Evaluation of Patients with Chest Pain

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Overview

- Chest pain risk stratification using the H and P, ECG, labs, and imaging
- Disease Specific Evaluations:
  - ✓ Acute Coronary Syndrome
  - ✓ Pulmonary Embolism
  - ✓ Aortic Dissection
  - ✓ Pneumothorax
  - ✓ Esophageal Rupture
  - ✓ Valvular Heart Disease
  - ✓ Pericardial/Myocardial Disease

Acknowledgement

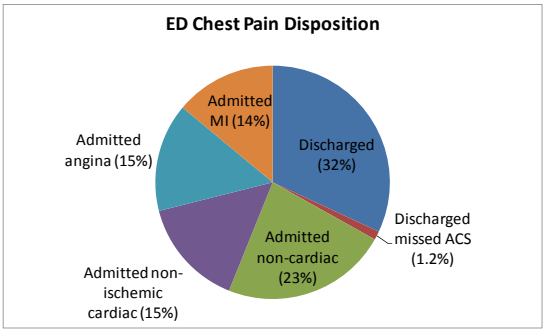
- Mark L. DeBard MD, FACEP
  - ✓ Professor of Emergency Medicine
  - ✓ Attending Emergency Physician, OSU University Hospital East
  - ✓ Co-lecturer with Dr. Moseley for many years on the topic of chest pain evaluation in Emergency Medicine for medical students, residents, and faculty physicians.

The Challenge of Chest Pain

- Whether in the office, ED, or inpatient setting, the patient with chest pain presents a diagnostic dilemma
- You can not treat all patients with chest pain the same due to the broad differential diagnosis that ranges from benign causes to immediately life threatening events
- Must have a strategy that will help identify higher risk patients and differentiate them from lower risk patients

ED Chest Pain Disposition (%)

- 6 million ED Chest Pain Patients (6% of all ED patients)



Chest Pain Evaluation

- Things in common that can be useful for the evaluation of any patient with chest pain regardless of the setting:
  - ✓ History
  - ✓ Physical Exam
  - ✓ ECG
  - ✓ Lab Testing
  - ✓ Imaging

Differential Diagnosis

- Life Threatening
  - ✓ ACS
  - ✓ Pulmonary embolism
  - ✓ Aortic dissection
  - ✓ Tension pneumothorax
  - ✓ Esophageal rupture
  - ✓ Pericardial tamponade
- Non-Life Threatening
  - ✓ Muscular
  - ✓ Skeletal
  - ✓ Pneumonia
  - ✓ Simple pneumothorax
  - ✓ Pericarditis
  - ✓ GERD
  - ✓ Valvular heart disease
  - ✓ Zoster
  - ✓ Radiculopathy

History

- Remains the cornerstone of diagnosis
- The importance of obtaining a thorough chest pain history cannot be over-emphasized

History

- Remains the cornerstone of diagnosis
- Specific characteristics of pain can help with better defining the differential diagnosis:
  - ✓ Chronicity
  - ✓ Onset
  - ✓ Duration
  - ✓ Intensity
  - ✓ Exacerbating factors
  - ✓ Remission/relieving factors
  - ✓ Associated symptoms

History

- Important to ask about associated symptoms that accompany the pain:
  - ✓ Shortness of breath
  - ✓ Nausea and/or vomiting
  - ✓ Diaphoresis
  - ✓ Syncope
  - ✓ Dizziness or weakness
  - ✓ Pain in other locations that might be related

History

- It is helpful to key in on the patient's own description of the pain:
  - ✓ Pain vs. discomfort
  - ✓ Pressure vs. sharp
  - ✓ Intensity at onset
  - ✓ Where is it located
  - ✓ Is the pain positional
  - ✓ What was the patient doing at the time
  - ✓ Worse with exertion
  - ✓ Worse with deep breaths

History

- Does the patient have a previous medical history that is relevant?
  - ✓ Known coronary artery disease
    - Previous re-vascularization?
    - Was there chest pain associated with that prior CAD event?
    - Is the current chest pain similar or different than previous chest pain?
  - ✓ Hypertension
  - ✓ Diabetes
  - ✓ CVA/TIA
  - ✓ Peripheral vascular disease

