Chest Pain: Refine Your Examination Skills and Differential Diagnosis

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"He’s complaining of chest pain, shortness of breath, cramps and dizziness. Do you see any Liga?"

Objectives

Upon completion of this program the learner will be able to:

1. Discriminate pertinent diagnostic points during the subjective data collection when interviewing and assessing the chest pain patient.
2. Identify objective data, including key signs and physical findings when assessing chest pain.
3. Differentiate various types of chest pain and offer treatment options in the management of each potential diagnosis.

Considerations When forming your Differential Diagnosis

Structures/organs to consider:

- Heart
- Aorta
- Vascular system
- Lungs and Diaphragm
- Esophagus and Stomach
- Liver
- Rib Cage
- Muscular Skeletal System
- Soft Tissue
- Nerves

Consider special populations:

- Diabetics
- Previous cardiac interventions or surgery
- Children
- Elderly

Back to Basics: a reminder of Anatomy

The Heart as a Pump: The Cardiac Cycle of Systole and Diastole

Ventricular Systole: the ventricles contract
- Mitral and Tricuspid valves close producing S1
- The right ventricle pumps blood into the pulmonary arteries (pulmonic valve is open)
- The left ventricle pumps blood into the aorta (aortic valve is open)

Ventricular Diastole: the ventricles relax
- Aortic and Pulmonic valves close producing S2
- Blood flows from the right atrium → right ventricle (tricuspid valve is open)
- Blood flows from the left atrium → left ventricle (mitral valve is open)

The Plumbing: The Left Coronary Arteries

The Left Main

- LAD- Left Anterior Descending
  - Diagonal branches
  - Supplies the walls of both ventricles and septum

- Circumflex
  - Atroventricular branch
  - Lateral
  - Posterior lateral branches
  - Supplies the walls of the left atrium and lateral wall of the left ventricle
  - Also may supply the SA and AV node (if not supplied by RCA)
The Plumbing: The Right Coronary Arteries

Right Coronary Artery (RCA)
- Branch to the SA Node
- Marginal branches
- Branch to the AV Node
- Branches to the left ventricle
- Posterior Descending Artery

RCA Supplies the Right Atrium, Right Ventricle, SA node and some of the AV node.

The RCA can be Dominant or Non-Dominant.

The Electrical System

ECG and Rhythm strip:
- ST Elevation
- ST Depression
- Presence of a Q wave
- Changes in T waves
- Arrhythmias

Note: Electrocardiograms may also be normal or nonspecific in some cardiac conditions, eg: left circumflex occlusion often shows normal ECG

Refining your Subjective Data Skills

First Tip: Try to Enter the room with an open mind, and without other healthcare workers opinion in your thoughts, as it can guide your process. Clear all thoughts of pre-diagnosing; EG: the nurses report, or the family members “diagnosis”

Asking the right questions: Example:
- Start with Location and Type of chest pain
- “Point with one finger”
- What does the pain feel like?
- Answer: (in the patients words)
  - Sharp pain in the center of my chest
  - Dull ache under my left arm
  - Burning in my upper chest
- This response helps you prioritize your actions

Subjective Data Collection

Interviewing the Patient

- Ascertain the whole story (seems there is always a piece missing)
- It helps to be guided by an organizational tool
- Such as SOAP notes, or similar
- HPI: History of Present Illness is so important
- Get a Description of event – prior, during and after onset of pain or symptoms
- Consider using a tool to help guide your questions:
  - OLDCART, Seven attributes, PQRST

L.O.C.A.T.E.

L = Location/Radiation
- Pinpoint the position:
  - Exact location in chest, neck, back, or arm
- Does the pain radiate? if so, where?
  - Arms, neck, jaw, teeth, back stomach, shoulder?
- Use anatomical landmarks to describe the exact location
  - Eg: 5th intercostal space, midclavicular line

O = Onset and Duration
- Exact time of the chest pain onset
- Was it gradual or acute?
- When does it occur?
  - Time of day or during what activity
  - Is onset associated with food, work, exercise?
  - What was the patient doing at the time of onset?
- How long does it last?
- Does it change? Move?
- Does it Increase or decrease in intensity?
L.O.C.A.T.E.

