

- Side effects: liver dysfunction, myopathies
- LDL Goals per ATPIII
 - CHD risk/risk equivalent (>20%): LDL <100 mg/dL
 - >2 risk factors (<20%):LDL <130 mg/dL
 - 0-1 risk factors (<10%):LDL <160 mg/dL
 - Triglycerides <200mg/dL; non-HDL <30 over LDL goal
- Meds:
 - Atorvastatin (Lipitor)
 - Fluvastatin (Lescol)
 - Lovastatin (Mevacor)
 - Pravastatin (Pravachol)
 - Rosuvastatin (Crestor)
 - Simvastatin (Zocor)

ACE Inhibitors

- Heart failure and LVSD
- Monitoring: BP, Scr, K, cough
- Meds
 - Benazepril (Lotensin)
 - Enalapril (Vasotec)
 - Lisinopril (Prinivil/Zestril)
 - Quinapril (Accupril)
 - Ramipril (Altace)

Angiotensin Receptor Blockers

- Heart failure and LVSD
 - alternative to ACEI
- Drugs:
 - Candesartan (Atacand)
 - Irbesartan (Avapro)
 - Losartan (Cozaar)
 - Olmesartan (Benicar)
 - Valsartan (Diovan)

Questions

Give a man a fish, he eats for a day.
Teach a man to fish, he eats for a lifetime
Chinese proverb