Clinical Approach to Chest Pain

I. Introduction – chest pain an immediate challenge – correct diagnosis by vigilantly obtained detailed history that is supported by physical findings, and electrocardiogram, a CXR and an echocardiogram, and a CT/PE.

II. Epidemiology

A. Prevalence – non-emergent chest pain
   1.) 60% Not due to (cardiac, GI, or pulmonary.)
   2.) 36% of all diagnosis (Musculoskeletal)
   3.) 13% reflux esophagitis
   4.) Stable angina 11%, UA or MI occurred in only 1.5%

B. Risk factors matter: (FH, Lipids, HX CAD, DM, smoking, hypertension)

III. Emergency Chest Pain → (“Killer” chest pains)*

A. Acute Coronary Syndrome (ACS)
B. Pulmonary Embolism
C. Aortic Dissection
D. Tension Pneumothorax

*Must be transferred to ER and dealt with Emergently

IV. Evaluation of chest pain:

A. Description of chest pain, characterize. (tight, squeeze, dull, sharp)
B. Quality of pain
   1.) Pleuritic, positional, sharp, correlate weekly with ACS.
   2.) Radiation to shoulder and arms, exertional, correlates with ACS.
   3.) Levines sign, fist over chest.
   4.) Ischemic pain tends to be same, each time.
   5.) Ripping or tearing and sudden, consider Aortic dissection.
   6.) Pleuritic CP in PE – (40-48%)
C. Region or Location
   1.) Ischemia, diffuse – distribution
   2.) Chest wall is distributed to a small area
D. Radiation
   1.) Neck, throat, lower jaw, teeth, upper extremity or shoulder correlates with myocardial ischemia.
   2.) Right shoulder – acute Cholecystitis
   3.) Pericarditis to trapezius ridges
   4.) Aortic dissection to mid-scapula
   5.) Cervical Radiculopathy to chest, upper back, upper extremity pain.

E. Temporal
   1.) Aortic dissection and pneumothorax are sudden
   2.) Ischemia is slow and builds to peak, 5-10 minutes
   3.) Musculoskeletal chest pain is vague, with movement

F. Provocation
   1.) Post prandial pain is upper gastrointestinal
   2.) Exertion is CAD
   3.) Pleuritic - PE, pneumothorax, pneumonia

G. Palliative
   1.) Palliative by antacid or food in GI in origin
   2.) NTG not helpful, GI cocktail not reliable – treats both.
   3.) Pericarditis improves sitting up, worse when supine.

H. Severity
   1.) Many MI’s are unnoticed or minimal discomfort. Dissection severe.

I. Associated Symptoms
   1.) Dyspnea – on exertion is associated with angina, ischemia
   2.) Syncope – consider aortic dissection, PE, or ruptured aneurysm or aortic stenosis, rarely MI.
   3.) Atrial fibrillation uncommon in new MI.
   4.) Constitutional – in elderly, ischemia
   5.) Women – SOB, weakness and fatigue as opposed to angina.

V. Risk Factors – Always helpful

VI. Physical Exam
   A. General appearance important, who is sick?
B. Pay attention to vital signs (↑HR, RR)
C. Palpitations (PVC's)
D. Complete cardiac exam – new murmurs.
E. Complete lung auscultation – rales
F. Abdomen – acute cholecystitis can mimic MI.

VII. Ancillary Studies
A. EKG
   1.) Key is changes, serial trace, multiple leads (right sided or posterior chest.)
B. CXR
   1.) Exclude pneumonia, pneumothorax, and aortic dissection.
C. CT/PE
   1.) Exclude pulmonary embolism and aortic dissection.
D. TEE or CT Aortogram – exclude aortic dissection.
E. Stress Testing – screen chest pain that is indeterminate. Not indicated for atypical chest pain or distinct angina.
F. EGD – endoscopy to diagnose reflux esophagitis and other esophageal disease.