History

- **Risk Factors:**
  - ✓ **Framingham risk factors (population based)**
  - ✓ **Connective tissue diseases**
  - ✓ **High potency stimulant use**
- **Realize that risk factors only convey a lifetime statistical risk for disease processes:**
  - ✓ **Presentation with chest pain has already selected for a higher risk group**
  - ✓ **Don't ignore them totally**

History

- **Pearls:**
  - ✓ **Abrupt onset think TAD, PE, PTX**
  - ✓ **Pleuritic pain think pericarditis, PE, pneumonia**
  - ✓ **Don't rely on response to therapy like NTG or GI cocktails**
  - ✓ **Radiation to jaw, arms, or neck increases likelihood of ACS**
  - ✓ **Consider sudden onset of symptoms, associated syncope or near syncope, or CHF like symptoms associated with the chest pain to be high risk**

History

- **Avoiding Pitfalls:**
  - ✓ **Don't discount risk solely based on age, gender, or lack of traditional risk factors**
  - ✓ **Remember that some groups of patients tend to have atypical presentations:**
    - **Women**
    - **Elderly**
    - **Diabetics**
  - ✓ **Focus the history on life threats first and then broaden to include less concerning causes**

Physical Exam

- **Realize that most patients with chest pain will have a normal physical examination**
- **The physical exam should be used to make diagnosis more likely, not totally exclude a diagnosis:**
  - **The absence of a single physical exam sign or combination of signs lacks the sensitivity and specificity to exclude disease**
- **Don't fixate on reproducible chest wall pain!**
  - **15% of patients having an active AMI report a tender chest wall**

Physical Exam

- **Focus on vital signs, general appearance, and positive findings:**
  - **Clinical signs of CHF (S3/S4, JVD, fluid overload)**
  - **Friction rub (pericarditis)**
  - **New onset murmur (aortic dissection, AMI)**
  - **Hamman's crunch (esophageal rupture)**
  - **Asymmetric pulses (aortic dissection)**
  - **Swollen extremities (PE, CHF)**
  - **Diaphoresis (non-specific, but concerning)**

ECG

- **You can classify the ECG based on ACC/AHA guidelines:**
  - ✓ **STEMI**
  - ✓ **NSTEMI/high risk unstable angina**
  - ✓ **Non-diagnostic**
- **The ECG is a slice in time only:**
  - ✓ **<50% of initial ECGs are diagnostic**
  - ✓ **Serial ECG's recommended, but timing is unclear**
  - ✓ **Progression with AMI**
    - **Hyper-acute T-waves**
    - **STE**
    - **T-wave inversion**
    - **Q waves**

High Risk Features to the H and P

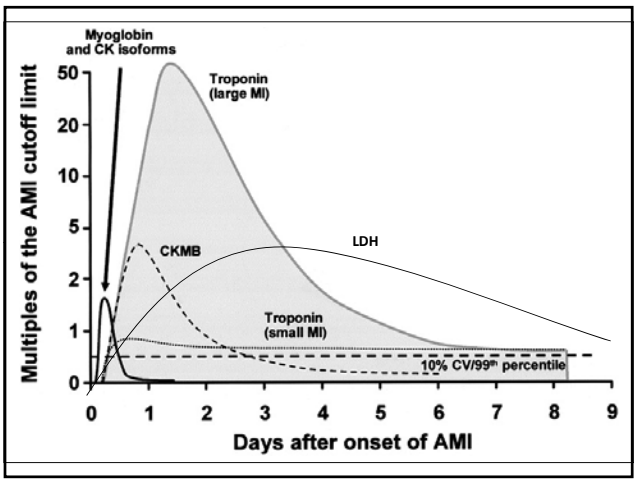
- **Sudden onset of pain**
- **High risk associated symptoms:**
  - ✓ **SOB, diaphoresis, vomiting, syncope, etc.**
- **Exertional pain or persistent rest pain**
- **Abnormal vital signs**
- **Elderly patients and those with multiple co-morbid conditions**

