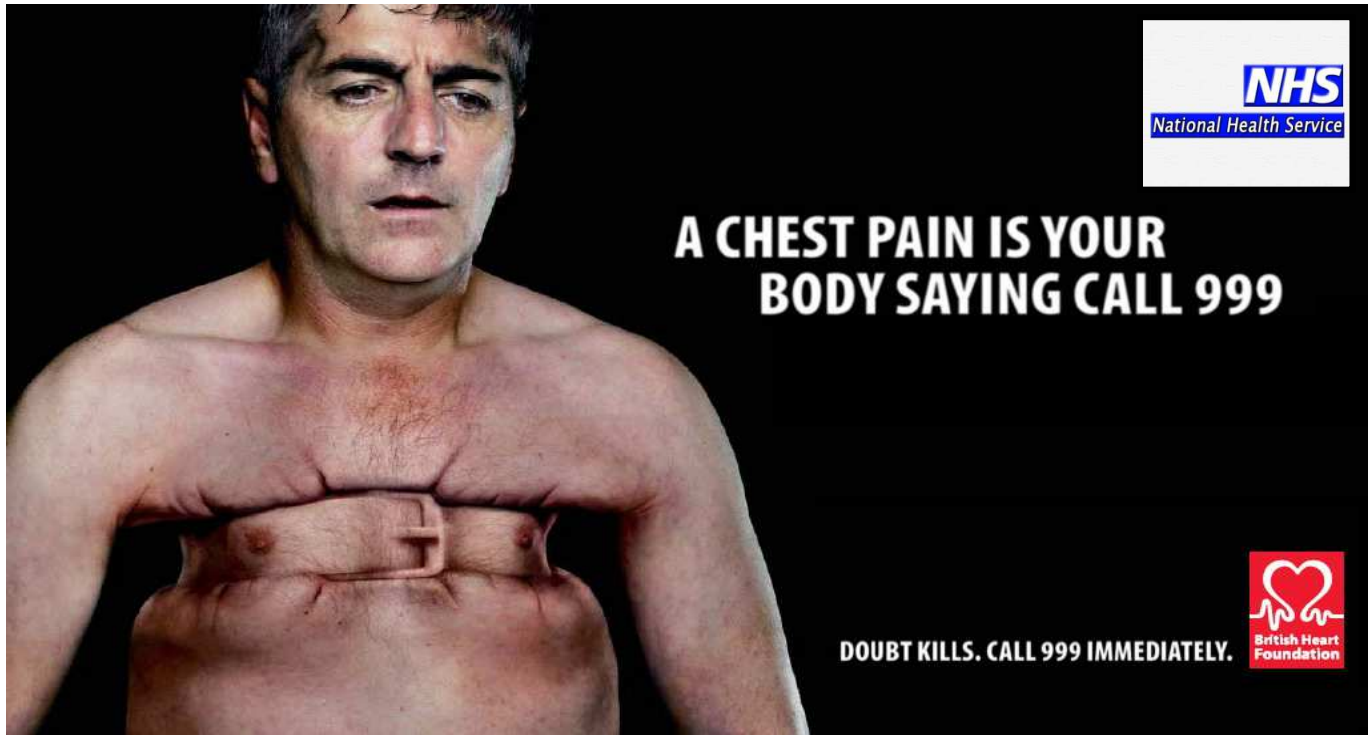
CHEST PAIN

Prof. Giovanni Zuliani



CHEST PAIN

- Chest pain accounts for about 4-5**%** of all Emergency Department visits per year in Western Countries (chest pain units)

- The *differential diagnosis of chest pain* is really important and extensive in Internal Medicine

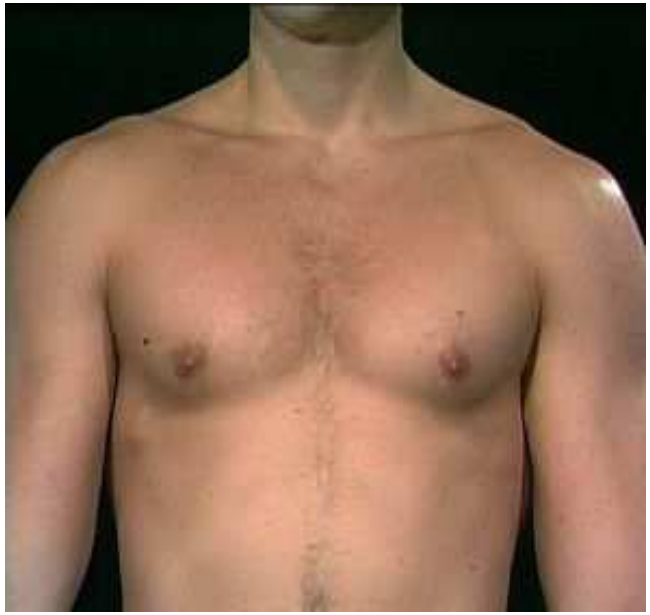
what patient defines emergency medicine?

undifferentiated chest pain
undifferentiated abdominal pain
undifferentiated headache
undifferentiated dizzy
undifferentiated back pain
undifferentiated fever

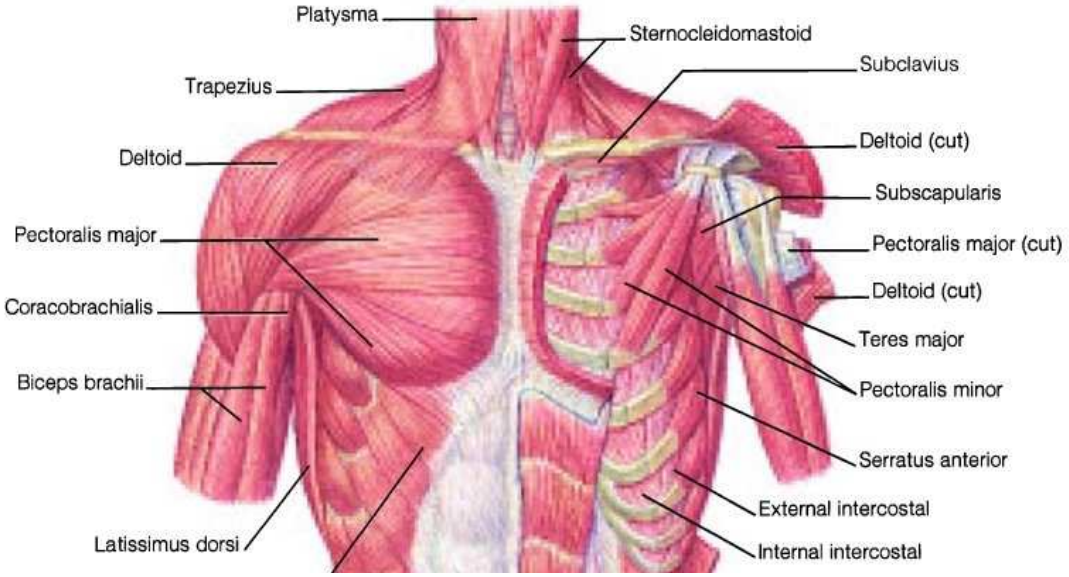
CHEST PAIN

1. ANATOMY OF THORAX
2. DIFFERENTIAL DIAGNOSIS
3. OVERVIEW OF DISEASES AND PROCESSES CAUSING CHEST PAIN
4. APPROACH TO CHEST PAIN