C = Character
- Ask the patient to describe the character, (they may need help with descriptive words)
  - Sharp
  - Dull
  - Aching
  - Burning
  - Pressure
  - Heaviness
  - Stabbing
  - Sharp
  - Tightness
  - Cramp
- Assess a pain scale (0-10), scoring it both now and also when the pain started.

L.O.C.A.T.E.

A = Associated symptoms
- Nausea
- Vomiting
- Dizziness
- Shortness of breath
- Palpitations
- Fatigue
- Edema
- Dizziness
- Shortness of breath
- Fatigue
- Check for symptoms of Muscular-skeletal pain
- Check for vague symptoms, especially in females, such as sleep pattern changes

L.O.C.A.T.E.

T = Treatment
- What has the patient tried to do or use to relieve the pain: Both this time and in the past
  - OTC medications (eg: tums, pepcid, tylenol, ASA)
  - Herbal remedies, Self Rx: recreational drugs,
  - Rest/Stopped activity associated with the pain
  - Breathing techniques
  - Meditation/relaxation/stretching exercises/
  - Heat or Ice
  - Alcohol/Tobacco/Drug of choice
- Did this treatment work?

L.O.C.A.T.E.

E = Eliminates/Aggravates
- What eliminates the pain?
- What aggravates or instigates the pain?
  - Movement
  - Deep Respirations or coughing
  - Eating
  - Does food alleviate or aggravate the pain?
  - Is the pain changed by leaning forward?

Interviewing the Patient

Past History:
- Medical diagnosis
- Hospitalizations
- Surgical procedures

Medication:
- Prescription
- Over the Counter (OTC)
- Herbal remedies

Allergies:
- Both to medications and environmental

Exposures:
- Chemical, infectious, environmental

Personal and Social History
- Smoke/tobacco use: How much?
- Alcohol: How much and what?
- Street Drugs: Drug of choice and frequency of use (especially cocaine)
- Diet: Dietary patterns, salt intake, cholesterol, caffeine
- Exercise: Regular? Never? Strenuous work outs?
- Other social factors to consider:
  - Stress
  - Safety, Dangerous behaviors
  - Sexual History (eg: used ED med for before CP started)
  - Travel: Out of the country, exposed to TB?
  - Had recent immunizations?
Interviewing the Patient

- **Family History**
  - Immediate family
  - Mother, father, siblings, grandparents
  - History of similar symptoms
  - History of Cardiac disease/surgery or ACS
  - Risk factors like DM, HTN, Hyperlipidemia

- **Review of Systems**
  - Usually done while performing the physical exam.
  - Is a systematic approach to the patients symptoms
  - Is usually documented separately to the physical exam as it is still subjective data.

Tips on Subjective Data Collection

- Develop rapport with your patient:
  - Attitude, your greeting, eye contact
  - “People don’t care how much you know until they know how much you care” (Dale Carnegie)

- Use of lay language-avoid medical jargon

- English proficiency of the patient

- Try to be concise with your questions and confident in your abilities (not wishy washy!)

- Try not to act surprised by some of the answers that you may receive to your questions

Objective Data

- **Physical Assessment**
  - **Head to Toe Assessment (focus on pain sites)**
    - Airway and Lung Assessment
    - Thorough Chest Examination
  - **Vital Signs**
  - **ECG and rhythm strip**
  - **Radiology**
  - **Lab Results**
  - **Other Test Results**
    - Sometimes dependent on access to facilities

Physical Assessment

- **Chest Assessment:**
  - **Inspection**
    - General visual inspection of the chest and thorax
  - **Palpation**
    - Includes pulses
  - **Percussion**
    - not often performed on the chest wall since radiology methods now show size of heart
  - **Auscultation**
    - Heart sounds