ECG

- **If the ECG is abnormal, its important to compare it to an older ECG if available;**
  - ✓ **Can be critical for conditions like bundle branch blocks (old vs. new) in the setting of new onset chest pain as it helps determine intervention**
- **In addition to ACS:**
  - ✓ **ECG changes in PE**
  - ✓ **ECG in TAD**
  - ✓ **ECG in pericarditis**
  - ✓ **Arrhythmias**

Lab Testing

- In patients sick enough to come to the ED or be admitted for chest pain, patients usually require:
  - ✓ Basic chemistries
  - ✓ Complete blood count
- Based on the history and physical examination, utilize a targeted approach to laboratory testing:
  - ✓ Coagulation profile (if on coumadin), cardiac markers, d-dimer, BNP, LFT's, Lipase
  - ✓ Tox screen if concern for high potency stimulant use



Lab Testing

- Cardiac Markers
  - ✓ Myoglobin
    - First to peak, non-specific
    - Good NPV
  - ✓ CK-MB
    - Former gold standard; supplanted by troponin
    - Elevation in muscle damage, renal failure, sepsis, CVA
  - ✓ Troponin
    - Prolonged elevation in serum (7-14 days)
    - More sensitive and specific for ACS than CKMB; detects micro infarcts
    - Elevated troponin in UA = 9x increase in death due to MACE

Lab Testing

- BNP:
  - ✓ Helpful in the assessment of acute shortness of breath of unclear etiology or for assessment of CHF
  - ✓ Know your lab assay
  - ✓ Level <100 = unlikely CHF
  - ✓ Level >500 = likely CHF
  - ✓ Level between 100 and 500 = uncertain
    - Chronic elevation
    - Chronic renal insufficiency
    - Severe COPD with right sided failure
    - PE
    - Elderly women

Lab Testing

- **D-dimer:**
  - ✓ **Helpful for the assessment of PE**
  - ✓ **ELISA test preferred; know your lab assay**
  - ✓ **Excellent sensitivity, but poor specificity**
  - ✓ **Need to combine d-dimer testing with some assessment of pre-test probability**
  - ✓ **Low or moderate pre-test probability and negative ELISA d-dimer, means you have excluded to the limits of testing**
  - ✓ **If positive d-dimer, need to follow up with further definitive test like VQ scan or CTPA to exclude disease**

Imaging

- **For most patients that are being assessed for chest pain, the PA and Lateral Chest X-Ray remains quite useful:**
  - ✓ **Good screening test for many conditions**
  - ✓ **Assessment of vasculature, lungs, bones, etc.**
  - ✓ **Can provide alternative diagnoses in some cases**
- **Be cautious about sensitivity and specificity and using the CXR to "rule out" diagnoses**
- **Better to utilize to "rule in" based on findings of the examination**

Imaging

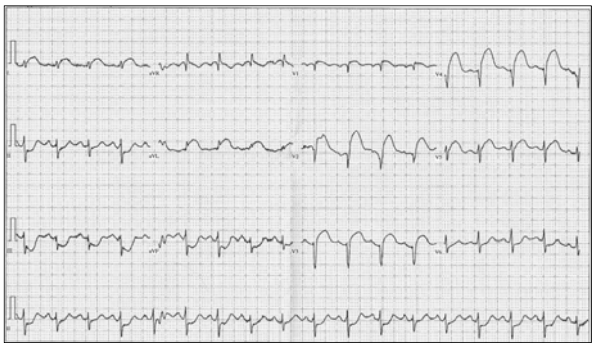
- **Let the history and physical examination guide the decision about imaging**
- **Increasingly many options and difficult to apply the available literature to the patient sitting in front of you:**
  - ✓ **CT coronary angiogram with calcium scoring**
  - ✓ **Cardiac MRI with vasodilator stress**
  - ✓ **80 lead ECG vest with regional pain mapping**

Acute Coronary Syndrome

Acute Coronary Syndrome

- **ECG:**
  - ✓ **You can classify the ECG based on ACC/AHA guidelines:**
    - **STEMI**
    - **NSTEMI/high risk unstable angina**
    - **Non-diagnostic**
  - ✓ **The ECG is a slice in time only:**
    - **Serial ECG's recommended, especially if the patient's symptoms change**