CHEST ANATOMY

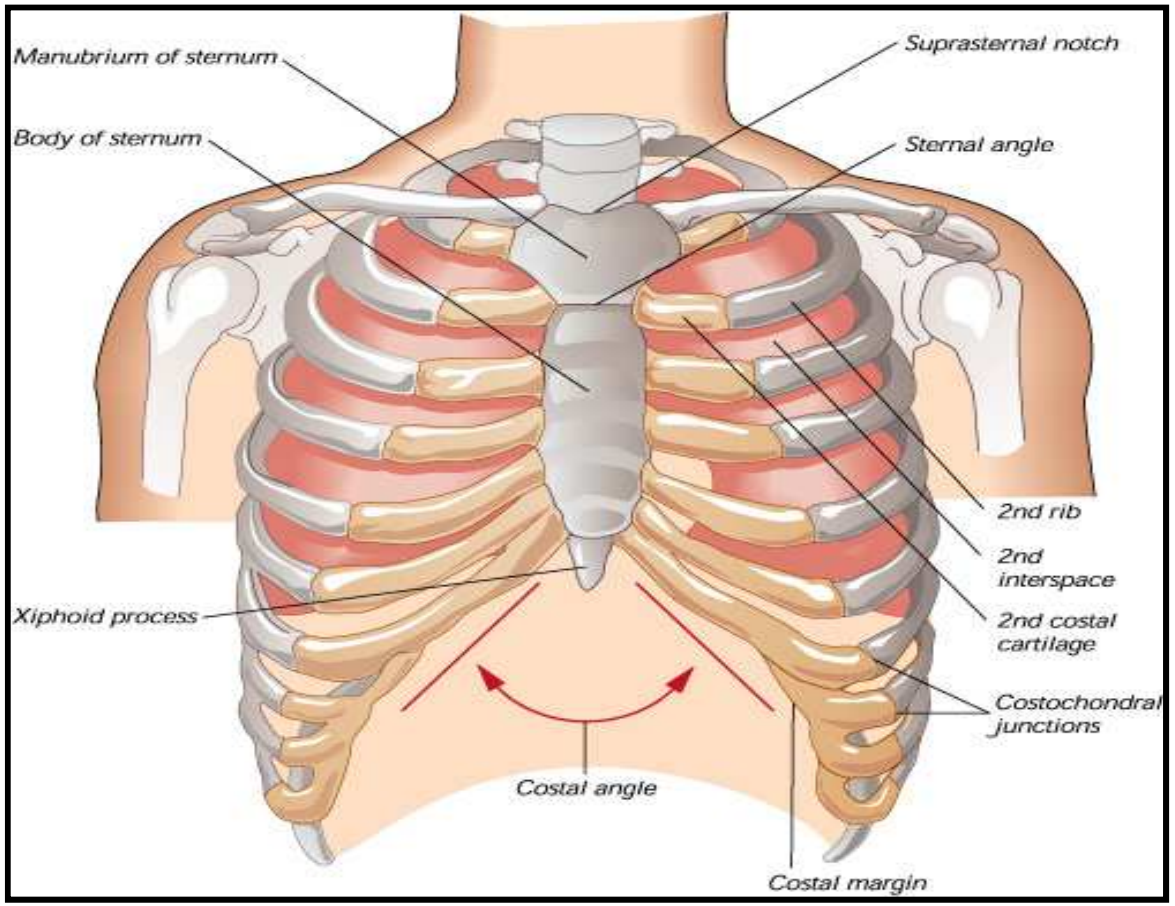


SKIN



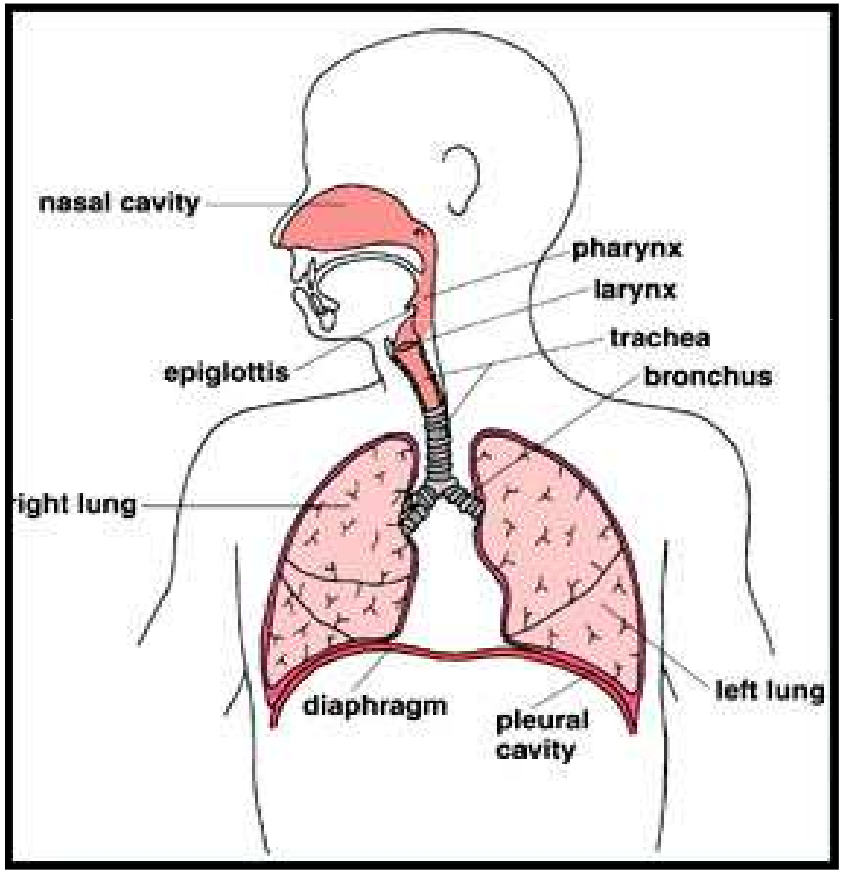
MUSCLES

CHEST ANATOMY



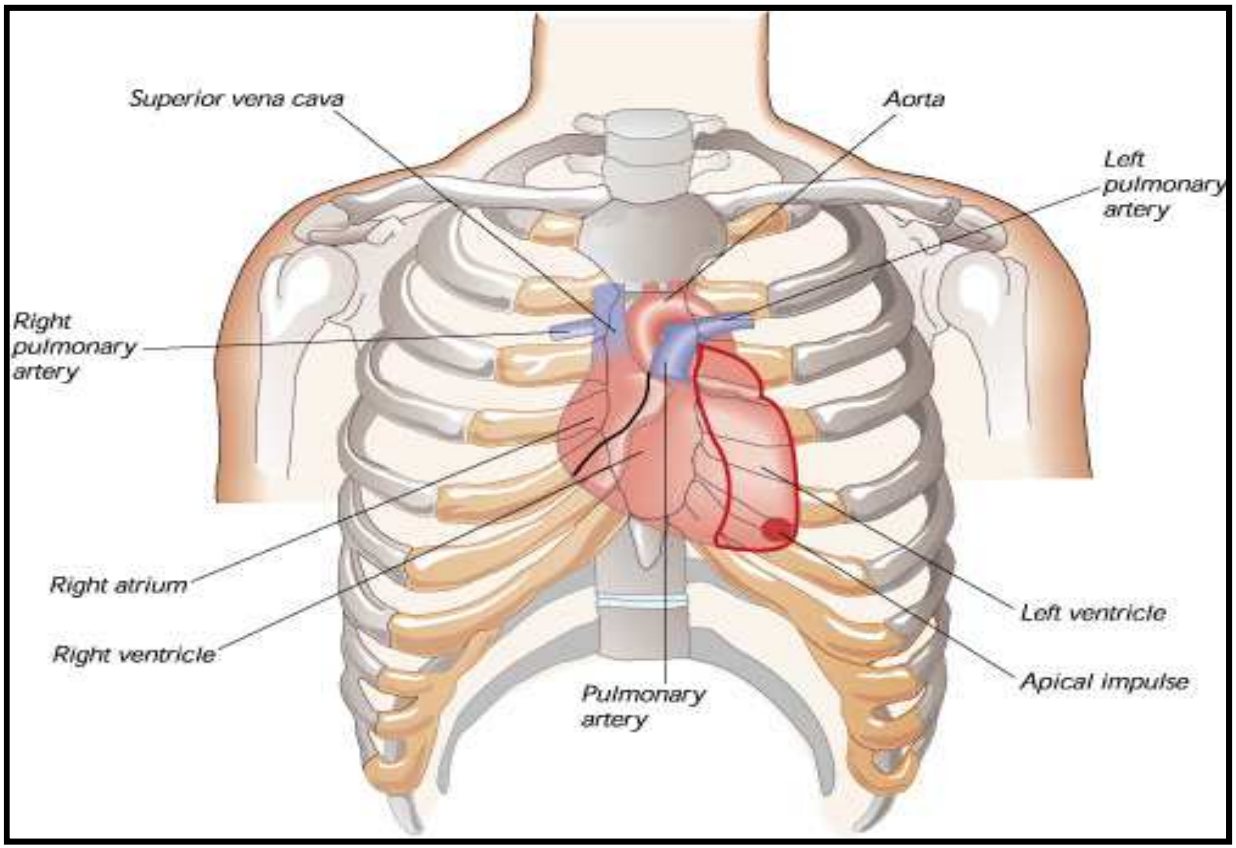
BONES

CHEST ANATOMY



PULMONARY SYSTEM

CHEST ANATOMY

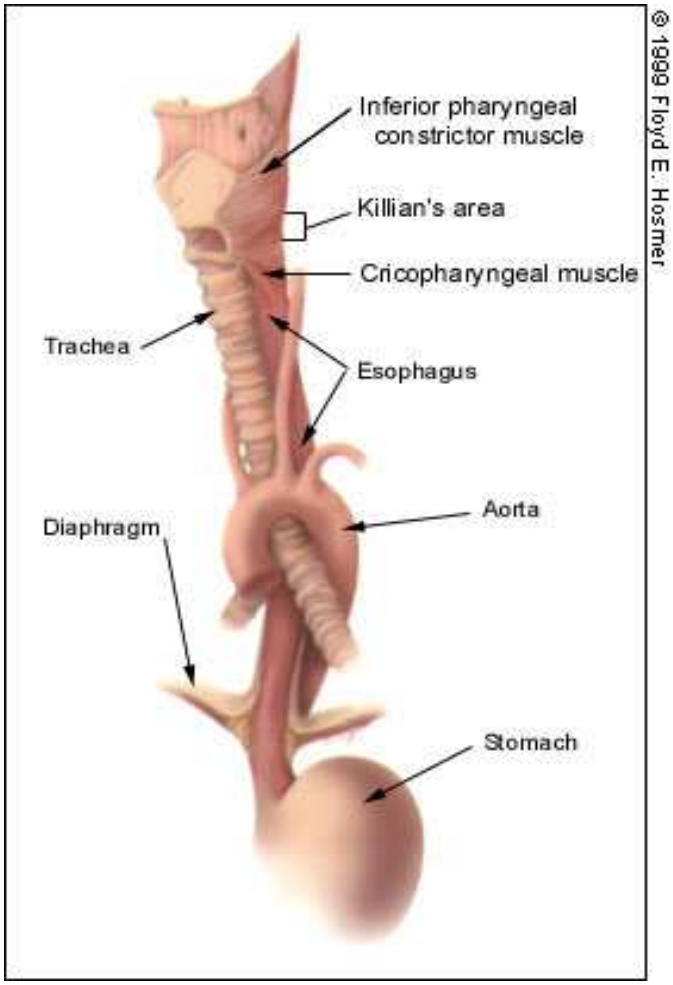


HEART

CHEST ANATOMY

VASCULATURE AND GI SYSTEM

AORTA AND ESOPHAGUS



DIFFERENTIAL DIAGNOSIS OF CHEST PAIN

1) CHEST WALL PAIN
2) PULMONARY CAUSES
3) CARDIAC CAUSES
4) VASCULAR CAUSES
5) G.I. CAUSES
6) OTHER (PSYCHOGENIC CAUSES)

1. CHEST WALL PAIN

DDX: CHEST PAIN

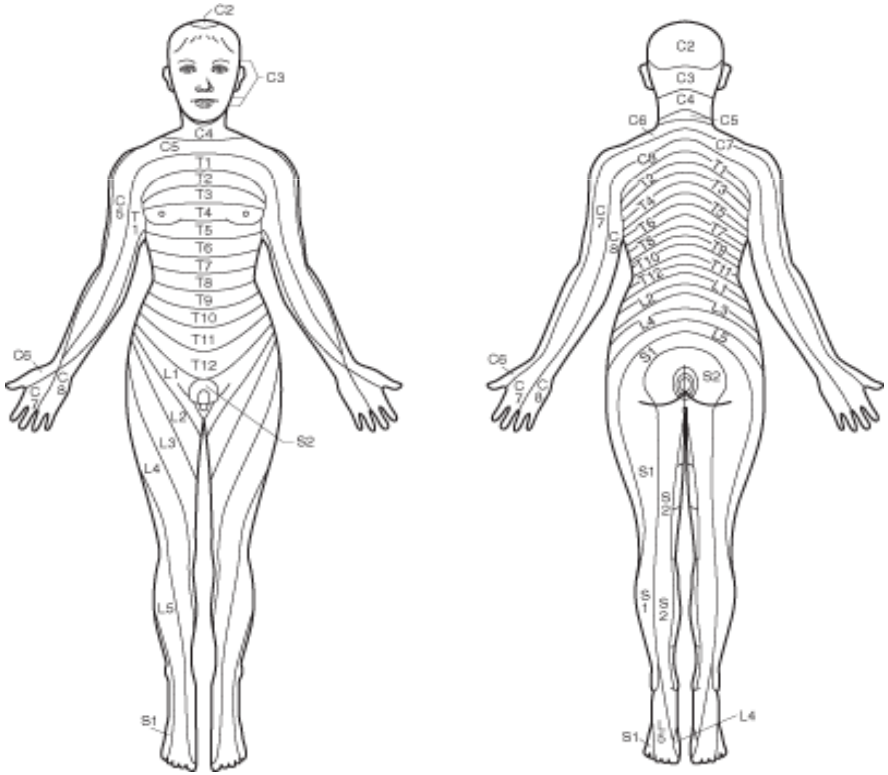
- **CHEST WALL PAIN**
  - Skin and sensory nerves:
    - **Herpes Zoster**
  - Musculoskeletal system:
    - **Isolated Musculoskeletal** Chest Pain Syndrome:
      * Costochondritis
      * Xiphoidalgia
      * **Precordial Catch Syndrome**
      * **Rib Fractures**
    - **Rheumatic and Systemic Diseases** causing chest wall pain

CHEST WALL PAIN

- **HERPES ZOSTER**

- Reactivation of Herpes Varicellae virus
- Immuno-compromised patients (HIV, stress, very old / fragile subjects) are often at risk for reactivation.
- 60% of zoster infections involve the trunk
- Pain often precede rash (very rarely pain without rash)

HERPES ZOSTER



- Clusters of vesicles (with clear or purulent fluid) grouped on an erythematous base. Lesions eventually rupture and crust.
- **Dermatomal distribution.**
- Usually unilateral involvement that halts at midline.

