Acute Coronary Syndromes

Objectives

• Epidemiology and Health Care Impact
• Pathophysiology
  – Unstable Angina
  – NSTEMI
  – STEMI
• Clinical Clues
• Pre-hospital Management

Epidemiology

• About 600,000 people die of heart disease in the United States every year—that’s 1 in every 4 deaths.
• Heart disease is the leading cause of death for both men and women.
• Coronary heart disease is the most common type of heart disease, killing nearly 380,000 people annually.

Epidemiology

• Every year about 720,000 Americans have a heart attack.
• Coronary heart disease alone costs the United States $108.9 billion each year.
• In 2009, approximately 683,000 patients were discharged from U.S. hospitals with a diagnosis of acute coronary syndrome (ACS).

Figure Legend:
Age- and sex-adjusted incidence rates of acute MI, 1999 to 2008. Lines represent 95% confidence intervals. Solid line represents exponential reduction. STEMI, ST-elevation myocardial infarction.
Epidemiology

• Diabetes
  – Approximately 23% of patients with STEMI in the United States have diabetes mellitus
  – 75% of all deaths among patients with diabetes mellitus are related to coronary artery disease

• Hyperlipidemia
  – About 71 million Americans have high cholesterol.
  – Only 1 out of every 3 adults with high cholesterol has the condition under control.

• Hypertension
  – About 1 in 3 U.S. adults—or 67 million people—have high blood pressure.
  – Only about half (47%) of people with high blood pressure have their condition under control.¹

• Tobacco Use
  – About 46.6 million adults in the US smoke—1 out of 5 adults

• Obesity
  – More than one-third of U.S. adults (34.9%) are obese.

• Genetics

Acute Coronary Syndromes

• Unstable Angina
  • NSTEMI
  • STEMI

Unstable Angina

• New Angina
• Rest Angina
• An Increasing severity, duration or frequency of stable angina

Non-STEMI

• Myocardial ischemia characterized by elevated Cardiac Biomarkers.
• No evidence of STEMI on ECG
• Other ECG finding may/may not be evident
• Not always due to an acute coronary syndrome
  – This can be a result of global hypoperfusion
    • "demand ischemia"

STEMI

• Classic ST segment elevation on ECG
• Trans-mural infarct
• +/- Cardiac biomarkers
  – Troponin elevation evolves over 4-6 hours
Coronary Artery Disease

HPI

- Patients with STEMI do not seek medical care for approximately 1.5 to 2 hours after symptom onset
- Chest pain is the most common presenting symptom
- Approximately one third of patients with MI experience symptoms other than chest pain
  - Diabetics
  - Females

Clinical Clues

- "Typical Chest Pain"
  - Positive Predictors – likelihood ratio (LR)
    - Radiation to shoulders – 2.3-4.7
    - Exertional – 2.4
    - Diaphoresis – 2.0
    - Nausea & Vomiting – 1.9
    - Similar to previous Angina (stable Angina) -1.8
    - “Pressure” – 1.3

- "Atypical Chest Pain"
  - Negative Predictors (LR)
    - Pleuritic – 0.2
    - Positional – 0.3
    - “Sharp” – 0.3
    - Reproducible – 0.3
    - Inframammary – 0.8
    - Non-exertional – 0.8

Past Medical History

- Diabetes
- Hypertension
- Dyslipidemia
- Tobacco
- Fam Hx of CAD
  - OR-
- Known CAD with previous MI
ECG Findings

- Unstable Angina
- STEMI
  - ST elevation ≥ 1mm
- NSTEMI
  - Peaked T-waves
  - Inverted T-waves
  - ST depression ≥ 1mm

Coronary Angiography

STEMI Foolers

- LBBB
- Hyperkalemia
- LVH
- Pericarditis
- Early Repolarization

Pre Hospital 12 Lead ECG

- Associated with shorter reperfusion times and lower mortality rates from STEMI.
- When coupled with communication of STEMI diagnosis and preferential transport to a PCI-capable hospital, has been shown to result in rapid reperfusion times and excellent clinical outcomes