Inspection of Chest Wall

- Inspect the chest wall, keeping landmarks in mind
- Look for abnormalities in the chest wall
- Observe skin color, varicosities, angiomas, scars
- Look for pulsations

Palpating the Chest Wall

- Using the finger pads, palpate for heaves or lifts from abnormal ventricular movements
- Using the ball of the hand, palpate for thrills - turbulence transmitted by a damaged heart valve
- Palpate the chest wall over the aortic, pulmonic, Tricuspid, Mitra (apical)
- Palpate PMI to evaluation size of heart

Note palpation is felt in seated position, or slightly leaning forward
Assessment of the Heart

- **Distinguish S1 from S2**
  - S1 - louder at the apex
  - S2 - louder at the base

- **Areas to listen:**
  - Aortic: 2nd right ICS
  - Pulmonic: 2nd left ICS
  - Tricuspid: lower left sternal border 4th ICS
  - Mitral: Mid clavicular line and 5th ICS (apex)

Heart Sounds

- **S1 (beginning of systole)**
  Occurs with the closure of AV valves - Tricuspid and Mitral

- **S2 (end of systole/Beginning of Diastole)**
  Occurs with closure of the semi-lunar valves - Aortic and Pulmonic

**Split S2**
- Closure of the Aortic valve A2 occurring followed by the closure of the Pulmonic valve P2
- Ventricular pressure is higher in the left than the right
- Left sided events may occur sooner than right

Splitting of Heart Sounds

- **S3 (early diastole) should not be audible**
  - S3 - Heard just after S2
  - Turbulent blood flow
  - May be normal in pregnancy and kids
    - Early sign of fluid overload

- **S4 (end diastole) should not be audible**
  - S4 - Heard just before S1
  - Ventricles resistant to filling, R/T to weak ventricles
  - Always pathologic

Heart Sounds

- Listen carefully both sitting and supine
- Listen in all 4 positions with both the diaphragm and then with the bell
  - Murmurs are heard best with the diaphragm
  - S3 and S4 are heard better with the bell
- Consider: Turn your patient to left lateral using bell: for low rumble of mitral stenosis. It also accentuates S3 or S4 (especially if the patient is obese)
- Don't press your stethoscope too hard. When pressing the bell too hard it becomes a diaphragm
- If you only have a diaphragm: press firm for diaphragm and lightly for the bell (review with stethoscope manufacturer)
Heart Murmurs

If you detect a heart murmur, listen for its:

- **Timing**
  - Systolic between S1 and S2
  - Diastolic between S2 and S1
- **Location of maximal intensity**
- **Radiation or transmission from the point of maximum intensity**
- **Pitch** - high, medium, low
- **Quality** - blowing, harsh, rumbling, and musical
- **Intensity** (Grade it 1-6 for systolic murmurs)

Intensity Grading

- Grade 1 or I/VI – Barely audible
- Grade 2 or II/VI – Quiet but audible (to the ear that is familiar with murmurs)
- Grade 3 or III/VI – Moderate
- Grade 4 or IV/VI – Loud (you should be able to hear this one)
- Grade 5 or V/VI – Loud with a palpable thrill
- Grade 6 or VI/VI – Very Loud, heard with stethoscope almost off the chest wall and has a palpable and visible thrill

Murmur Assessment

- **Diastolic**
  - Diastolic murmurs usually indicate vascular heart disease
  - Systolic murmurs often occur with the heart is not diseased
- **Mid Diastolic**
  - Mitral valve prolapse (MVP) is the most common vascular abnormality
  - Affects approximately 2-6% of the USA population
- **Systolic**
  - Many patients with MVP are asymptomatic

Jugular Venous Pressure

JVP provides non-invasive information about CVP and right atrial pressure and therefore indicating volume status

Physical Assessment

Findings to be aware of during your assessment of a patient with chest pain:

- Pallor, Diaphoresis
- Tachycardia or bradycardia
- Gallop Rhythm, new murmurs or thrills
- Carotid bruits
- Jugular Venous Distention (seen in CHF and Right Ventricular Infarction)
- Other Signs of Congestive Heart Failure, including:
  - Rales on lung examination
  - S3 Gallop Rhythm