Herpes Zoster

H. ZOSTER: TREATMENT

- **ZOSTER VIRUS:**

  * Antivirals: **Acyclovir** (800 mg x4/day) or **Valacyclovir** (1g/8h) reduce duration of symptoms. Might also reduce incidence of post-herpetic neuralgia.
  * +/- **Corticosteroids:** may reduce inflammation
  * Analgesia: **NSAIDS, Paracetamol, Tramadol**

POSTHERPETIC NEURALGIA:

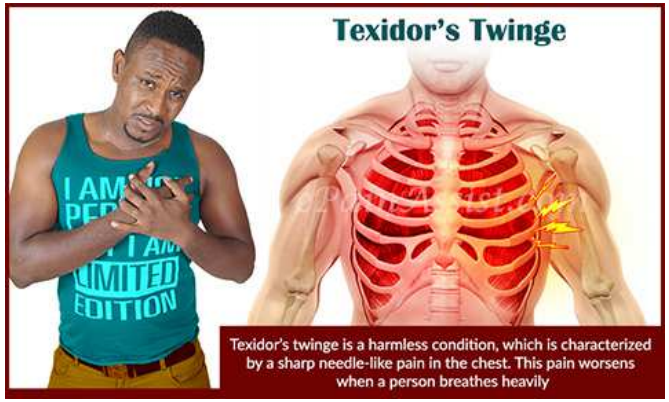
* May follow the course of acute zoster: shooting, sharp pain, hyperesthesia in involved dermatome
* Treatment: **Analgesics (NSAIDS, Opioids), Antiepileptics (Carbamazepine, Fenitoin, Gabapentin), Antidepressants (e.g. Amitriptilin 25 mg x3 day), Capsaicine as topic.**

CHEST WALL PAIN

- **Musculoskeletal Pain**
  - Usually **localized, sharp, positional**
  - Pain often **reproducible** by palpation
  - At times reproduced by **turning or arm movement**
  - May elicit history of repetitive or unaccustomed activity involving trunk/arms
  - Rheumatic diseases will cause musculoskeletal pain via thoracic joint involvement

MUSCULOSKELETAL PAIN

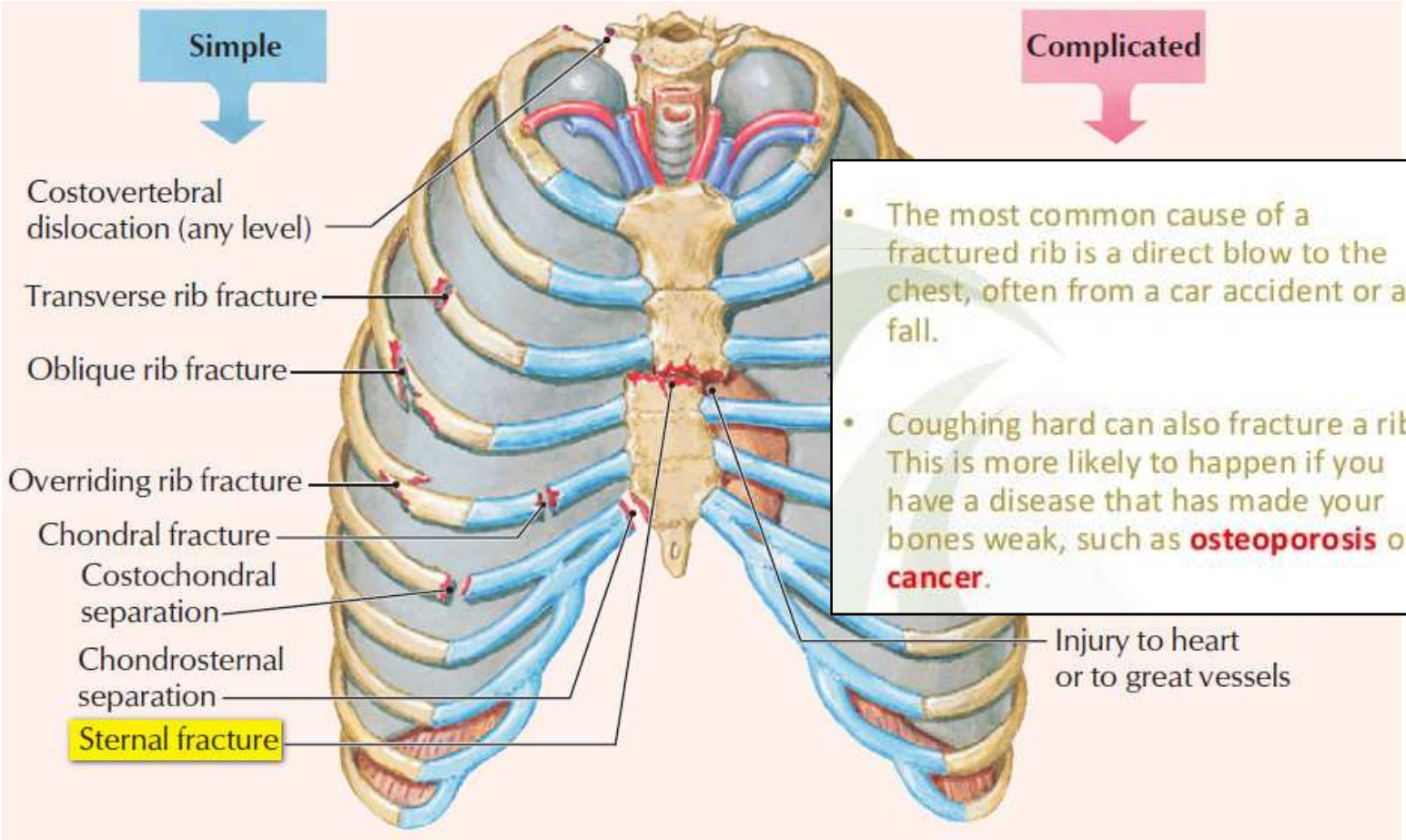
• **COSTOCHONDRITIS**	• Inflammation of costal cartilages +/- sternal articulations. No swelling
• **TIETZE SYNDROME**	• Primary painful swelling in one or more upper costal cartilages.
• **XIPHODYNIA**	• Discomfort over xyphoid reproduced by palpation
• **PRECORDIAL CATCH SYNDROME**	• Primary sharp pain lasting for 1-2 min episodes near the cardiac apex and associated with inspiration, poor posture, and inactivity
• **RIB FRACTURE**	• Pain over involved rib

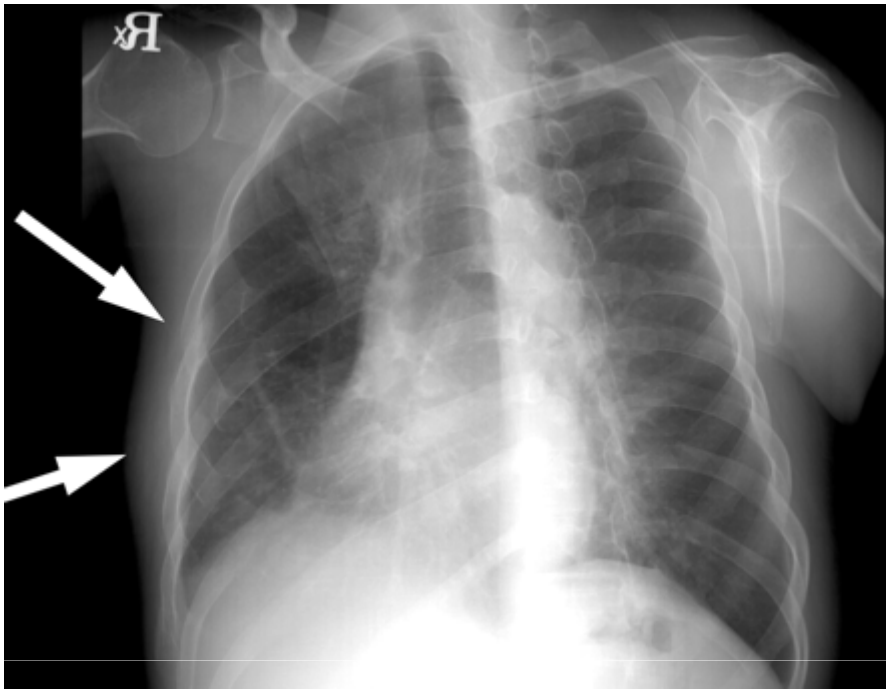


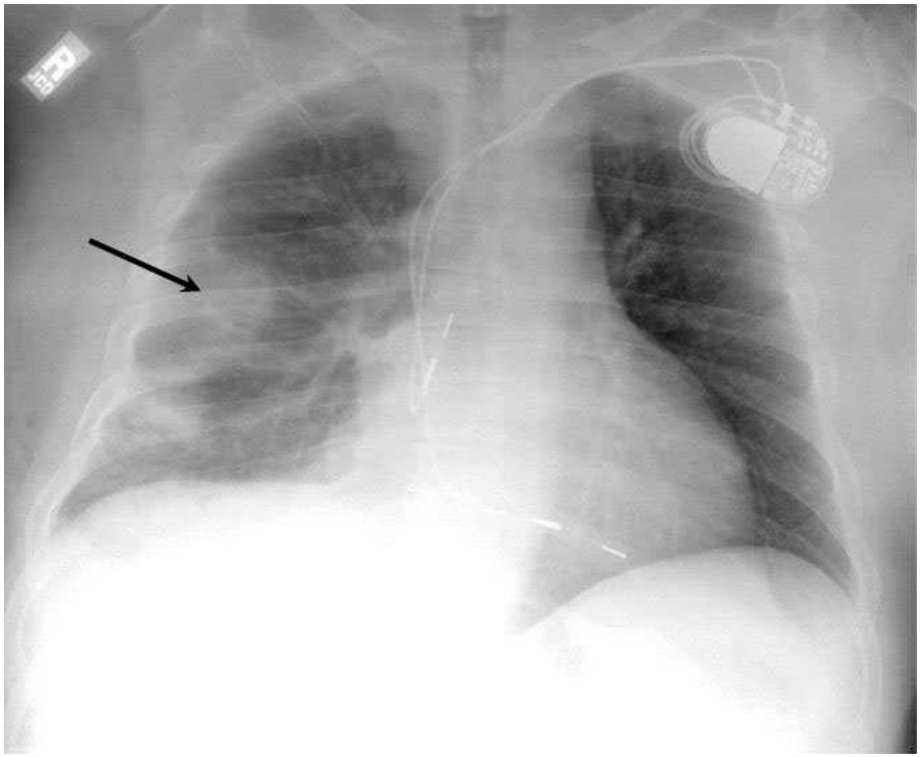
Precordial Catch Syndrome (PCS) - Texidor's twinge