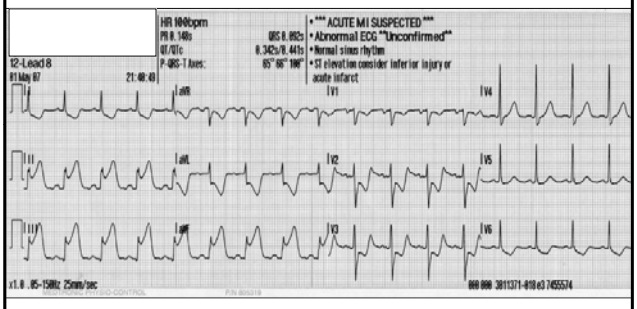
LAD STEMI



Acute Coronary Syndrome

- **ECG**
  - ✓ **Normal ECG does not rule out ACS**
    - **A circumflex MI may be ECG-"silent"**
  - ✓ **Review AMI ECGs and anatomic lesions:**
    - **Anterior = LAD**
    - **Lateral = Circumflex, diagonal**
    - **Anterolateral = LAD or Left Main**
    - **Inferior = RCA (90%), Circumflex (10%)**
    - **Posterior = Usually RCA; associated with inferior, lateral AMI**

Inferior STEMI



Acute Coronary Syndrome

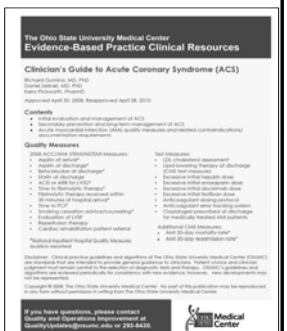
- **LEVEL 1: ST ELEVATION MI (STEMI)**
  - ✓ **ST-segment elevation or presumed new LBBB is characterized by ST-segment elevation 1 mm in 2 or more contiguous pre-cordial leads or 2 or more adjacent limb leads.**
- **LEVEL 2: HIGH RISK UA/NON-ST ELEVATION MI (NSTEMI)**
  - ✓ **Ischemic ST-segment depression 0.5 mm or dynamic T-wave inversion with pain or discomfort. Transient ST- segment elevation 0.5 mm for 20 minutes is also included in this category.**
- **LEVEL 3: INTERMEDIATE OR LOW RISK UA**
  - ✓ **Normal or non-diagnostic changes in ST segment or T waves are inconclusive and require further risk stratification. This classification includes patients with normal ECGs and those with ST-segment deviation of 0.5 mm or T-wave inversion. Serial cardiac studies (and functional testing) are appropriate.**

Acute Coronary Syndrome

- **Cardiac Marker Summary:**
  - ✓ **No marker is 100% sensitive all the time**
  - ✓ **Troponin is the gold standard for AMI diagnosis**
  - ✓ **Patients with positive markers have distinctly higher all cause morbidity and mortality in the literature**
  - ✓ **Cardiac marker analysis should not delay coronary intervention in high risk patients (STEMI)**

Clinician's Guide to ACS

- **Imperative to follow some sort of evidence based strategy for acute coronary syndrome.**
- **Lots of literature to guide practice, but hard to keep up with.**
- **Algorithmic approach that standardizes care and minimized practice deviation.**


The Ohio State University Medical Center
Evidence-Based Practice Clinical Resources

Clinician's Guide to Acute Coronary Syndrome (ACS)

Contents

Quality Measures

Acute Coronary Syndrome

- **Non-Invasive Testing:**
  - ✓ **Numerous studies show the prognostic value of stress testing to help risk stratify chest pain patients**
    - **Negative stress**
      - **2% with MACE at 6 month**
    - **Positive or inconclusive stress**
      - **17% with MACE**
    - **Combining treadmill or pharmacologic stress with nuclear imaging or echocardiography greatly increases sensitivity.**
      - **Modality less important than timing of testing**
      - **Testing is more sensitive if patient actually having symptoms at the time of testing**