Timing | Valve | Other Reasons
--- | --- | ---
Early Diastolic | AR | Usually acquired or congenital valve abnormalities
| PR | 
Mid Diastolic | MS | Ventricular Septal Defect
| YS | Atrial Septal Defect
| Rheumatic Fever | 
Mid Systolic | AS | Aortic obstruction
| PS | Dilation of Ascending Aorta
| Dilation of Pulmonary Artery | 
Late Systolic (may have click) | MVP | Papillary muscle dysfunction
Holosystolic or pansystolic | MR | Ventricular Septal defect
| TR | 
Continuous | Patent Ductus Arteriosus
| Aortovenous Fistula |
Tips on Objective Date Collection

- Professional/personal manner
- Use the right tools
  - good stethoscope
- Proper exam technique
- Let the patient see you wash your hands
- Patient modesty and privacy
- Document as soon as you can (not to forget anything)
  - Tip: voice record details if no time to write/chart
  - Be specific

Other Objective Data to Consider

- 12 Lead EKG
- Chest X-Ray (CXR)
- Blood tests (lab to consider)
- CT or MRI
- Echocardiography
- Stress Testing (Exercise or pharmacological), with or without Radionuclide perfusion stress study
- CT (cCTA), CTA or VQ scan to R/O PE
- PET scan
- Angiography
- Transesophageal Echocardiography (TEE)

Tests depend on clinical presentation and access to tests

Other Objective Data

Cardiac Laboratory Studies

- Cardiac Enzymes (Troponin, Myoglobin CK-MB)
- Chemistry (Electrolytes)
- Lipids (At goal LDL <130 or <70 for DM, HDL >40)
- Beta Naturetic Peptide (r/o fluid overload)
- C-Reactive Protein (sign of Inflammation)
- Hematological Studies (anemia = ↓ oxygenation)
- D-Dimer (clots)
- Coagulation Studies

Other Objective Data

Coronary Risk Factors:

- History or Coronary Artery Disease
- Advanced age
- Being female
- Diabetes mellitus (DM)
- Smoker or Smoking history
- Hypertension
- Hyperlipidemia/dyslipidemia/ hypercholesterolemia
- Prior cerebrovascular accident (CVA) Stroke
- Inherited metabolic disorders
- Cocaine, Methamphetamine or any other drug use
- Occupational stress
- Connective tissue disease
- Metabolic Syndrome (insulin resistance)

Start to Differentiate Diagnosis

- Assess pain
- Start thinking of possible diagnosis
- Interview as you assess pain
  - Do not need to "sit and chat!"
  - "Time is muscle"
- Consider Coronary Risk Factors

How is the metabolic syndrome diagnosed?

- ↑ Waist circumference: ≥ 40” m, ≥ 35” f
- ↑ Triglycerides: ≥ 150 mg/dL
- ↓ HDL: ≤40 mg/dL Male
- ≤ 50 mg/dL Female
- ↑ BP: ≥ 130/85 mm Hg
- ↑ Fasting glucose: ≥ 100 mg/dL

National Cholesterol Education Program (NCEP) Adult Treatment Panel III (ATP III), The American Heart Association and the National Heart, Lung, and Blood Institute
Differentiating Chest Pains

- Acute Coronary Syndrome - Acute Myocardial Infarction
- Angina (all types)
- Costochondritic pain (Tietze’s disease)
- GERD, Reflux Esophagitis and Esophageal spasm
- Pleurisy, Pleuritis and pleural effusion
- Spontaneous Pneumothorax
- Pulmonary Embolism
- Pericarditis
- Mitral Valve Prolapse
- Aortic Dissection
- Hyperventilation syndrome or secondary hyperventilation
- Anxiety and Panic attack
- Herpes Zoster

Acute Coronary Syndrome

Spectrum of clinical presentations with and without ST changes

- ST-segment elevation myocardial infarction (STEMI)
- Non-ST-segment elevation myocardial infarction (NSTEMI)
- Unstable Angina
- Associated with rupture of an atherosclerotic plaque and partial or complete thrombosis of the infarct-related artery