• It is a common cause of chest pain complaints in children and adolescents, but it also occurs, though less frequently, in adults.
• PCS manifests itself as a ***very intense, sharp pain, typically at the left side of the chest, which is worse when taking breaths.*** **Patients often think that they are having a heart attack which causes them to panic.**
• This pain ***typically lasts from 30 seconds to a few minutes.***
• Though some episodes last ***just a few breaths, in rare cases they can persist for up to 30 minutes.*** On some occasions, breathing in or out suddenly will cause a small *popping or cracking sensation in the chest*, which results in the pain going away. In most cases the pain is resolved quickly and completely

Rib Fractures







Look for unrecognized
Rib Fractures !

MUSCULOSKELETAL PAIN

TREATMENT = Analgesia: you can use

- **NSAIDs:** ibuprofen, ketoprofen, diclofenac, naproxen, piroxicam, nimesulide
- **COX2 Inhibitors:** e.g. celecoxib

- **Paracetamol: 0.5-1g x3 day** (+/-codein)
- **Tramadol: 50-100 mg x 3-4 day**

ALWAYS CONSIDER SIDE EFFECTS

2. PULMONARY CAUSES OF CHEST PAIN

DDX: CHEST PAIN

- **PULMONARY CAUSES**

  - Pulmonary Embolism
  - Pneumonia
  - Pleuritis - Serositis
  - Pneumothorax
  - Sarcoidosis
  - Asthma - COPD
  - Lung cancer (rare presentation)

PULMONARY EMBOLISM

- **RISK FACTORS: VIRCHOW'S TRIAD**

1. *Hypercoagulability*

* ***Malignancy***
* Pregnancy, early post-partum, ***oral contraceptive pill, hormone replacement treatment***
* Genetic Mutations: Factor V Leiden, Protein C or S deficiencies, antiphospholipid Ab

2. *Venous Stasis*

* ***Long distance travel by airplane***
* ***Prolonged bed rest or recent hospitalization***
* ***Cast immobilization***

3. *Venous Injury*

* Recent surgery or ***trauma***

PULMONARY EMBOLISM

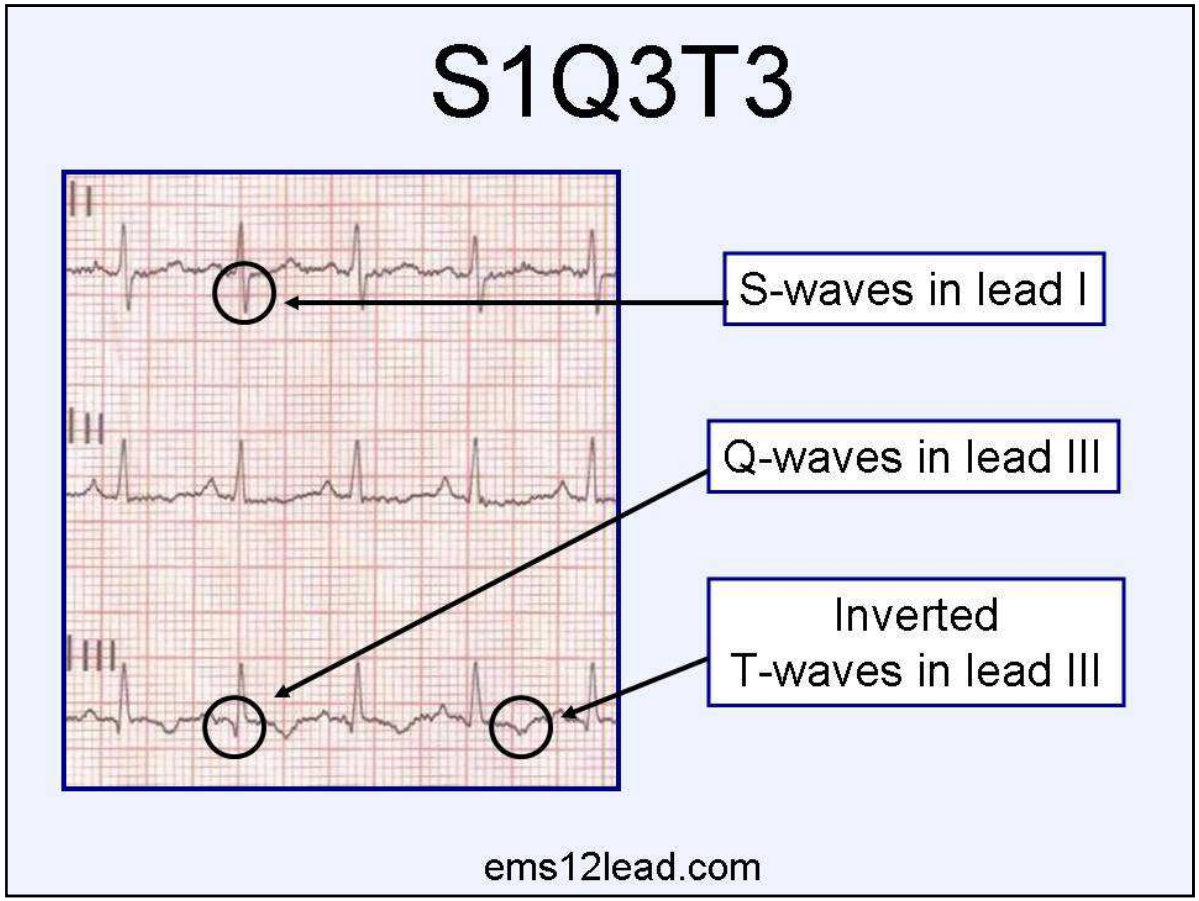
- **CLINICAL FEATURES**
  - **Chest pain of pleuritic origin**
  - Shortness of breath, tachypnea, hypoxemia
  - Tachycardia
  - (Hemoptysis) cough
  - Consider diagnosis in *new onset atrial fibrillation*
  - Look for asymmetric leg swelling (signs of DVT) which places patients at risk for PE

If massive PE: hypotension, syncope, unstable vital signs, and acute cor pulmonale; may also present with cardiac arrest (pulseless electrical activity >>asystole).

PE: DIAGNOSTIC TESTS

- **EKG:**
  - Sinus tachycardia most common
  - *Often see non-specific abnormalities*
  - *Atrial fibrillation (new onset …)*
  - Look for S1-Q3-T3 (low SENS - SPEC)
    (S wave in lead I, Q wave in lead III,
    inverted T wave in lead III) …

NOT FREQUENT …

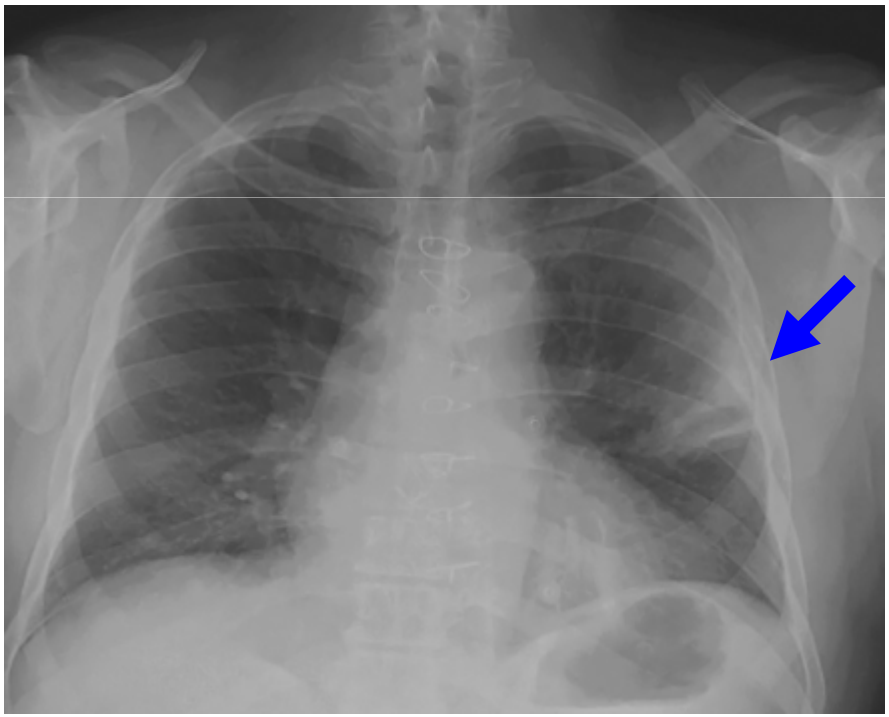


PE: DIAGNOSTIC TESTS

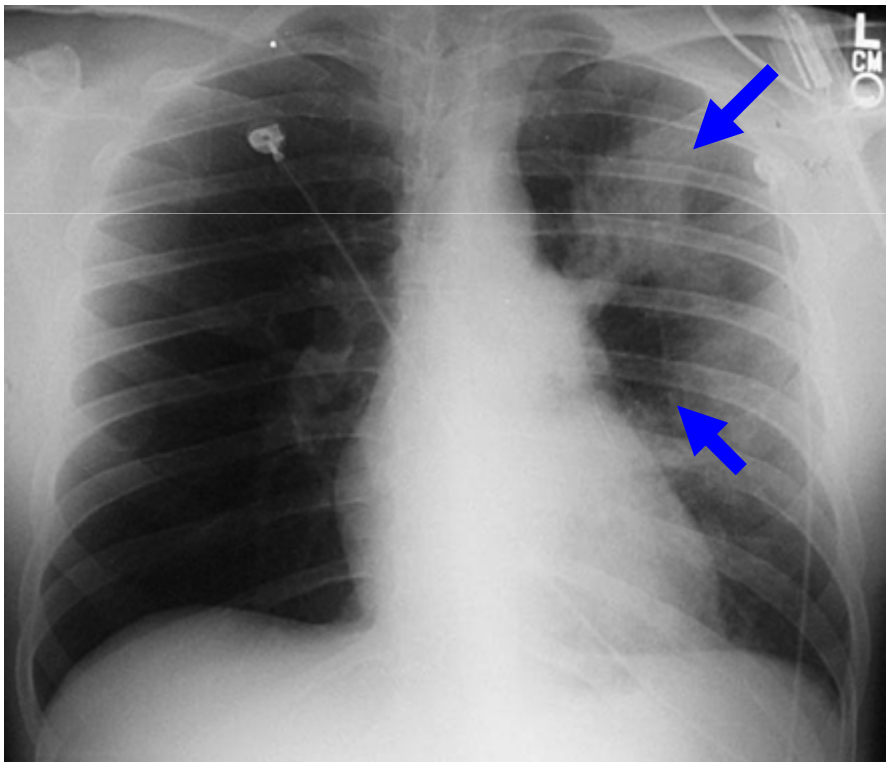
- **CHEST XRAY**

  - Normal in > 30% of cases
  - **Very often: non-specific on NO Rx findings**
  - Look for **Hampton's Hump** (triangular pleural based density with apex pointed towards hilum): sign of pulmonary infarction
  - Look for **Westermark's sign**: Dilation of pulmonary vessels proximal to embolism and collapse distal