Acute Coronary Syndrome

- **CT Coronary Angiogram:**
  - ✓ **In setting of acute chest pain, pt should be low risk**
  - ✓ **Non-inferior to stress nuclear imaging in low risk ED chest pain patients:**
    - **Stress nuclear imaging:**
      - **Sensitivity=71%, Specificity=90%, NPV=97%**
    - **Multidetector CT:**
      - **Sensitivity=86%, Specificity=92%, NPV=99%**
  - ✓ **What's the physiological significance of lesions it finds?**
  - ✓ **Radiation exposure and cost for low risk patients?**

Acute Coronary Syndrome

- **Treatment:**
  - ✓ **Protocol based diagnostic and treatment algorithm:**
    - **IV, Oxygen, Cardiac Monitor (or call 911)**
    - **CXR, cardiac markers, other labs**
    - **ASA (if they have a chest, given them ASA)**
      - **Chewed, 162-325 mg unless taken**
      - **Clopidogrel if true ASA allergy**

Acute Coronary Syndrome

- **Cardiac Catheterization:**
  - ✓ **Considered the gold standard for ACS diagnosis**
    - **Anatomical and functional assessment**
    - **Can fix what you find (PCI)**
    - **Variability in lesion designation (visual assessment)**
    - **Some centers now using IV ultrasound to look at plaque stability**
  - ✓ **Complications**
    - **ATN from IV dye load**
    - **Bleeding (groin hematoma, RP bleed)**
    - **Pseudoaneurysm**

Acute Coronary Syndrome

- **Treatment**
  - ✓ **Nitroglycerin**
    - **0.4 mg SL q 5 min X 3**
    - **IV drip if needed for CP, HTN, CHF**
    - **Not if BP <90, HR <50, RV MI**
  - ✓ **Beta Blocker**
    - **Should be used, but timing?**
  - ✓ **Morphine**
    - **Should it be used?**
  - ✓ **Others**
    - **ACE, statin important, but not acutely**

Acute Coronary Syndrome

- **Treatment**
  - ✓ **Anticoagulation**
    - **Anticoagulate high risk ACS patients aggressively**
      - **Don't give high risk therapies to low risk groups**
      - **Know local practices, but remember that guidelines are increasingly national and expected**
    - **Positive troponin and ECG changes should get**
      - **ASA**
      - **Heparin/LMWH**
      - **Clopidogrel**
      - **Glycoprotein IIb/IIIa Inhibitor**

Cocaine Associated Chest Pain

- **Very common in the ED patient population**
- **Acute intoxication causes vasospasm, inflammatory mediator release, platelet aggregation**
- **ACS can result**
- **Treatment = routine ACS + lorazepam**
  - ✓ **<u>Exception</u> = concern over use of beta blockers – this may worsen vasoconstriction and hypertension**
- **Conservative management in most cases**

Acute Coronary Syndrome

- **ACS Treatment Summary**
  - ✓ **STEMI**
    - **ASA, NTG, B-blocker, UFH/LMWH, Clopidogrel, IIb/IIIa Inhibitor**
    - **Thrombolytics or PCI**
    - **Disposition = ICU**
  - ✓ **NSTEMI/High Risk UA**
    - **ASA, NTG, B-blocker, UFH/LMWH, Clopidogrel, IIb/IIIa Inhibitor**
    - **Disposition = ICU**
  - ✓ **Some Risk for UA**
    - **ASA, NTG, +/- on B-blocker**
    - **Disposition: Floor telemetry admission vs. short stay unit (depends on local resources)**

Pulmonary Embolism

Pulmonary Embolism

- **Diagnostic:**
  - ✓ **Physical exam is unreliable**
    - **Hohman's sign**
  - ✓ **Symptoms from HPI helpful like dyspnea, rapid heart rate, palpitations, pleurisy, hemoptysis, calf pain, etc.**
  - ✓ **Literature strongly supports some type of structured pre-test probability assessment**
    - **Well's Criteria**
    - **Charlotte Rule**

Pulmonary Embolism

- **Diagnostic:**
  - ✓ **DVT**
    - **Duplex Ultrasonography**
      - **Non-invasive and first line**
      - **More sensitive proximally**
      - **Serial exams necessary?**
      - **Availability**
    - **Venography**
      - **Gold standard (does anyone do this?)**
      - **CTV often combined with CTA**