Acute Myocardial Infarction

Presentation/Symptoms:

- Chest pain or pressure is usually intense
- May also be diffuse and radiate to shoulders, neck jaw and arms.
- Pain lasts greater than 20 minutes
- Pain is not completely relieved by palliative measures
- Rest
- Nitroglycerin (3 consecutive doses)
- Pain is often accompanied by other systemic symptoms
- Nausea
- Dyspnea
- Diaphoresis
- A sense of impending doom may be present. (Bad sign!)
- Notes: Consider coronary risk factors:

Acute Myocardial Infarction

Assessment Findings

- 12 lead ECG (grouped)
- ST elevations (>2mm)
- Q waves
- T Wave Changes
- May have reciprocal changes
- Arrhythmias may occur
- Ventricular arrhythmias, PVC’s, AV blocks

- 12 Lead ECG should be done within the first 10 minutes of arrival (Antman et al)

AMI - EKG Findings

Example of an EKG with Grouping of the ST Elevations

Acute Anteroseptal MI
ST > 2mm Anterior leads with Q waves
Acute Myocardial Infarction

Diagnostic Tools

- Serologic markers/ Cardiac Enzymes
  - Myoglobin
  - Troponin
  - CPK-MB
- Radiology Testing
  - CXR

Graph from Merck.com

Acute Myocardial Infarction

Treatments:

- Percutaneous Coronary Intervention (PCI)
  - Followed by glycoprotein IIa/IIIb inhibitor
- If No PCI available - urgent thrombolysis (TPA/Retivase) and transfer for PCI
- Other therapies include:
  - Oxygen
  - Aspirin - 160-325 mg of non-enteric coated aspirin to chew and swallow
  - Low molecular weight heparin (Lovenox)
  - Beta Blockers
  - Nitrates and Morphine for relief of chest pain

LAD Blockage

Common Options in the Cath Lab

- Balloon Angioplasty
- Coronary Stenting

Angina

Presentation/Symptoms:

- Chest pressure or heaviness that may radiate (neck/back/jaw)
- Atypical Angina Sx – Abdominal pain, gas/bloating, dyspnea
- Usually induced by exertion, activity or psychological stress
- Relieved by rest or nitrates
- Patient often has cardiac history and coronary risk factors

Tests and Assessment Findings:

- EKG
  - May have ECG Changes (Q waves, ST, T changes)
  - Previous EKG is very useful
  - Consider previous damage
  - May have arrhythmias (more commonly by history)
- Echocardiogram
  - Useful to establish EF may be helpful in choosing medications
- Serum
  - There should be no elevation of cardiac enzymes
  - Correct any electrolyte imbalances
### Angina

**Treatment**
- **Oxygen**
- **Continuous cardiac monitoring**
- **Aspirin - 160-325 mg**
- **Nitrate and morphine to relieve chest pain**
- **Clopidogrel (Plavix)**
- **Anticoagulant/Low molecular weight heparin**
- **Beta blockers or calcium channel blockers**
- **Glycoprotein IIa/IIIb inhibitor**
- **Cath Lab – PCI – within 24-48 hours**
- Depending on severity, last PCI and risk, patients may be treated conservatively or invasively

### Differentiating AMI From Angina Based on Clinical Presentation

- Chest Pain of AMI and of Angina are similar, with some subtle differences:
  - **AMI** is usually more intense than Angina
  - **AMI** is usually more persistent than Angina (>20-30 minutes)
  - **AMI** is often accompanied by systemic symptoms
    - **Nausea**
    - **Sweating**
    - **Apprehension**
  - **AMI** is not fully relieved by palliative measures
    - **Rest**
    - **Nitroglycerin (3 consecutive doses)**
  - **ECG and serial cardiac enzymes may be needed**

### Costochondritis pain (Tietze’s disease)

**Presentation/Symptoms**
- Usually involves multiple locations
- Usually reproduced with palpation or respiratory movement (deep breath or cough)
- Consider traumatic causes