Hampton’s Hump



Westermark’s Sign



PE: DIAGNOSTIC TESTS

- **Arterial Blood Gas (ABG - EGA):**
  * Look for ↓ PaO2 and ↓PaCO2 **(sum PO2 + PCO2 < 100)**
- **D Dimer - XDP:**
  * Often elevated in PE **(High Sens. but very Low Spec.)**
  * **Useful test only in low probability patients**
  * May be abnormally high in various conditions:

    malignancy, pregnancy, sepsis, recent surgery

PE: DIAGNOSTIC TESTS

- **Pulmonary angiography: Gold Standard**
- **Helical CT scan** with I.V. contrast
- **VQ SCAN (Ventilation-Perfusion scan)** - i.e. pulmonary scintigraphy: use in setting of renal insufficiency; good for recognizing small repeated PE episodes

WELL'S SCORE FOR PE RISK

Medscape® www.medscape.com

Variable	Points
Surgery* or fracture (of lower limb) within 1 month	2
Previous PE or DVT	3
Age >65 years	1
Active malignant condition†	2
Unilateral lower-limb pain	3
Hemoptysis	2
Heart rate	
75–94 beats per minute	3
≥95 beats per minute	5
Pain on lower-limb deep venous palpation and unilateral edema	4

**under general anesthesia; †solid or hematologic malignant condition, currently active or considered cured <1 year; $PaCO_2$, partial pressure of carbon dioxide (arterial); PaO_2, partial pressure of oxygen (arterial); PE, pulmonary embolism; DVT, deep-vein thrombosis*

Score	Category
0–3 points	low probability
4–10 points	intermediate probability
≥11 points	high probability

GENEVA SCORE FOR PE RISK

Variable	Regression Coefficients	Points
Risk factors		
Age > 65 y	0.39	1
Previous DVT or PE	1.05	3
Surgery (under general anesthesia) or fracture (of the lower limbs) within 1 mo	0.78	2
Active malignant condition (solid or hematologic malignant condition, currently active or considered cured < 1 y)	0.45	2
Symptoms		
Unilateral lower-limb pain	0.97	3
Hemoptysis	0.74	2
Clinical signs		
Heart rate		
75–94 beats/min	1.20	3
≥95 beats/min	0.67	5
Pain on lower-limb deep venous palpation and unilateral edema	1.34	4
Clinical probability		
Low		0–3 total
Intermediate		4–10 total
High		≥11 total

* DVT = deep venous thrombosis; PE = pulmonary embolism.

PE SEVERITY SCORE

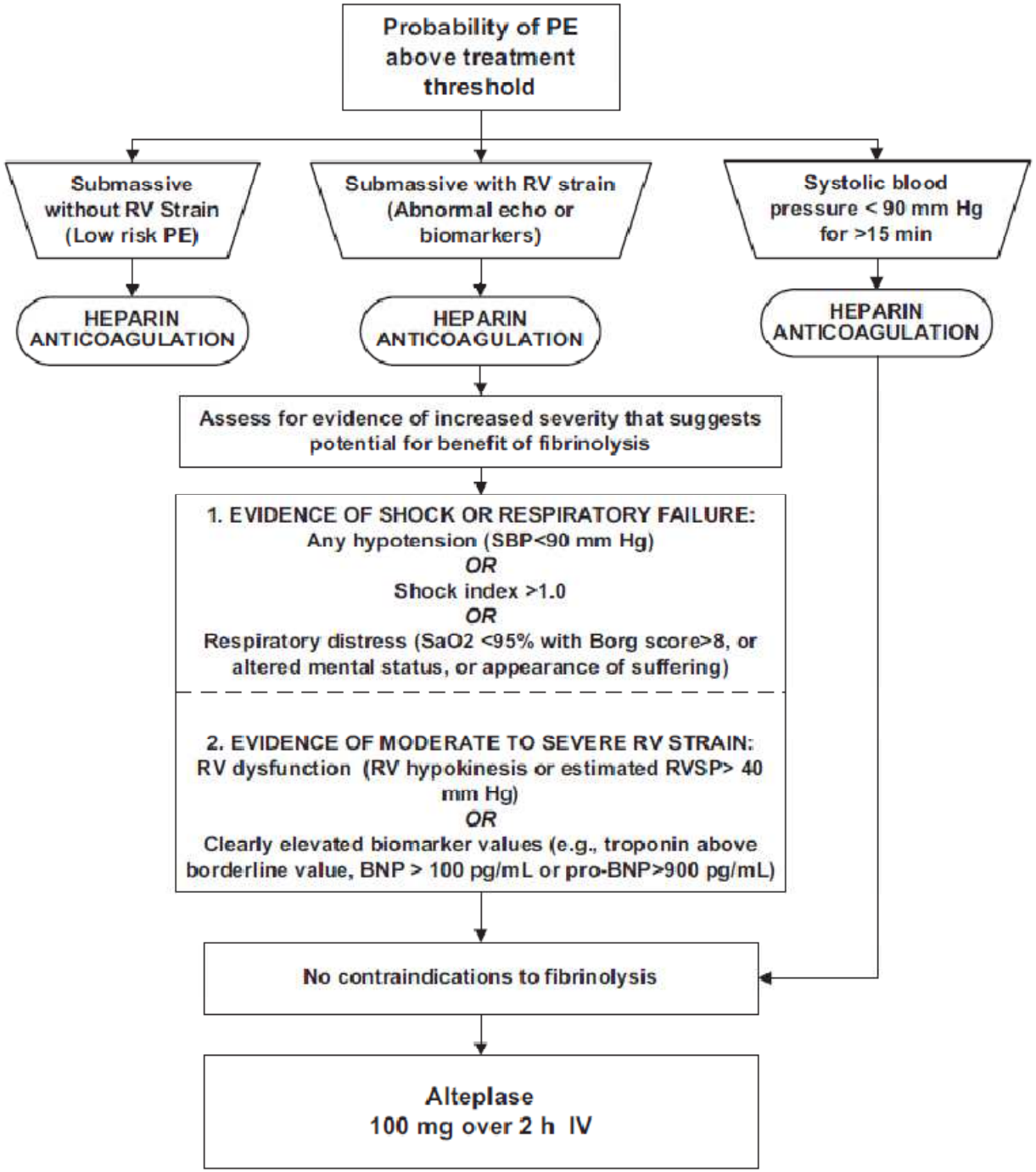
Pulmonary Embolism Severity Index

Predictors	Points
Age	+1 per year
Male sex	+10
Heart failure	+10
Chronic lung disease	+10
Arterial oxygen saturation <90%	+20
Pulse ≥110 beats per minute	+20
Respiratory rate ≥30 breaths per minute	+20
Temperature <36°C	+20
Cancer	+30
Systolic blood pressure <100 mm Hg	+30
Altered mental status	+60

Pulmonary Embolism Severity Score (Sum of the Points)	Risk Class	30-day Mortality Rate
≤65	I	0–1.6%
66–85	II	1.7%–3.5%
86–105	III	3.2%–7.1%
106–125	IV	4.0%–11.4%
>125	V	10.0%–24.5%

PE: TREATMENT

- **ABC**
- **Initiate Heparin**
  * Unfractionated Heparin: 80 Units/Kg bolus IV, then 18units/kg/hr → aPTT x 2)
  * **Fractionated Heparin: 1mg/kg BID**
  * If high pre-test probability for PE: initiate empiric heparin while waiting for imaging ! Make sure no intraparenchymal brain hemorrhage or GI hemorrhage prior to initiating heparin.
- **Consider Fibrinolytic Therapy:**
  * Especially if PE + hypotension: **rTPA (Alteplase)**: 10 mg IV as bolus in 10 m', followed by 90 mg IV in 120 m'
- **Surgical treatment**
- **(Inferior Cava Filter)**



RV: Right Ventriculum

RV: Right Ventriculum Systolic Pressure

tPA (tissue Plasminogen Activator) contraindications

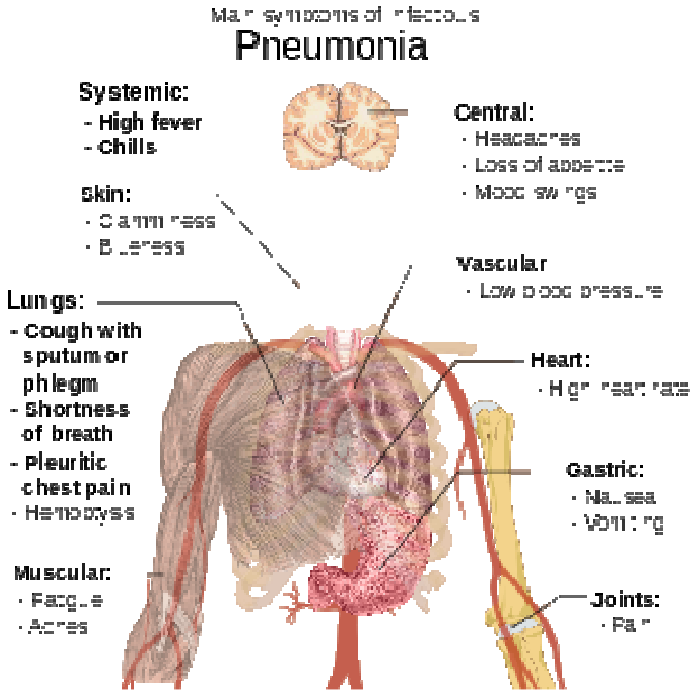
Contraindications

tPA Alteplase (Activase) is **contraindicated** if any of the following are present: (***Check if any contraindications present***)

