Acute Myocardial Infarction: 
Differential Diagnosis and Patient Management

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Chest Pain

- Common complaint in ED
  - 5% of all ED visits or 5 million visits per year
- Wide range of etiologies
  - Cardiac, Pulmonary, GI, Musculoskeletal
- Why does distinguishing these causes matter?
- How do you distinguish causes of chest pain?

Chest Pain That Kills Quickly

- Acute Coronary Syndromes
- Pulmonary Embolism
- Aortic Dissection
- Esophageal Rupture
- Pneumothorax
- Cardiac Tamponade

Chest Pain That Can Kill

- Pneumonia
- Pulmonary Hypertension
- Myocarditis
Benign Causes
- Musculoskeletal
- Esophagitis
- Bronchitis (chest pain secondary to cough)
- Recently placed nipple rings
- “Non-Specific chest pain”

Categorizing Chest Pain
1. Chest Wall Pain
   - Sharp, precisely localized
   - Reproducible: Palpation, movement
2. Pleuritic or Respiratory Chest Pain
   - Somatic pain, sharp
   - Worse with breathing/coughing
3. Visceral Chest Pain
   - Poorly localized, aching, heaviness

Categorizing Chest Pain
1. Chest wall
   - Costosternal syndrome
   - Costochondritis
   - Precordial catch syndrome
   - Slipping rib syndrome
   - Xiphodynia
   - Radicular syndrome
   - Intercostal nerve
   - Fibromyalgia
2. Pleuritic
   - Pulmonary embolism
   - Pneumonia
   - Spontaneous pneumothorax
   - Pericarditis
   - Pleurisy
3. Visceral Pain:
   - Typical exertional angina
   - Atypical angina
   - Unstable angina
   - Acute Myocardial Infarction
   - Aortic dissection
   - Pericarditis
   - Esophageal reflux or spasm
   - Esophageal rupture
   - Mitral valve prolapse

Causes Table
Acute Coronary Syndromes

- Unstable Angina
- N-STEMI
- STEMI

Types of Clots

- White Clot: Platelet rich clot (UA or N-STEMI) Treatment with Antiplatelets
- Red Clot: Fibrin rich clot (STEMI) Treatment with Fibrinolytics

White Clot vs Red Clot

- Regardless of the type of clot, both patients should go to the Cath Lab!!!!

Different MI Locations

- Location, Location, Location!
- It matters!
- Left vs Right MI
### 12 Lead ECG Interpretation: Precordial Leads

- V1 - V6
  - V1 and V2
  - V3 and V4
  - V5 and V6

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### Right-Sided Chest Leads

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### Don’t Forget to Obtain the Whole Story!

- What does the 12 lead EKG tell us?
- What does the 12 lead EKG NOT tell us?
- So the 12 lead EKG only takes us so far………..

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### Right Sided Leads
Acute Coronary Syndromes

1. Symptoms suggestive of ischemia or infarction

2. Initial assessment and care and hospital preparation
   - Monitor, support ASCs. Be prepared to proceed CPR and defibrillation
   - Administer aspirin and consider oxygen, intravenous, and morphine if needed
   - Obtain 12-lead ECG. If ST elevation
     - Notify receiving hospital with transmission or interpretation; note time of onset and first medical contact
     - Notify hospital should mobilize trocar resources to respond to STEMI
     - If considering percutaneous coronary intervention (PCI), use thrombolytic checklist

3. Concurrent ED assessment (<10 minutes)
   - Check vital signs, evaluate oxygen saturation
   - Establish IV access
   - Perform brief, targeted history and physical exam
   - Review complete hematochemical checklist (Figure 2)
   - Check anticoagulation (warfarin, heparin)
   - Obtain initial cardiac markers levels
   - Initial electrolyte and coagulation studies
   - Obtain portable chest x-ray (<30 minutes)

4. Initial ED general treatment
   - If Q wave, start high-dose IV heparin
   - Morphine 100 to 200 mg (if not given by EMS)
   - Nitroglycerin sublingual or topical
   - Morphine if discomfort not relieved by nitroglycerin

5. ECG interpretation

6. STEMI assessment
   - STEMI definition (Figure 3, 4)
   - Confirm mortality or high-risk STEMI
   - Consider PCI options
   - Consider thrombolysis
   - Consider thrombolytic therapy

7. Treatment of STEMI
   - Start thrombolytic therapy
   - Consider PCI options
   - Consider thrombolysis

8. Treatment of non-STEMI
   - Start thrombolytic therapy
   - Consider PCI options
   - Consider thrombolysis

9. Follow-up
   - Discharge
   - 1-2 weeks after hospital discharge
   - Consider outpatient follow-up

10. Discharge instructions
    - Provide written instructions
    - Follow-up appointments
    - Medication management
Case Study
- 35 year old male with sudden ripping pain radiating to back.
Aortic Dissection

- Blood violates aortic intimal and adventitial layers
- False lumen is created
- Dissection may extend proximally, distally, or in both directions

Aortic Dissection: In Whom Should You Suspect This Disease?

- Bimodal distribution
  - Young: Connective tissue (Marfan) or pregnancy
  - Older: Most commonly > 50 (mean age 63)
- Risk factors
  - Male: 66% of patients
  - Hypertension: 72% of patients
  - Connective tissue disease
    - 30% of Marfan's patients get dissections
  - Cocaine Use
  - Syphilis

Aortic Dissection

- Presentation (difficult clinical diagnosis)
  - 85% have chest or back pain
  - “Ripping” or “tearing” in 50%
  - Neurologic symptoms in 20%
  - Hematuria
  - Asymmetric pulses

Aortic Dissection Diagnosis

- CXR - Widened mediastinum, abnormal aortic knob, pleural effusions
  - Not sensitive (25% have wide mediastinums)
- Chest CT - Very sensitive and specific
  - Quickly obtained
  - Must think about kidney + contrast
- Angiography - Gold standard
  - Most reliable anatomy of dissection
- Bedside US – evaluate aorta and look at heart to rule out tampanode.
Aortic Dissection Classifications

- De Bakey system: Type I dissection involves both the ascending and descending thoracic aorta. Type II dissection is confined to the ascending aorta. Type III dissection is confined to the descending aorta.
- The Daily system classifies dissections that involve the ascending aorta as type A, regardless of the site of the primary intimal tear, and all other dissections as type B.

Aortic Management

- Involve CT surgery early
- Blood pressure control
  - Goal SBP 120-130 mmHg
  - Beta blockers are first line (Labetalol and Esmolol)
  - Can add vasodilators i.e. nitroprusside
- Admission to ICU
  - Ascending dissections will need surgery