**Tests and Assessment Findings**
- Pain on palpation or deep inspiration
- EKG and CXR Negative

**Treatments**
- Heat often provides relief
- Usually relieved with long term anti-inflammatory medications; but may take months to be fully relieved

### GERD, Reflux Esophagitis and Esophageal spasm

**Presentation/Symptoms**
- May have mid-chest pressure
- Often accompanied with:
  - **Coughing, choking sensation**
  - **Acid taste in throat**
  - **Heartburn**
  - **Sore throat or voice changes**
- Usually postprandial

**Tests and Assessment Findings**
- May be worse in recumbent position, but also while straining, like angina pectoris.
- **EGD will determine true cause (esophageal damage, varacies, stricture, ulcers etc)**
- **No EKG changes**

**Treatments**
- Usually relieved with ant-acids, H2 blockers or PPI
- Be aware that nitrates can also relieve this pain and can make differentiation with angina difficult

### GERD, Reflux Esophagitis and Esophageal spasm

**Presentation/Symptoms**
- Chest pain usually sharp/retrosternal, stabbing, or burning
- Usually Sudden onset
- Pain often with coughing, deep breathing, or lying down.
- Pain can radiate to trapezial ridge
- Pain is often diminished by leaning forward shallow breathing or remaining still.
- Pericardial pain can last for hours or days
- It is not relieved by nitroglycerin, but can be relieved with NSAID’s

### Pericarditis

**Presentation**
- Chest pain usually sharp/retrosternal, stabbing, or burning
- Usually Sudden onset
- Pain often with coughing, deep breathing, or lying down.
- Pain can radiate to trapezial ridge
- Pain is often diminished by leaning forward shallow breathing or remaining still.
- Pericardial pain can last for hours or days
- It is not relieved by nitroglycerin, but can be relieved with NSAID’s
**Pericarditis**

**Tests and Assessment Findings:**
- There may be a pericardial friction rub (best heard with the diaphragm placed over the lower mid sternal edge)
- EKG may have ST elevation in multiple leads, or may be unusually grouped and with no reciprocal ST changes
- Arrhythmias (eg SVT)
- There may be a PMH of viral illness, immunological disorders, connective tissue diseases, neoplasms, renal failure, AMI (Dressler’s Syndrome), radiation or drugs
- There may be a fever
- Endocardiogram is useful
- May require a endomyocardial biopsy for a definitive positive diagnosis

**EKG Changes in Pericarditis**

**Treatment:**
- Treated with NSAIDS, often long term
- Rare occasions may require steroids
- If pericardial effusion occurs, may need a pericardiocentesis

**Mitral Valve Prolapse**

**Presenting Symptoms:**
- Atypical chest pain
- Anxiety, Panic attacks
- Palpitations, Arrhythmias
- Exercise intolerance and Fatigue
- Orthostasis
- Syncope or presyncope

**Testing and Assessment:**
- Mid-systolic click and/or a mid-to-late systolic murmur
- Echocardiography
- Stress test can help identify arrhythmias

**Pleurisy, Pleuritis and Pleural Effusion**

**Presentation/Symptoms:**
- Sharp chest pain, Increases with breathing, coughing or movement
- Dyspnea, Cough and sometimes splinting
- Note: Pleuritis is a common cause of stabbing pain and is usually preceded by a prolonged cough

**Tests and Assessment Findings:**
- Consider pleural effusion for diminished breath sounds, dullness to percussion or pleural rub
- Chest X-ray will assist diagnosis
Pleurisy, Pleuritis and Pleural Effusion

**Treatments:**
- Lying on the affected side may relieve the pain
- Maintain oxygenation
- Comfort
- Severe cases may need thoracentesis and/or Chest Tube

Pneumothorax

- May be Spontaneous, Tension, or related to trauma
- Air leaks into the pleural space
- Usually unilaterally

