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

- 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

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 illicits
- FH: Adopted

  * ACTIONS?*

Initial Management

- ABCs
- IV, O2, monitor, full VS (bilateral BP’s)
  - 190/105; 165/85
- EKG
- CXR
- 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 ≥ 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