



EM Clerkship: Chest Pain



Objectives

- Discuss a general approach to chest pain
- Review differential diagnosis
- Develop an understanding of the diagnosis and management of common and serious causes of chest pain

Background

- Chest pain is chief complaint in ~3% of ED patients
- Diagnostic possibilities range from life-threatening to common or unusual
- Cardiovascular disease remains the #1 killer of American men and women

General Approach

- Approach all chest pain patients as having a serious cause until proven otherwise
- H&P, diagnostic testing and treatment should proceed in parallel given range of possible conditions
- Immediate visualization and rapid evaluation
- Stabilize and treat prior to full evaluation

General Approach

- Screen for severity
 - ABCs
 - IV access (& labs)
 - Oxygen
 - Monitor, full VS
 - +/- EKG, portable CXR
 - Brief H&P
 - Immediate treatment
 - Asa, TNG, Morphine, etc*
 - Monitor response to interventions

12 Lead EKG Indications

- **Chest pain**
- Symptomatic **rhythm** disturbance (tachy, brady, palpitations, etc...)
- **Syncope**
- **SOB**, DOE, orthopnea or PND (≥ 40 yo)
- Epigastric pain, N/V (≥ 40 yo)
- Arm, neck or jaw pain (≥ 40 yo)
- Toxic ingestion
- Altered mental status
- Dizziness, hypotension
- When in doubt...

Portable CXR

- Rapid evaluation for:
 - Pneumothorax
 - Pulmonary edema
 - Pneumomediastinum
 - Pneumonia
 - Cardiomegaly
 - Pacemaker lead position
 - Dissection



Other testing

- Considerations in working up chest pain:
 - Cardiac enzymes
 - D-Dimer
 - BNP
 - CT scan
 - Echocardiogram



Historical Factors

- Position
- Quality*
- Radiation*
- Severity
- Timing*
- Aggravating/Alleviating factors*
- Associated symptoms*
- Similarity to prior episodes
- Cardiac risk factors*
- PMH/PSH
- Medications



Physical Exam

- Vitals *
- General appearance/color
- Diaphoresis
- Neck *
- Chest*
- Abdomen
- Extremities*

Reproducible pain does not rule out serious causes of chest pain



Differential Diagnosis

- What are serious causes of chest pain?
 - Myocardial infarction
 - Unstable angina
 - Pulmonary embolism
 - Aortic dissection
 - Esophageal rupture
 - Pneumomediastinum
 - Spontaneous pneumothorax



Differential Diagnosis

- What are other causes of chest pain?
 - Stable angina
 - Pericarditis
 - Abdominal pathology
 - GERD/PUD
 - Biliary obstruction
 - Pancreatitis
 - Pneumonia/other infections
 - Herpes zoster
 - Chest wall pain
 - Muscle strain/tear
 - Rib fracture/contusion
 - Anxiety



Case 1

- 51M c/o acute onset L CP x 30 min, + diaphoresis
- no radiation
- no SOB
- no N/V
- no syncope
- no hx of same
- PMH: HTN, on no meds, NKDA
- SH: +tobacco, no drugs
- FH: HTN

Actions?

Initial Management

- ABCs
- IV, O2, monitor, full VS (bilateral BP's)
- EKG
- pCXR
- Labs:
 - CBC, M7, Coags, Cardiac enzymes

Case 1

- Afebrile, 65 (regular), 150/90 (symetric), 18, 100% ra
- Looks sweaty, distressed, uncomfortable
- Chest clear, heart regular without M/G
- Abdomen soft, NT/ND, BS+
- No JVD, no edema, no rash; nonfocal
- Remainder of exam wnl



Case 1

- pCXR = normal
- Actions?
 - Activate cath lab ASAP
 - 'MONA':
 - Asa 325 mg chew and swallow
 - Nitro sublingual q5 x3; drip as needed
 - Morphine 4-8 mg IV
 - Oxygen (at least 2L NC)
 - Heparin bolus & drip
 - Consider plavix (per institution protocol)
 - 2b3a inhibitors?
- to cath lab (*consider tPA if cath lab unavailable*)

Case 1

- Same presentation, but EKG is normal...
- Now what?
 - repeat EKG @ 20 mins &/or pain free
 - All normal / unchanged
- Cardiac enzymes return negative...
- Now what?
 - 'Risk stratification'

'Risk Stratification'

- Serial EKGs
 - “one EKG begets another”
- Serial cardiac enzymes
 - Intervals vary by risk factors and provider
- Stress testing
 - Nuclear stress, stress echo, EKG treadmill
- Angiography
- Cardiac CT?