Pulmonary Embolism

- **D-dimer:**
  - ✓ **Helpful for the assessment of PE**
  - ✓ **ELISA test preferred; know your lab assay**
  - ✓ **Excellent sensitivity, but poor specificity**
  - ✓ **Need to combine d-dimer testing with some assessment of pre-test probability**
  - ✓ **Low or moderate pre-test probability and negative ELISA d-dimer, means you have excluded to the limits of testing**
  - ✓ **If positive d-dimer, need to follow up with further definitive test like VQ scan or CTPA to exclude disease**

Pulmonary Embolism

- **Diagnostic:**
  - ✓ **PE**
    - **VQ Scan – have to do structured PTP assessment**
      - **PIOPED I**
      - **Low PTP and normal or very low prob = essentially rules out PE**
      - **High PTP and high prob = rule in PE**
      - **Anything else needs further testing**
    - **CT scan – high quality scanner and radiologist**
      - **PIOPED II**
      - **Study of choice; often gives alternative diagnosis**
      - **Literature unclear what to do with negative CTA when you have a high PTP**

Pulmonary Embolism

- **Diagnostic:**
  - ✓ **PE**
    - **CT Scan**
      - –**Can increase sensitivity if combining CTA with CT venography**
      - –**Helps define pelvic vein VTE, and can catch proximal femoral DVT**
    - **Pulmonary Angiography**
      - –**Gold standard**
      - –**Not available**
      - –**Not trivial morbidity**

Aortic Dissection

Pulmonary Embolism

- **Treatment:**
  - ✓ **Anticoagulate with UFH or LMWH**
    - **LMWH superior for treatment of DVT**
    - **Unclear about PE; safe to use, but many still start with UFH**
  - ✓ **IVC filter to prevent further clot in those with contra-indications to anticoagulation**
  - ✓ **Thrombolytics or surgical embolectomy for massive PE and hemodynamic instability**
    - **Immediate consultation with ICU and cardiothoracic surgery if available**

Aortic Dissection

- **Path:**
  - ✓ **Sheer stress leads to intimal tear**
  - ✓ **Risk factors:**
    - **Hypertension (most common)**
    - **Trauma**
    - **Pregnancy**
    - **Coarctation**
    - **Bicuspid AV**
    - **High potency stimulants**
    - **Syphilis**

Aortic Dissection

Stanford

- Type A
  - ✓ Any involvement of ascending aorta
- Type B
  - ✓ Limited to descending aorta

DeBakey

- Type I
  - ✓ Ascending and descending aorta
- Type II
  - ✓ Ascending only
- Type III
  - ✓ Descending only

Aortic Dissection

- Diagnostic:
  - ✓ ECG
    - Beware AMI mimic; beware anticoagulation
  - ✓ CXR
    - More helpful in trauma; normal CXR not sensitive enough to rule out the diagnosis
    - Review classic findings in trauma
  - ✓ CT scan with IV contrast
    - Study of choice in stable patient

Aortic Dissection

- Clinical:
  - ✓ Sudden onset of intense, ripping, tearing pain that often is in the chest radiating to the back or abdomen (suspect when pain above and below diaphragm)
  - ✓ Absent pulses, discrepancy in UE/LE BP, ischemic limb
  - ✓ New murmur of AR
  - ✓ Cardiac tamponade
  - ✓ Neuro symptoms like CVA, syncope, cauda equina syndrome
  - ✓ Mesenteric ischemia

Aortic Dissection

- Diagnostic:
  - ✓ Conventional angiography
    - Gold standard, but not readily available
    - Being supplanted by CTA
  - ✓ Echocardiography
    - TTE helpful to rule out complications but not great sensitivity
    - TEE is the test of choice for unstable patient; often done perioperatively
    - Dubious availability even with cardiology back up

