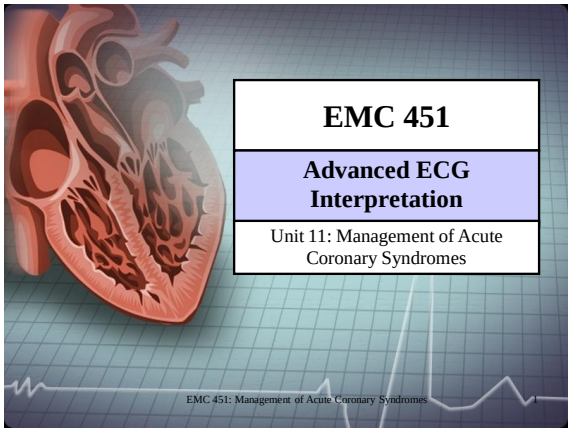


Unit Objectives

- Upon completion of this unit, you should be able to:
  - Describe the AHA algorithm for ACS
  - Discuss the benefits of prehospital 12-lead EKG
  - Discuss the use of glycoprotein IIb/IIIa receptor inhibitors, heparin, LMH, ACE inhibitors, beta blockers, aspirin, and nitroglycerin in the management of ACS.
  - Discuss the use of PCI and fibrinolytics in the management of ACS.
  - Discuss the current recommendations regarding prehospital thrombolysis.
  - Describe the use of angiography, angioplasty, stents, and CABG in the management of ACS.

Deaths from ACS

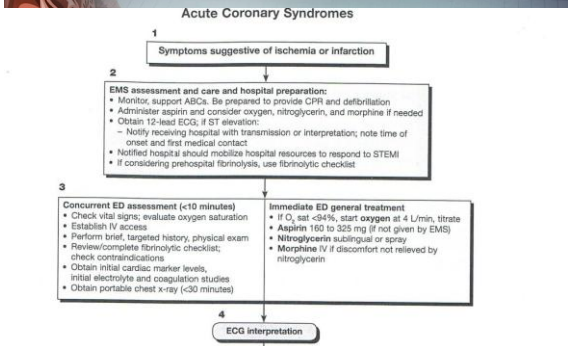
- CVD was 251.2 per 100,000
- CVD accounted for 33.6% of all 2,243,712 deaths in 2007
- More than 150,000 Americans killed by CVD were less than 65 years of age.
- This year, 785,000 Americans will have a new MI. 470,000 will have a recurrent MI
- Most deaths occur in prehospital setting
- Most deaths result from VF or VT
- Major risk of VF/VT is within the first 4 hours of symptoms
- Reperfusion reduces risk of VF/VT

Heart Disease and Stroke Statistics--2011 Update : A Report From the American Heart Association
http://circ.ahajournals.org/content/123/4/e18.full.pdf

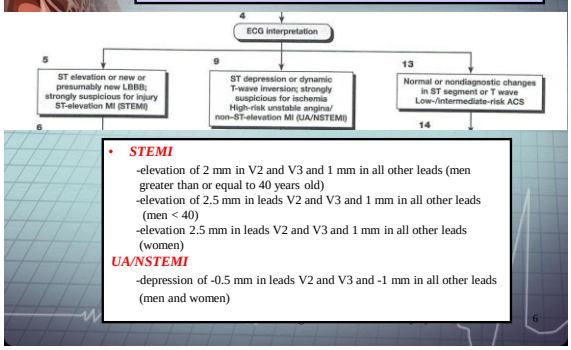
Goals of Therapy

- Reduce the amount of myocardial necrosis that occurs in patients with AMI, preserving left ventricular function, preventing HF, and limiting other cardiovascular complications.
- Prevent major adverse cardiac events: death, non-fatal MI, need for revascularization.
- Treat acute, life threatening complications of ACS.