EKG Findings: ACS

- Infarction
 - ~50% of acute infarcts will have ST elevation
 - Frequently nonspecific/subtle changes
 - Ischemia
 - ~50% will have abnormal EKG
 - Arrhythmia
 - Normal or unchanged*
- * Sensitivity of initial EKG in patients with ischemia is ~20-50%



Spectrum of ACS

- Myocardial infarction
 - STEMI (*EKG dx*)
 - NSTEMI (*troponin dx*)
 - Unstable angina (*clinical dx*)
 - Stable angina (*clinical dx*)
 - Undifferentiated chest pain (most ED pts)
- * *Reproducible pain or response to therapy does not rule out serious causes of chest pain*



Cocaine Chest Pain

- The Problem → Cocaine:
 - accelerates atherosclerosis
 - vasospastic (elevates BP and HR)
 - pro-thrombotic
 - pro-arrhythmic
- The Solution:
 - Cocaine CP = EKG
 - Assume ischemia until proven otherwise
 - Treat as if ACS*
 - Treat pain with benzodiazepines



Case 2

- 60M p/w sudden, 'tearing' SSCP radiating thru to back
- maximal at onset
- + N/V & diaphoresis
- no syncope or SOB
- Looks sweaty, distressed and very uncomfortable
- PMH: HTN, no meds, NKDA
- SH: Moderate etoh, + tobacco, no ilicits
- FH: Adopted

• ACTIONS?



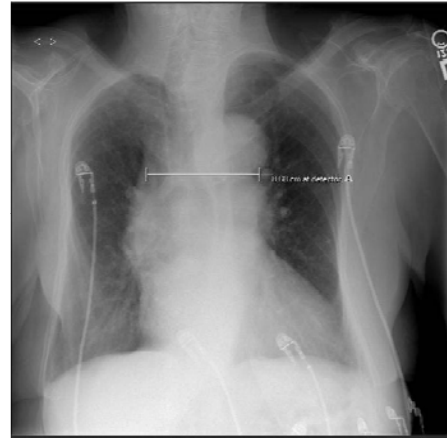
Initial Management

- ABCs
- IV, O2, monitor, full VS (bilateral BP's)
 - 190/105; 165/85
- EKG
- pCXR
- Labs:
 - CBC, M7, Coags, Cardiac enzymes



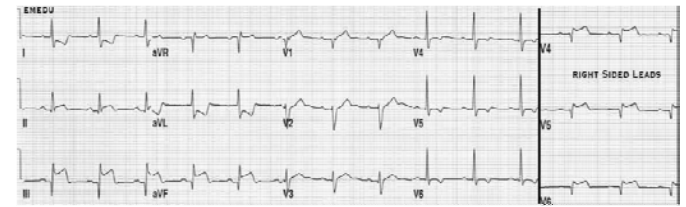
Case 2

- Afebrile, 190/105, 50, 18, 99%RA
- Looks sweaty, distressed
- Chest clear, heart regular with diastolic murmur
- Abdomen soft, NT/ND, BS+
- No JVD, no edema, no rash; nonfocal
- Remainder of exam normal



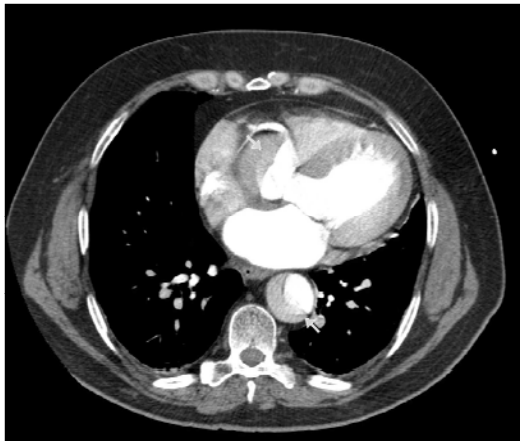
CXR: Aortic Dissection

- Normal (16%)*
- Wide mediastinum (60%)*
- Abnormal aortic knob / Left aortic cap
- Tracheal deviation
- Esophageal deviation
- Ring sign (*aorta displaced ≥ 5 mm from calcified aortic intima*)



EKG: Aortic Dissection

- Normal (~1/3)
- Nonspecific ST or T-wave changes (43%)*
 - LVH (~1/3) from longstanding HTN
- STE (5%)*



Action!!!: Aortic Dissection

- BP & rate control (dP/dt) → goal SBP 100-120, HR 60-70
 - Labetalol, esmolol
 - Nitroprusside >> nitroglycerin
- Pain control → blunt adrenergic surge
- STAT imaging
 - CTA aortic dissection protocol – *test of choice*
 - MRA aortic dissection protocol
 - TEE
- Disposition
 - ICU for medical management vs. definitive surgical repair

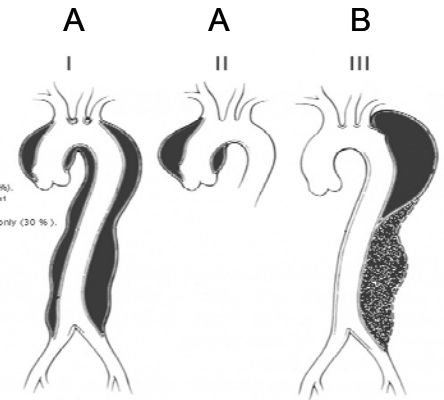
Aortic Dissection

Historical features*:

- Abrupt or sudden onset (87%)
- Ripping or tearing (54%)
- Chest pain (76%)
- Syncope (14%)

Findings*:

- BP asymmetry \geq 20 mm Hg (PPV for AD = 98%)
- Asymmetrical pulses (32%)
- New diastolic murmur: AI (51%)
- Tamponade (6%)
- Neurologic deficits (16%)



Case 3

- 25F c/o sharp, stabbing SSCP for the past 3 days
- non-radiating
- non-pleuritic
- worse with lying down, improved by sitting forward
- recent URI Sx with low grade fever
- PMH: LMP 2 weeks ago, No Meds, NKDA
- SH: + etoh, No TOB or IVDU
- FH: Denies

• ACTIONS?