Myths

- Normal ECG is always reassuring!
  - ECG only identifies a subset of the ACS population
    - Unstable Angina
    - +/- in NSTEMI
  - Serial ECGs are critical in high probability patients
    - CARDIAC ISCHEMIA IS A DYNAMIC PROCESS!
**Management**

- **MONA**
  - Morphine
  - Oxygen
  - Nitroglycerine
  - Aspirin

**Management**

- **Morphine**
  - Decreased sympathetic drive results in decreased myocardial demand and oxygen utilization
  - Analgesia
  - Necessary?
    
    "Use of morphine either alone or in combination with nitroglycerin for patients presenting with NSTE ACS was associated with higher mortality even after risk adjustment and matching on propensity score for treatment. This analysis raises concerns regarding the safety of using morphine in patients with NSTE ACS and emphasizes the need for a randomized trial. (Am Heart J 2005;149:1043-9.)"

**Management**

- **Oxygen**
  - Improved Oxygen delivery to ischemic tissue
  - Nasal Cannula v. Non Re-breather

**Management**

- **Nitroglycerine**
  - Coronary artery dilation improves perfusion

**Asprin**

- Anti-platelet therapy
- 162mg - 324mg
- Improved mortality

**Myths**

- Improved pain with nitro always supports ACS and vice versa
  - Nitro does not always alleviate angina
    - Especially with near total coronary occlusions
  - Failure to respond to nitro can suggest "unstable" angina
  - Nitro can/does alleviate esophageal spasm
Management

- Prehospital ECGs by trained personnel is associated with shorter reperfusion times and lower mortality rates from STEMI.
- The use of prehospital ECGs, particularly when coupled with communication of STEMI diagnosis and preferential transport to a PCI-capable hospital, has been shown to result in rapid reperfusion times and excellent clinical outcomes.

UA/NSTEMI Management

- Serial Cardiac Biomarkers
- Serial ECGs
- Telemetry Monitoring
- Non-invasive Stress Testing
- Coronary Angiography for "High Risk" Patients

STEMI Management

- Primary PCI is the recommended method of reperfusion when it can be performed in a timely fashion by experienced operators.
- EMS transport directly to a PCI-capable hospital for primary PCI is the recommended triage strategy for patients with STEMI, with an ideal FMC-to-device time system goal of 90 minutes or less.
Summary

• Maintain a high index of suspicion for ACS
  – Diabetics, HTN, High Cholesterol & Smokers
• Ask the right questions
  – Quality, Duration, Intensity, Location & Radiation
• Pre-hospital 12-lead ECG when possible
  – Before Nitroglycerine if possible
  – Repeat ECGs are valuable in high probability patients
• Aspirin, Oxygen and Nitroglycerin
• Appropriate destination
  – “Time is Tissue”

Question #1

1. How many people in the U.S. are obese?
   a. Less than one-third
   b. More than one-third
   c. More than 52%
   d. None

Question #2

2. Chest pain is not a common presenting symptom with a STEMI.
   a. True
   b. False

Question #3

3. What are the medications that should be given to a patient with chest pain?
   a. Tylenol, Nitro
   b. Aspirin, Oxygen and Nitroglycerin
   c. Aspirin and Oxygen
   d. None of the above

Question #4

4. A normal ECG a good finding with a patient presenting with chest pain.
   a. True
   b. False

Question #5

5. _________ of all deaths among patients with diabetes mellitus are related to coronary artery disease.
   a. 25%
   b. 90%
   c. 75%
   d. 72%
Questions?

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Updates Please

• Starting with the March EMS Live@Nite presentation, all certificates will be printed by participants or their agency. The certificate template will be available through the health training website at the same location as all presentation downloads. It will be posted the day after each monthly presentation.

Special thanks to
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For providing our Secret Question prize

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