ACS Protocol



Assess Initial 12-lead EKG



- ***STEMI***
  - -elevation of 2 mm in V2 and V3 and 1 mm in all other leads (men greater than or equal to 40 years old)
  - -elevation of 2.5 mm in leads V2 and V3 and 1 mm in all other leads (men < 40)
  - -elevation 2.5 mm in leads V2 and V3 and 1 mm in all other leads (women)

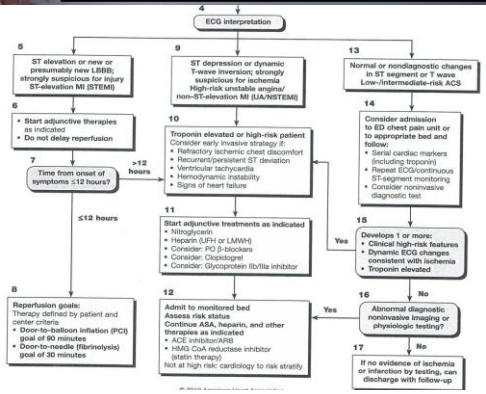
UA/NSTEMI

- -depression of -0.5 mm in leads V2 and V3 and -1 mm in all other leads (men and women)

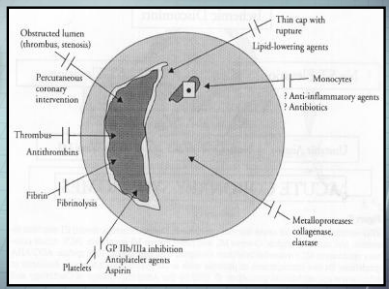
Prehospital 12-lead EKG

- Increases on-scene time by 4 minutes
- No difference in quality of information between field EKG and EKG obtained at hospital
- Reduces door-to-drug time between 20 and 55 minutes
- Improved outcome (8% mortality with a field 12-lead vs. 12% without)

ACS Protocol Continued



Interventions in the Thrombogenesis Process



Heparin

- Prevents new clots from forming by inhibiting thrombin
- Difficult to dose because patients differ in the concentrations of several proteins to which heparin binds.
- Serial coagulation levels required.
- Reduction in mortality not as high as once thought (now shown to produce only 6% reduction)
- Probably no benefit when patients are treated with ASA, beta blockers, nitrates, and ACE inhibitors
- Recommended for patients receiving alteplase, reteplase, tenectaplase

Low Molecular Weight Heparin (LMWH)

- Longer plasma half-life and a more predictable anticoagulation response
- Shorter duration of bleeding time after platelet inhibition
- Lower incidence of thrombocytopenia
- Lower incidence of bleeding events
- Easier to administer
- No anticoagulant monitoring necessary
- Drugs
  - Lovenox
  - Fragmin
  - Fraxiparin

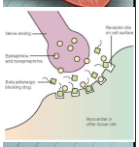
Glycoprotein IIb/IIIa Receptor Inhibitors

- GP IIb/IIIa receptor is the final common pathway to platelet aggregation
- GP IIb/IIIa inhibition is one method of reducing ischemic complications after plaque fissure or rupture.
- Prevents new clots from forming
- Drugs
  - Integrelin (Eptifibatide)
  - ReoPro (Abciximab)
  - Aggrastat (Tirofiban)

Aspirin

- 23% reduction in mortality from MI.
- Antiplatelet effect
- 160 – 325 mg

Beta Adrenergic Blockers



- Reduce myocardial oxygen demand by reducing heart rate, system pressure, and myocardial contractility.
- Provides protective effect against progression to Q-wave MI.
- Reduces incidence of arrhythmias.
- Contraindicated in patients with symptomatic bradycardia, LV failure, heart block, COPD, IDDM

Nitroglycerin

- Previously thought to reduce size of infarct, but recent studies are inconclusive.
- Use for treatment of ischemic chest pain in the early management of ACS.
- Not a substitute for narcotic analgesia.
- Also used in the treatment of HTN, CHF, and large anterior wall MI.
- Contraindicated in RV MI. Obtain V4R in all patients with inferior wall MI prior to administering NTG.