Aortic Dissection

- **Treatment:**
  - ✓ **Close HD monitoring; arterial line**
  - ✓ **Control BP (<120 SBP) and HR (<60)**
    - **Beta blockers are mainstay**
    - **Prevent sheer stress and further tear**
    - **Classic combination is esmolol and nitroprusside**
  - ✓ **Classic dictum of Stanford A managed surgically and Stanford B managed medically**
    - **Blurred with new stent grafts and PCI?**

Pneumothoraxic

- **Sudden onset of sharp unilateral chest pain**
- **Traumatic usually obvious by history and part of standard trauma evaluation**
- **Spontaneous 1:13,000; 6x more common in young males**
- **Treatment depends on size:**
  - ✓ **Observation**
  - ✓ **Small lumen catheters**
  - ✓ **Heimlich valves**
  - ✓ **Traditional tube thoracostomy for all larger PTX**

Pneumothorax

Esophageal Rupture

Esophageal Rupture (Boerhaave's Syndrome)

- History is usually protracted vomiting, followed by severe chest pain and dysphagia:
  - ✓ Constant pain; usually much worse with swallowing
  - ✓ Dsypnea also common
  - ✓ If late presentation, patients are critically ill
  - ✓ Commonly described in alcoholics
  - ✓ 92% iatrogenic or trauma, 8% spontaneous
- Hammond's Crunch:
  - ✓ cellophane sound of mediastinum due to SQ emphysema
- Pneumomediastinum, Left pleural effusion
- Gastrograffin swallow, CT, antibiotics, OR, ICU

Mitral Valve Prolapse

- Path
  - ✓ Familial incidence
  - ✓ Increased risk of dysrhythmia, endocarditis, sudden death
- Clinical
  - ✓ Atypical chest pain and palpitations; advanced disease leads to MVR
- Treatment
  - ✓ Beta blockers help for atypical chest pain and palpitations

Valvular Heart Disease

Aortic Stenosis

- Path
  - ✓ <65 = rheumatic HD and congenital bicuspid
  - ✓ >65 = calcifications
  - ✓ Obstruction of LV outflow track lead to CHF and sudden death
- Clinical
  - ✓ Classic triad of angina, dyspnea, and syncope
  - ✓ Harsh murmur with radiation to carotids
- Treatment
  - ✓ Extreme caution with preload/afterload reduction (get help with acutely decompensated patients)
  - ✓ Valvuloplasty stabilizing, replacement definitive

Pericarditis

Pericarditis

- Clinical
  - ✓ Sharp, stabbing, pleuritic CP
  - ✓ Worse with supine, better when sitting up
  - ✓ Friction rub (classic) but usual transient and difficult to ascultate
  - ✓ Viral symptoms (low grade fever, malaise, URI symptoms)
  - ✓ Usually tachycardic

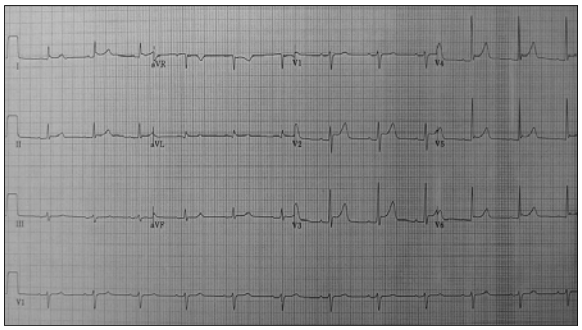
Pericarditis

- Path
  - ✓ Idiopathic (most common)
  - ✓ Infectious (viral, TB was classic cause)
  - ✓ Malignancy (lung and breast)
  - ✓ Drug induced (procainamide, hydralazine)
  - ✓ Post radiation
  - ✓ Post MI (Dressler's syndrome)
  - ✓ Uremia
  - ✓ Connective tissues (RA, lupus)

Pericarditis

- ECG
  - ✓ Electrical alternans with big effusions
  - ✓ First stage = ST elevation, PR depression
  - ✓ Second stage = ST isoelectric
  - ✓ Third stage = T wave inversion
  - ✓ Fourth stage = resolution
  - ✓ BEWARE OF MIMIC TO AMI!
- CXR
  - ✓ Limited value (alternative diagnosis)
  - ✓ With acute effusion can have normal silhouette