**Presentation:**
- Shortness of breath
- Tachypnea
- Atypical sharp chest pains

**Tests and Assessment Findings:**
- May find decreased of absent breath sounds over the pleural air and possible pleural rub
- Tracheal shift (away from pleural air)
- Confirm with CXR

**Treatments:**
- Tripod position to assist breathing
- Maintain oxygenation
- Comfort
- Thoracentesis and/or Chest Tube

Pulmonary Embolism

**Presenting Symptoms:**
- Chest Pain (atypical)
- Shortness of breath

**Consider risk factors:**
- Investigate for a history of DVT or recent DVT related symptoms
  - Unilateral swelling or pain in the legs
  - Recent surgery (within 3 months)
  - Malignancy
  - Smoker
  - Prolonged bed rest
  - Long distance traveling
  - BCP/Hormone therapy

**Tests and Assessment Findings:**
- CXR normal, No pulmonary congestion.
- Both PaO2 and PaCO2 may be decreased
- CTA
- Positive D-dimer assay
- VQ Scan
- Pulmonary angiogram

**Treatments:**
- Maintain oxygenation
- Comfort
- Anticoagulation
- Possible Embolectomy
Dissection of the aorta

Presentation:
- Usually very severe pain described as a tearing
- Center of the chest or back with changing localization
- Central Chest Pain, may Radiate to the back or neck
- Usually unaffected by position
- Patients may verbalize a “Fear of Impending Doom” (Bad sign!)
- Type A dissection sometimes obstructs the origin of the coronary artery (usually the RCA) with signs of impending inferioposterior infarction (arrhythmias)
- No relief of pain

Aortic Dissection

Tests and Assessment Findings:
- Pulses may be asymmetrical
- Heart sounds may have aortic valve regurgitation/diastolic murmur.
- There may be signs of a broad mediastinum on chest x-ray.

Treatment:
- Hemodynamic stabilization
- Surgery

Hyperventilation Syndrome or Secondary Hyperventilation

Presentation:
- Dyspnea
- Often patients are young
- May C/O Chest pain
- May complain of tingling and numbness of the limbs and/or dizziness
- Secondary hyperventilation may be attributable to an organic illness/cause;
  - Acidosis
  - Pulmonary embolism
  - Pneumothorax
  - Asthma
  - Infarction

Tests and Assessment Findings:
- ABG: PaCO2 may be decreased, PaO2 may be increased or normal.
- CXR – Normal findings

Treatment:
- Maintain oxygenation
- Comfort
- Breathing techniques
- Sedatives
- No longer recommended to breath into a paper bag

Herpes Zoster

Presentation:
- May complain of localized chest or thorax pain/paraesthesia before or during rash.
- Always look at the skin
- No ECG, CXR or lab changes

Treatment:
- Medications and topical treatments

Anxiety and Panic Attack

Presentation:
- Chest tightness or pressure
- May be accompanied by nervousness, tachycardia, tachypnea, nausea, diaphoresis, dizziness and restlessness
- Patients with depression may complain of a “continuous feeling of heaviness in the chest” with no correlation to exercise and have normal EKG findings

Tests and Assessment Findings:
- EKG, CXR and laboratory findings should be negative
- Diagnosis made through ruling out more serious findings

Treatment:
- Consider treating with SSRI, but may not see immediate effects
- Benzodiazepines will have faster results
Notes

Note: Use of "Street Drugs" can present with chest pain, need to gather history and prepare for rapid treatment. (ABCs).
- May use antidote if one exists.
- Cocaine can cause coronary spasms and advanced atherosclerosis and will need full cardiac evaluation.

Note: NTG can be a useful treatment option and sometimes used as a tool to "determine" if pain is cardiac in nature.
- It may be useful in the relief of angina
- Be careful, as it can also relieve esophageal spasms.

(Always check for recent use of Viagra, Levitra or Cialis)

Questions?

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Please see reference list for further reading and check these links for heart sound assistance
- http://www.med.umich.edu/lrc/psb/heartsounds/
- http://www.med.ucla.edu/wilkes/Systolic.htm