- If CT demonstrates hemorrhage or early changes of recent major infarction such as sulcal effacement, mass effect,
  edema, thrombolytic therapy should be avoided.
- Isolated, mild neurological deficits, such as ataxia alone, sensory loss alone, dysarthria alone or minimal weakness
- *Rapidly improving neurological signs
- Evidence of intracranial hemorrhage on pre-treatment evaluation
- Suspicion of subarachnoid hemorrhage
- Intracranial neoplasm, arteriovenous malformation or aneurysm
- *Serious head trauma or another stroke in previous 3 months
- Previous intracranial hemorrhage
- Pre-thrombolytic uncontrolled systolic BP greater than 185 mmHg or diastolic BP greater than 110 mmHg
- Seizure at onset of stroke
- *Recent myocardial infarction (less than 1 month)
- *Any major surgery, history of trauma or CPR within preceding 14 days
- *Gastrointestinal or urinary bleeding within preceding 21 days
- *Any bleeding diathesis
- *Patient taking **Warfarin (Coumadin)** and INR greater than 1.7
- Heparin administration within 48 hours preceding onset of stroke and aPTT outside the normal range
- Platelet count less than 100,000/mm3
- Fibrinogen less than 120mg/dL
- Blood glucose less than 50mg/dL or greater than 400mg/dL
- *Pregnancy or delivery within 14 days
- Lumbar puncture or history of arterial puncture at a noncompressible site within preceding 7 days
- Known or suspected Bacterial Endocarditis

***May be appropriate for Intra-arterial tPA-Alteplase (Activase) Or Mechanical Clot Retrieval Device. Review these items with the stroke neurologist.**

PNEUMONIA



- **CLINICAL FEATURES**

- Cough +/- sputum production

- Fevers/chills

- Pleuritic chest pain

- Shortness of breath

- May be preceded by a viral upper respiratory infection with weakness / malaise / myalgias

- If severe: tachycardia, tachypnea, hypotension decreased O2 saturation

- Abnormal findings on pulmonary auscultation: rales, decreased breath sounds, wheezing, rhonchi

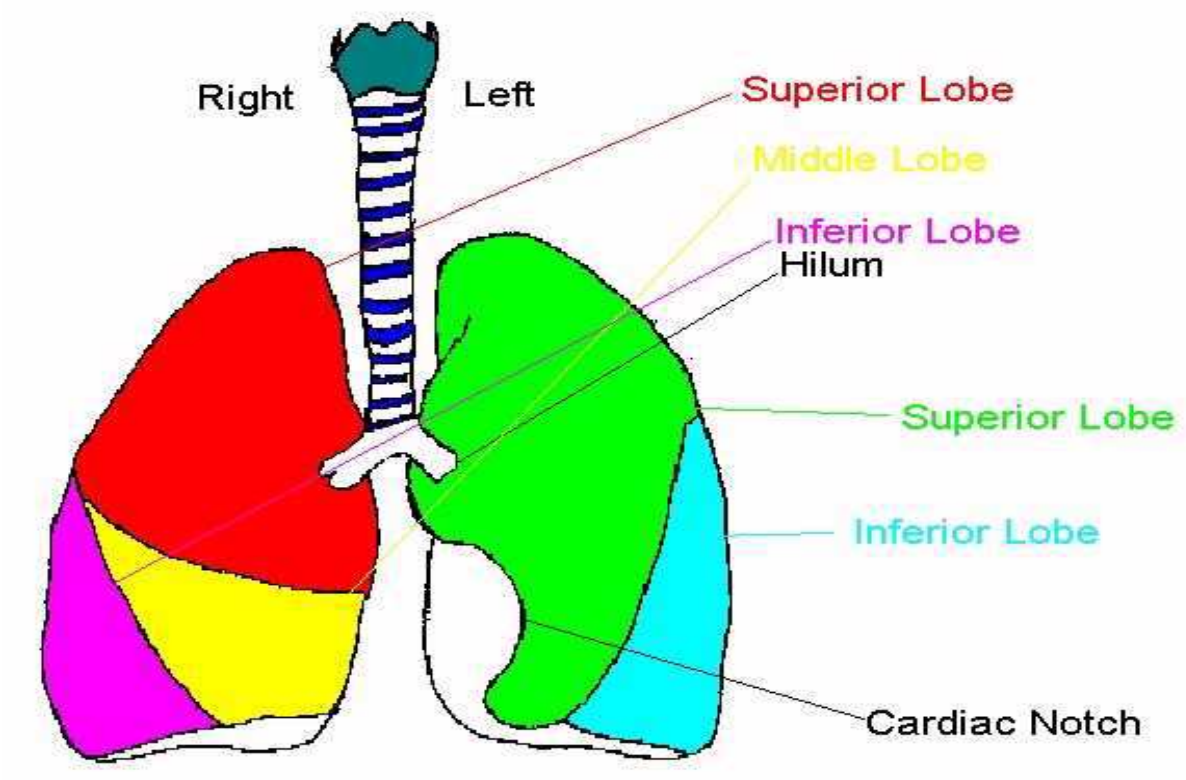
PNEUMONIA: DIAGNOSIS

- **Chest X ray Radiography (CXR)**

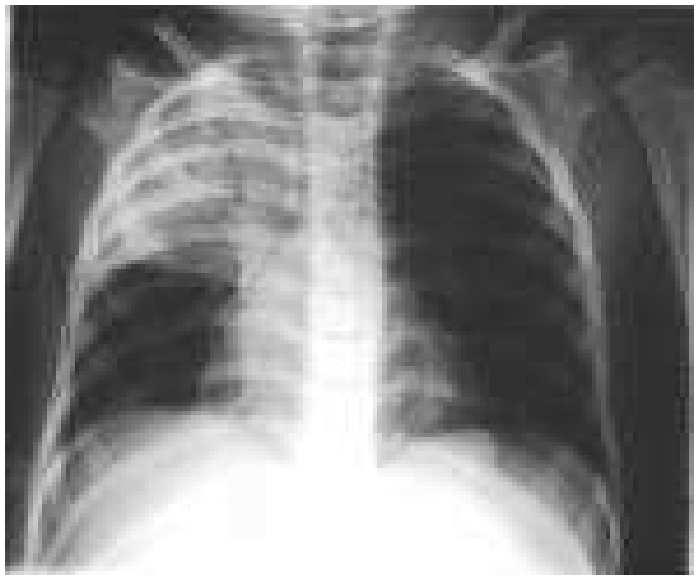
If patient is to be hospitalized:

- Consider sputum blood cultures
- Consider EGA if respiratory distress

LOCALIZING THE INFILTRATE

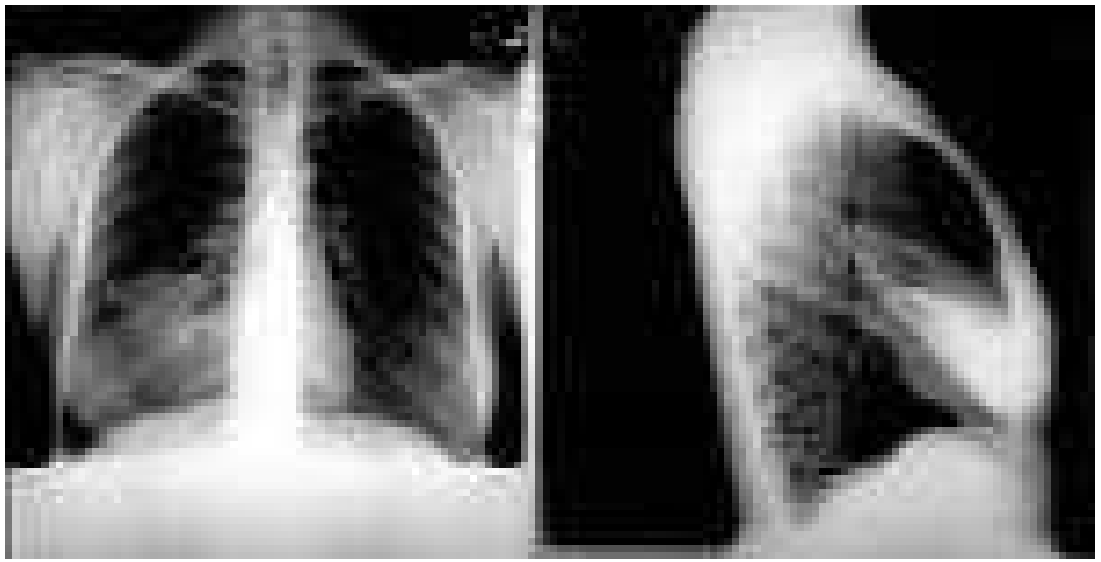


RUL PNEUMONIA



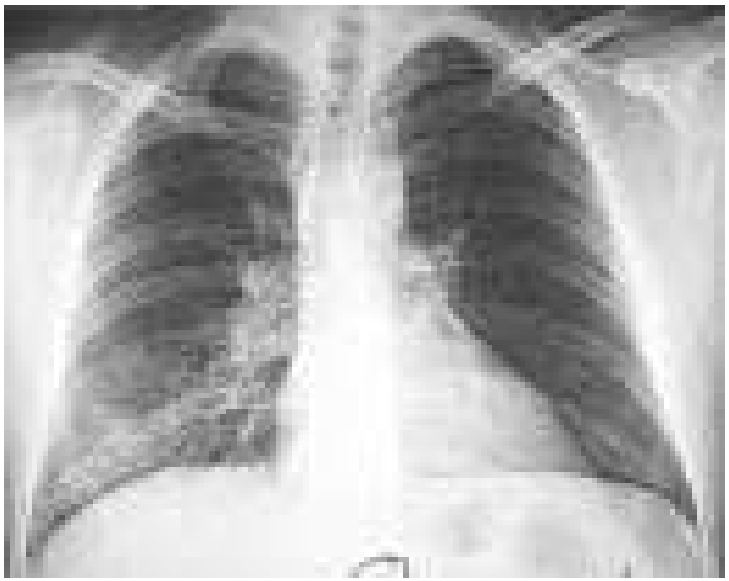
- Right **Upper** Lobe INFILTRATE

RML PNEUMONIA



- Notice that right heart border becomes obscured on PA view of Right **Medium** Lobe pneumonia

RLL PNEUMONIA



- Right **Lower** Lobe infiltrate

PNEUMONIA: TREATMENT

COMMUNITY DWELLING SUBJECT: (Streptococcus pneumoniae)

* B lattamin **+** Macrolide (Claritromicin – Azitromicin) Oral
* Fluoroquinolone: Moxifloxacin or Levofloxacin Oral