ACE Inhibitors

- 6% reduction in mortality
- Reduces infarct size, increases collateral blood flow
- Indications
  - AMI
  - LV failure (< 40% EF)
  - Heart failure
- Drugs
  - Captopril
  - Enalapril
  - Quinapril

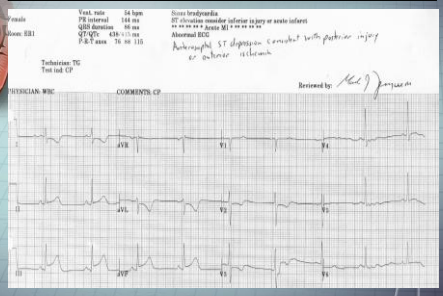
Clopidogrel

- Irreversible blockade of ADP receptor
- Blocks activation of the GP IIb/IIIa pathway

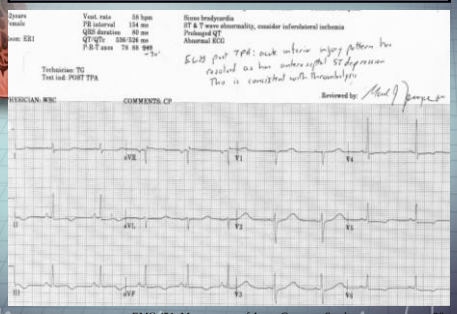
Fibrinolytics

- **Alteplase (TPA, Activase)**
  - **Catalyzes the conversion of tissue plasminogen to plasmin in the presence of fibrin. Fibrin specificity produces local fibrinolysis in the area of recent clot formation.**
  - **3 hour infusion**
- **Streptokinase (Streptase)**
  - **Bonds with plasminogen to expose plasminogen activating site**
  - **Converts plasminogen to plasmin**
  - **1 hour infusion**
- **APSAC (Anistreplase, Eminase)**
  - **Activates endogenous fibrinolytic system to produce plasmin**
  - **5 minute infusion**
- **Reteplace (Retavase)**
  - **Activates conversion of plasminogen to plasmin**
  - **2 minute bolus followed in 30 minutes by a second 2 minute bolus**
- **Tenecteplase**
  - **Single bolus over 5 seconds**
  - **Most fibrin specific**
  - **One of the lowest mortality rates**

12-lead Before Fibrinolytics



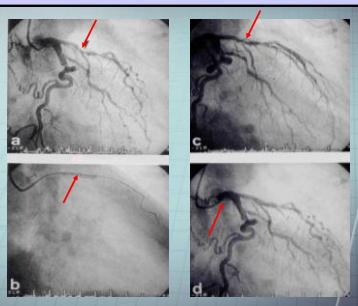
12-lead After Fibrinolytics



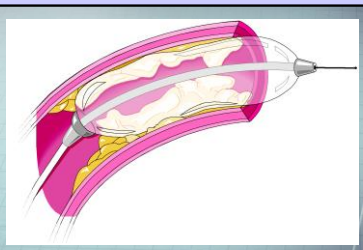
Prehospital Thrombolysis

- **Grampian Region Early Anistreplase Trial (GREAT)**
  - Thrombolysis 130 minutes sooner
  - 50% reduction in mortality
- **European Myocardial Infarction Project (EMIP)**
  - Thrombolysis median of 55 minutes sooner
  - 16 % reduction in mortality
- **Myocardial Infarction Triage and Interventional Trial (MITI)**
  - No significant difference in mortality
  - Advanced notification reduced hospital door-to-drug times which confounded results

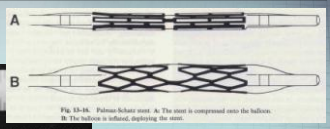
PCI-Angiography

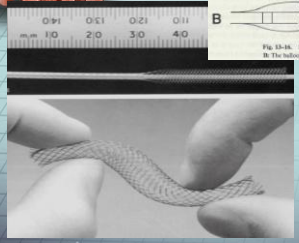


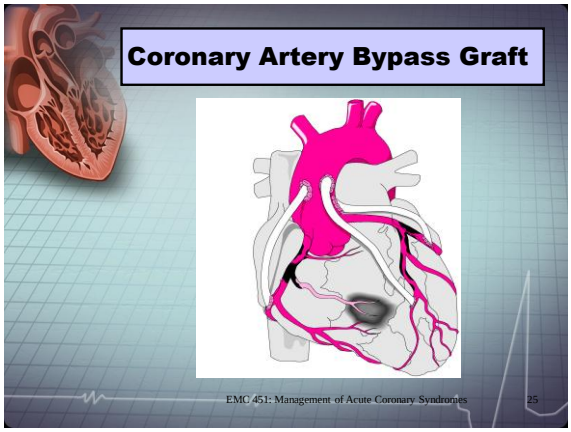
PCI-Angioplasty



PCI-Stents



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