Pericarditis



http://en.wikipedia.org/wiki/File:PericarditisECG.JPG

Pericarditis

- Treatment
  - ✓ NSAIDs unless contra-indicated
  - ✓ Not steroids in most cases
  - ✓ Recent studies show colchicine helpful
  - ✓ Pericardiocentesis or pericardial window for tamponade
- Disposition
  - ✓ Depends
  - ✓ Classically outpatient management

Pericarditis

- Diagnostic
  - ✓ Echocardiogram
    - Everyone with pericarditis eventually needs this to rule out significant effusion
    - Tamponade is associated with right heart diastolic collapse
    - Remember that tamponade is a clinical diagnosis (muffled heart sounds, hypotension, JVD)
  - ✓ Lab tests
    - Somewhat dependent on suspicion of etiology
    - Cardiac markers? Can have small troponin leak
    - ESR and CRP are non-specific but usually elevated

Myocarditis

- Path
  - ✓ Inflammation of heart muscle
  - ✓ Broad range of etiologies
  - ✓ Most common etiology in U.S. is viral (enteroviruses and echoviruses)
  - ✓ Most common worldwide is parasitic
  - ✓ Often mixed pericarditis and myocarditis picture

Myocarditis

- Clinical
  - ✓ Cardiac symptoms 7-14 days following viral illness (URI or GE)
  - ✓ CP reflects pericardial irritation
  - ✓ Fatigue, DOE
  - ✓ Fever, tachycardia out of proportion to fever
  - ✓ CHF and pulmonary edema in severe cases

Myocarditis

- Treatment
  - ✓ Primarily supportive and monitoring for complications
  - ✓ Antimicrobials if appropriate for infectious etiology
  - ✓ Steroids, IVIG, and antiviral agents are all controversial
  - ✓ Treatment of heart failure if present
  - ✓ LVAD and cardiac transplantation in severe cases

Myocarditis

- Diagnostic
  - ✓ ECG
    - Sinus tach, dysrhythmias, acute LVH
  - ✓ CXR
    - cardiomegaly
  - ✓ Echo
    - Best single test; also evaluates for complications like pericardial effusion
    - Many centers now using cardiac MRI
  - ✓ Lab tests
    - Often elevated cardiac markers
    - ESR and CRP usually elevated, but non-specific

Other Etiologies of Chest Pain

Hypertension

- Significant hypertension in conjunction with hypertensive heart disease can manifest at chest pain
- This is alleviated with reduction of blood pressure
- It is important to exclude co-existing coronary artery disease in these patients as presentation may be very similar
- Patients with HTN and diastolic dysfunction are prone to chest pain when blood pressure is uncontrolled

GERD / Esophagitis

- Things to remember:
  - ✓ Do NOT assume chest pain is from GERD in a patient with a history of GI complaints
  - ✓ Urgent / life-threatening causes MUST be excluded first
  - ✓ Do NOT assume pain relief from Maalox, GI cocktail, etc, correlates to a GI cause of the pain
    - This is similar to reproducible chest pain – it may <u>still</u> be from coronary ischemia / angina

GERD / Esophagitis

- A not entirely uncommon manifestation of GERD is atypical chest pain
- Depending on the person, rather than classic "heartburn," "chest pain" may be the presenting symptom
- Something to consider once more worrisome chest pain causes are excluded and to clinically correlate with overall presentation
- Consideration for empiric therapy and EGD/GI evaluation

Esophageal Spasm

- This is a somewhat controversial entity in regards to correlation with chest pain
- Occasional correlation between evaluation with manometry and chest pain
- Occasional relief with calcium channel blockers
- This is a difficult diagnosis to evaluate and should be done in conjunction with gastroenterology in the appropriately selected patient population

Costochondritis

- **Inflammation of the cartilage at the rib/sternum junction**
- **More common in women than men**
- **“Tietze’s syndrome” if significant inflammation at the rib/sternum cartilaginous region with possible overlying erythema**
- **Diagnosis is clinical with tenderness to palpation seen**
- **It is important to know that angina can have reproducible chest wall pain and distinguishing these two conditions is imperative**
- **Treatment is supportive and with NSAIDs**