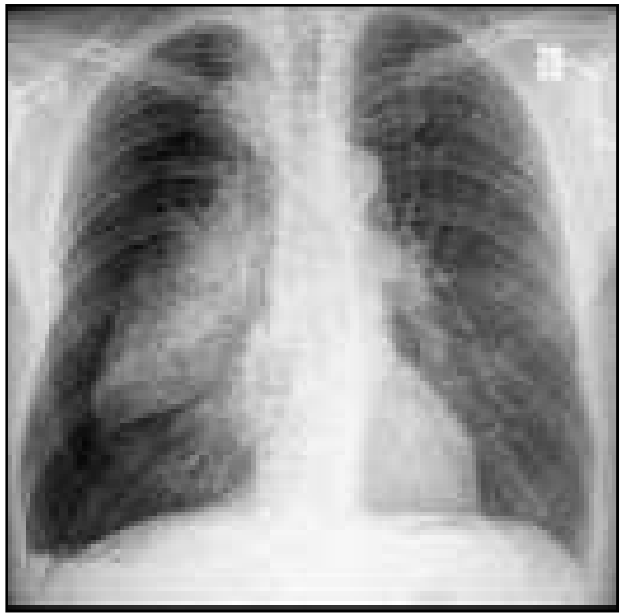
HOSPITAL aquired PNEMONIA (Gram -)

* Second-third generation Cephalosporin **+** Macrolide / Fluoroquinolone or Piperacillin **+** Meropenem / Imipenem IV

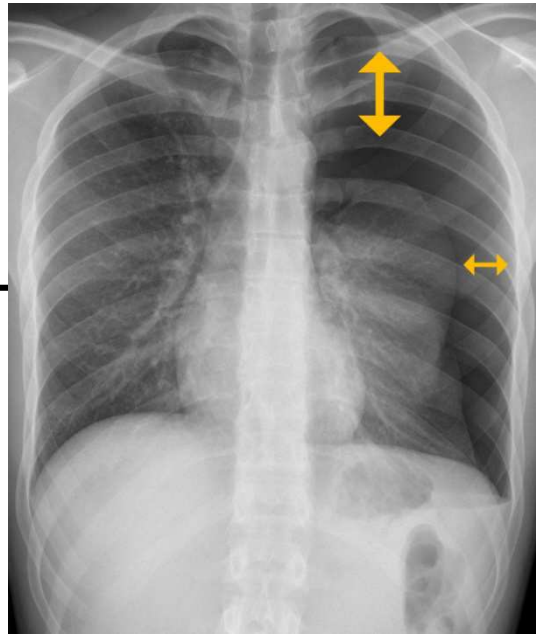
- **Pseudomonas:** Ceftazidime / Cefepime **+** Imipenem / Cipro IV
- **Staphilococcus meticillin-resistant:** Vancomin or Teicoplanin IV

SPONTANEOUS PNEUMOTHORAX

- **RISK FACTORS:**
  - **Primary**
    - * No underlying lung disease
      - * Usually: young male with low BMI
      - * Smoking: 20:1 relative risk compared to non-smokers
  - **Secondary**
    - * **COPD**
    - * **Cystic Fibrosis**
    - * **Neoplasms**
    - * AIDS + PC pneumonia



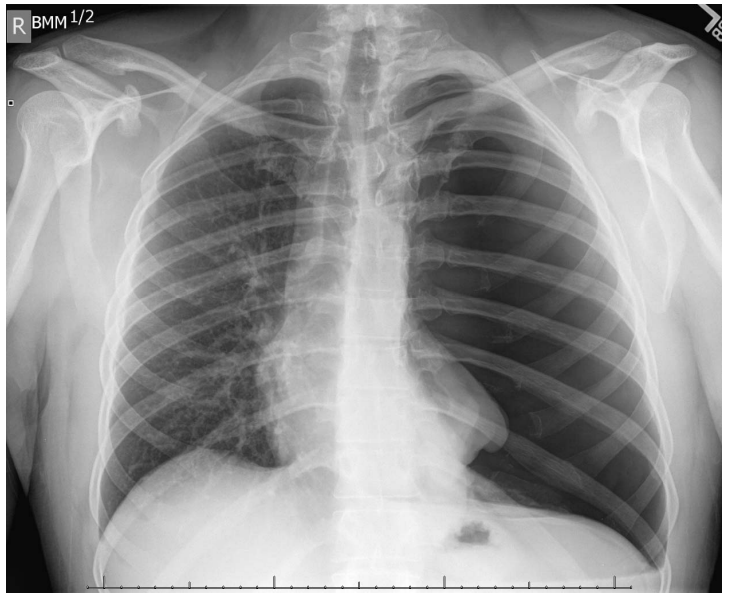
PNEUMOTHORAX



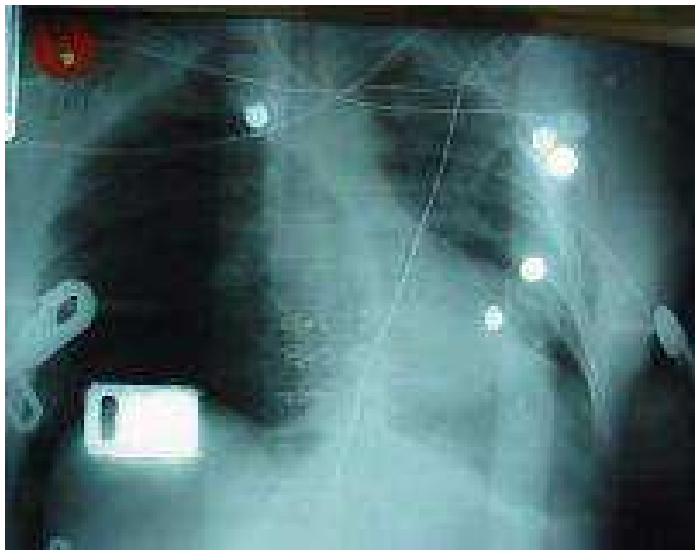
- **CLINICAL FEATURES**
  - **Acute pleuritic chest pain: 95%**
  - Usually pain localized to side of PTX
  - Dyspnea
  - May see tachycardia or tachypnea
  - Decreased breath sounds on side of PTX
  - Hyperresonance on side of PTX (↑↑ air)
  - **If tension PTX:** will have above findings + **tracheal deviation + unstable vital signs.** This is rare complication with spontaneous PTX

Tension Pneumothorax

- Trachea deviates to contra lateral side
- Mediastinum shifts to contra lateral side
- Decreased breath sounds and hyper-resonance on affected side
- Jugular veins distension
- Treatment: Emergent needle decompression followed by chest tube insertion

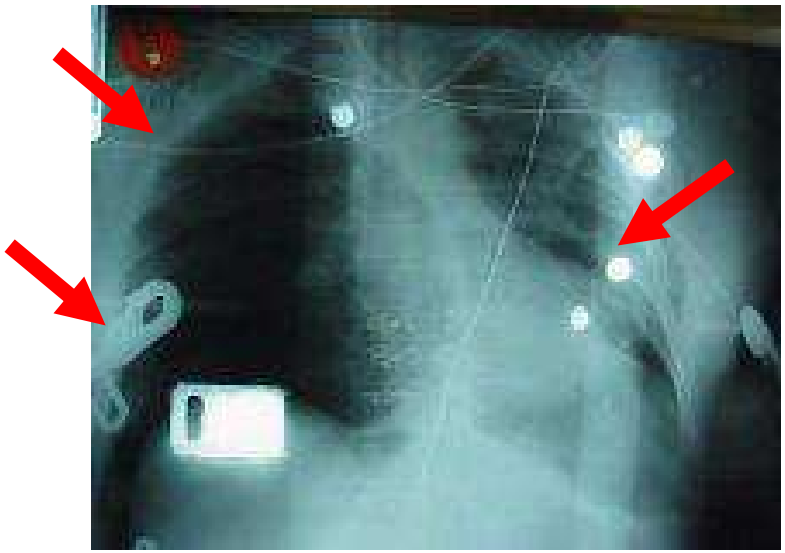


TENSION PNEUMOTHORAX



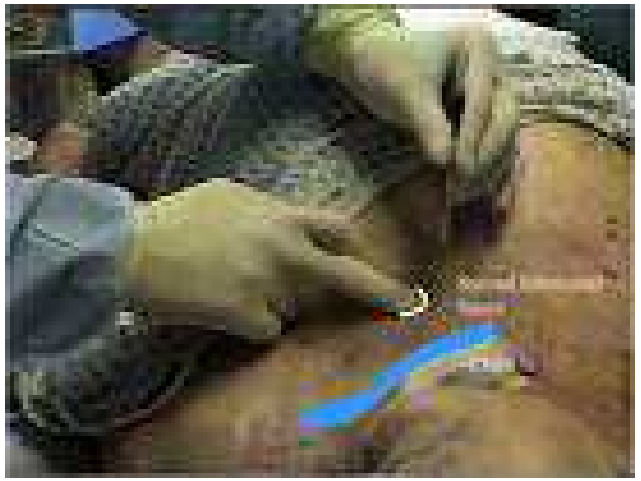
- What is wrong with this picture??

TENSION PNEUMOTHORAX



- Chest Xray should have never been obtained !!
- Tension PTX is a diagnosis requiring immediate life saving measures

NEEDLE DECOMPRESSION



- Insert large bore needle (14 - 16 Gauge) with catheter in the 2nd intercostals space mid-clavicle line. Remove needle and leave catheter in place. Should hear air.

SPONTANEOUS PTX

- **TREATMENT:**
  - If small (<20%): just observe with repeated X rays
  - Give oxygen: it increases pleural air absorption
  - If large: place chest tube

PLEURITIS/SEROSITIS

- Inflammation of pleura
- **Pleuritic chest pain**
- **Causes:**

  - Viral etiology, pneumonia associated
  - Systemic Lupus Erythematosus
  - Rheumatoid Arthritis
  - Drugs causing lupus like reaction:

    Procainamide, Hydralazine, Isoniazide

COPD/ASTHMA EXACERBATIONS

- **CLINICAL FEATURES:**

  - Decrease in O2 saturation & Shortness of breath
  - **May see also chest pain**
  - Decreased breath sounds, wheezing, prolonged expiratory phase on exam
  - Look for accessory muscle use (nasal flaring, tracheal tugging, retractions).