VIII. Specific chest pain syndrome
A. Chest wall – “patient can point to pain” – very accurate
   1.) Trauma
   2.) Costochondritis
   3.) Herpes Zoster
   4.) Cervical Radiculopathy
   5.) Thoracic outlet syndrome
   6.) Brachial plexus compression
B. Lungs / Pleura
   1.) Pleuritis – viral
   2.) PTE – dyspnea, tachycardia, tachypnea, hypoxia
   3.) Pneumonia – (Pneumococcal, Tb)
   4.) Neoplasm’s
   5.) Pneumothorax (Tension can be lethal)
   6.) Wells Score for Pulmonary embolism
### Low Probs <2.0

### Intermediate Probs 2.0-6.0

### High Probs >6.0

<table>
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<tr>
<th>Condition</th>
<th>Score</th>
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<tr>
<td>Clinical signs + sx of DVT</td>
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<tr>
<td>HR &gt; 100 beats/min</td>
<td>1.5</td>
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<tr>
<td>Immobilization for 3 or more days</td>
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<tr>
<td>Previous obj. dx Pul. embolism or DVT</td>
<td>1.5</td>
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<tr>
<td>Hemoptysis</td>
<td>1.5</td>
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<tr>
<td>Cancer (last 6 months)</td>
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<tr>
<td>Pulmonary embolism likely</td>
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Use for clinical risk assessment

7.) See clinical decision tree  pg.4
From:
Wells PS, Anderas DR Emergency diagnosis of pulmonary embolism
(AIM 2001;135:100)
8.)
   1.) D-dimer – most helpful when negative
   2.) Venous duplex testing for DVT
   3.) CT/PE testing for PA thrombosis
   4.) Ventilator/Perfusion lung scan if contrast not allowable

C. ACS
   1.) Acute Coronary Syndrome
      a. Acute Coronary Syndrome: (Unstable Angina, NSTEMI, STEMI)
      c. EKG is very important (ST elevation, ST depression)
      d. Angina pectoris can be stable or unstable
      e. Myocardial infarction pain last 20 or more minutes vs 10-15 minutes for angina.
      f. Angina is the last manifestation of ongoing ischemia, (myocardial contractile abnormalities occur earliest)
      g. New York and Canadian classification of angina pectoris
      h. Stress testing – see below
   2.) Other Cardiac causes of CP
      a. Pericarditis
         i. Distinct history
         ii. EKG changes – diffuse ST elevation, PR depression
      b. Aortic Stenosis
         i. Critical Aortic Stenosis can cause Angina
         ii. Significant echo AV gradient Across Aortic Valve
         iii. Angina poor prognosis
      c. HOCM
         i. Supply / demand imbalance
         ii. Outflow obstruction below Aortic Valve
         iii. Angina presentation common
         iv. SCD (Sudden Cardiac Death)
d. Aortic Dissection
   i. More likely if Marfans syndrome, Ehlos- Danlos, Lowey-Dietz, and Bicuspid Aortic Valve.
   ii. Hypertension and Hypercholesterolemia are risks.
   iii. Sudden, tearing, chest pain that radiates to back.
   iv. CXR – widened mediastinum, pleural effusion
   v. TEE – Aortic tear seen
   vi. CT angio of Aorta – dissection flap delineated.
   vii. Proximal dissection (type A) requires immediate surgery.
   viii. Distal dissection (type B), below the L subclavian artery, is medically treated.

3.) Test for Cardiac chest pain.

Sens & spec. of cardiac stress tests & cost

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<th>Type</th>
<th>Sens</th>
<th>Spec</th>
<th>Cost</th>
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<tr>
<td>EKG</td>
<td>0.68</td>
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<tr>
<td>Echo</td>
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<td>0.88</td>
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<tr>
<td>Thallium</td>
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<tr>
<td>SPECT</td>
<td>0.88</td>
<td>0.77</td>
<td>4.0</td>
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From:
Garber AM, Solom NA, Cost effectiveness of alternative strategies for the diagnosis of CAD.
(AIM 1999; 130: 719)