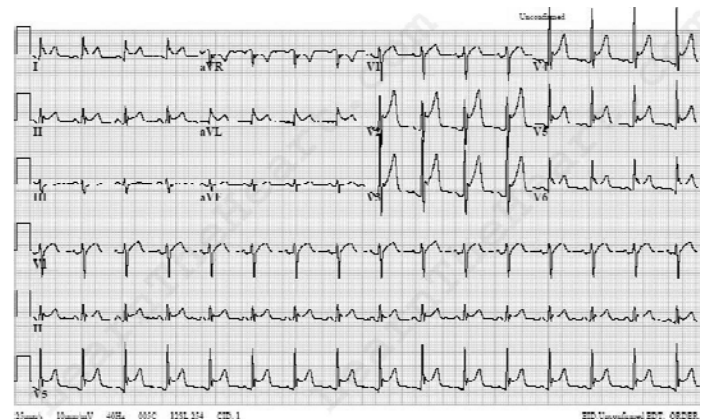
Initial management

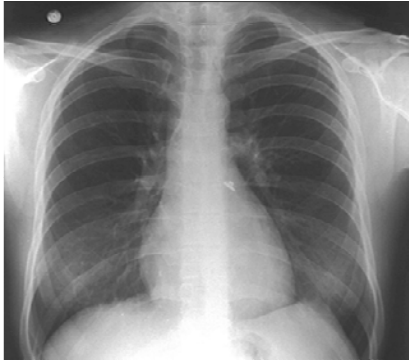
- ABCs
- IV, O2, Monitor, Full VS
- EKG
- CXR
- Labs:
CBC, M7, B-HCG



Initial evaluation

- 37.4, 94, 124/78, 16, 98% RA
- Appears comfortable, sitting forward
- Clear breath sounds
- Regular rhythm, no murmur
- It sounds a bit “funny” over the left sternal border
- Remainder of exam wnl





Case 4

- CXR: normal
- WBC 12,000, Cr and Trop wnl
- Diagnosis?
- Actions?

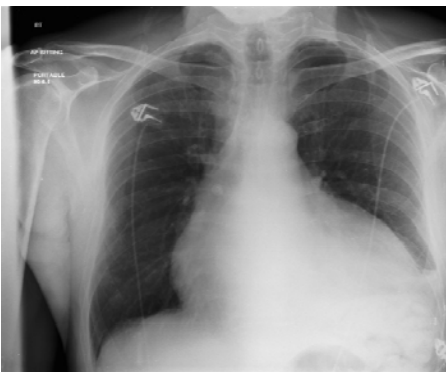


Pericarditis

- Common etiology idiopathic or infectious
- Other causes:
 - malignancy, SLE, RA, medications, radiation
- Dressler's syndrome = late post-MI
- Actions
 - NSAIDs: Toradol or Ibuprofen
 - Steroids if cannot tolerate or failed NSAIDs
 - Echocardiogram
 - Admit if hx ESRD, TB, recent MI, anticoagulated, Immunosuppressed, or if patient looks unwell

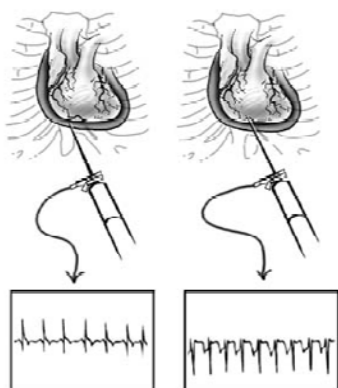


What if this were the EKG?



- enlarged, "bottle-shaped" heart





Case 5: A picture is worth 1000 words...

- 45M c/o “burning pain” on L chest for 6 days
- Non-radiating
- “A little short of breath” because of the pain
- Never had pain like this before

- 37.1, 78, 130/80, 18, 98% RA
- Well-appearing
- Clear breath sounds
- Regular rhythm, no murmur
- Abdomen soft, non-tender
- Extremities warm, no edema

Then you finish your exam...



- Vesicular lesions
- Erythematous base
- Dermatomal distribution

Take home points

- * Chest pain is serious until proven otherwise
- * H&P, diagnostic testing and interventions should proceed in parallel
- * Stabilize and treat prior to full evaluation
- * Consider the spectrum of disease and risk-stratify for further testing and disposition