Order CXR to rule out associated complications: PTX, pneumonia that may have led to exacerbation

3. CARDIAC CAUSES OF CHEST PAIN

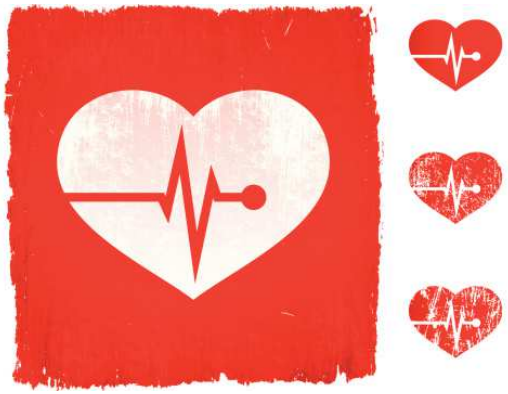
CARDIAC CHEST PAIN

- **CARDIAC CAUSES**

  - **Coronary Heart Disease (CHD)**:
    * Myocardial Ischemia (SCA)
    * Unstable Angina
    * Stable Angina

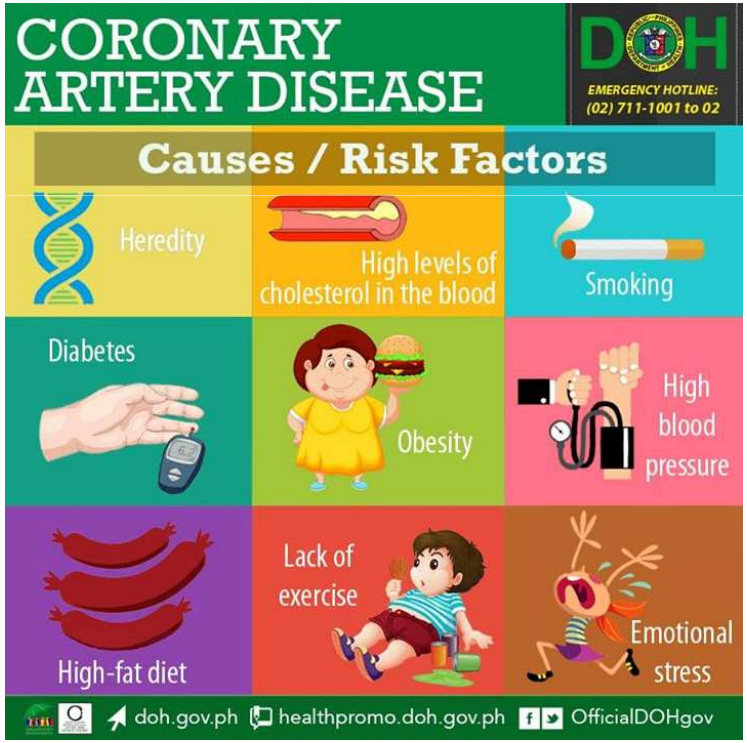
  - **Valvular Heart Disease**:
    * Mitral Valve Prolapse
    * Aortic Stenosis

  - **Pericarditis**
  - **Myocarditis**



RISK FACTORS FOR CAD

- Age
- Diabetes
- Dyslipidemia
- Hypertension
- Family History of CHD
- Tobacco Use
- Cocaine use (young men)



ISCHEMIC CHEST PAIN

- **CLINICAL FEATURES**
  - Chest pain: often described as **pressure, heaviness, tightness, squeezing**
  - Pain usually **sub-sternal** or in left chest; also epigastric
  - Pain can radiate to **neck, jaw, arms,**
  - **Associated symptoms:** *nausea, vomiting, diaphoresis,* ***shortness of breath,*** *lightheadedness,* ***palpitations***
  - In appropriate setting, consider above associated symptoms, as possible ***"Ischemic Equivalents".***
  - Pain may be associated with activity
  - Symptoms may improve with rest or NTG

ISCHEMIC CHEST PAIN

- **EXERTIONAL ANGINA**

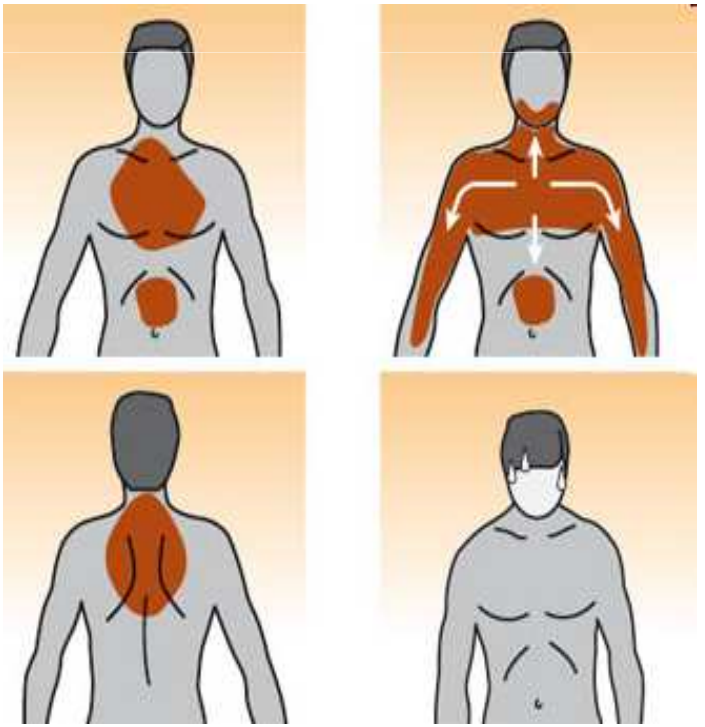
  * BRIEF EPISODES BROUGHT ON BY EXERTION AND RELIEVED BY REST OR NTG

- **UNSTABLE ANGINA**

  * NEW ONSET
  * CHANGE IN FREQUENCY/SEVERITY
  * OCCURS AT REST

- **AMI**

  * SEVERE PERSISTENT SYMPTOMS
  * ELEVATED TROPONIN I or T



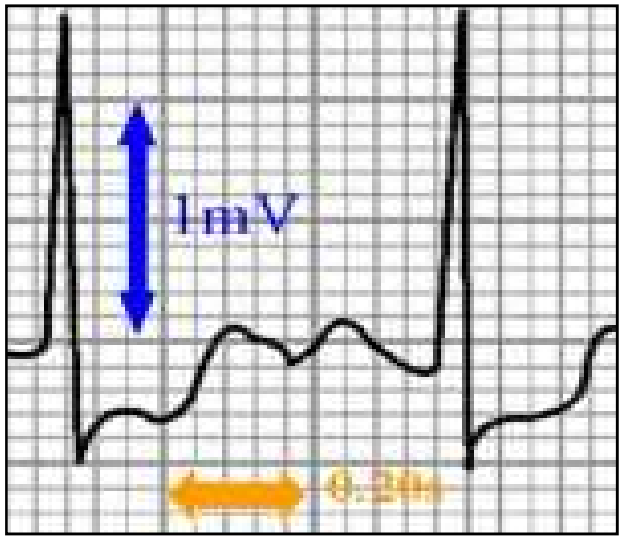
ISCHEMIC CHEST PAIN: DIAGNOSIS

- **12 LEAD EKG**
  - Look for ***ST segment elevation*** (at least 1mm in two contiguous leads)
  - Look for ***ST segment depression***
  - Look for ***T wave inversions***
  - Look for ***Q waves***
  - Look for new ***Left Bundle Branch Block*** (LBBB)
  - Always compare to old EKGs if possible

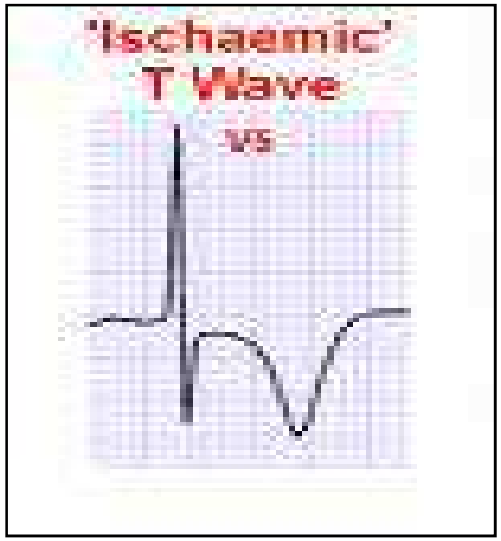
ACUTE MYOCARDIAL INFARCTION

TERRITORY	CORONARY ARTERY	EKG
INFERIOR	Right	II, III, AVF
ANTERIOR	Left AD	V2-V4
LATERAL	CIRCUMFLEX	V5-6, I, AVL
POSTERIOR	VARIABLE	TALL R WAVE IN V1/2 OR ST SEGMENT DEPRESSION

EKG CHANGES IN ISCHEMIC HEART DISEASE

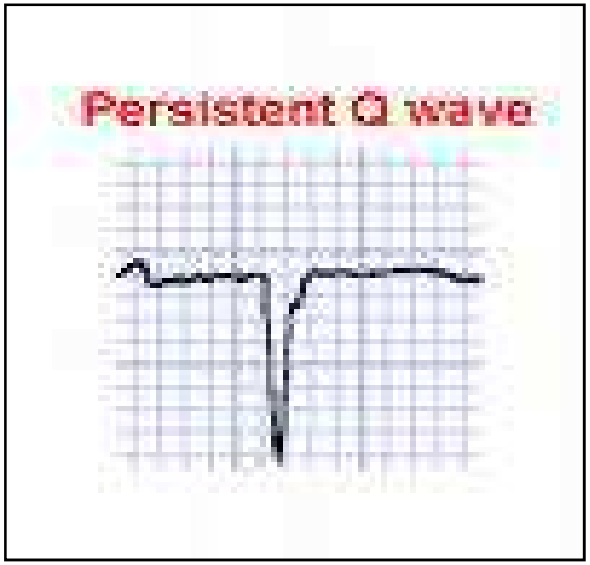


ST SEGMENT DEPRESSION

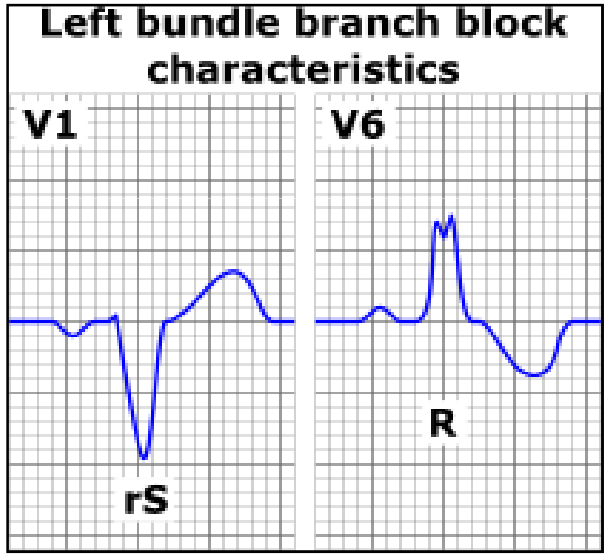


T WAVE INVERSION

EKG CHANGES IN ISCHEMIC HEART DISEASE

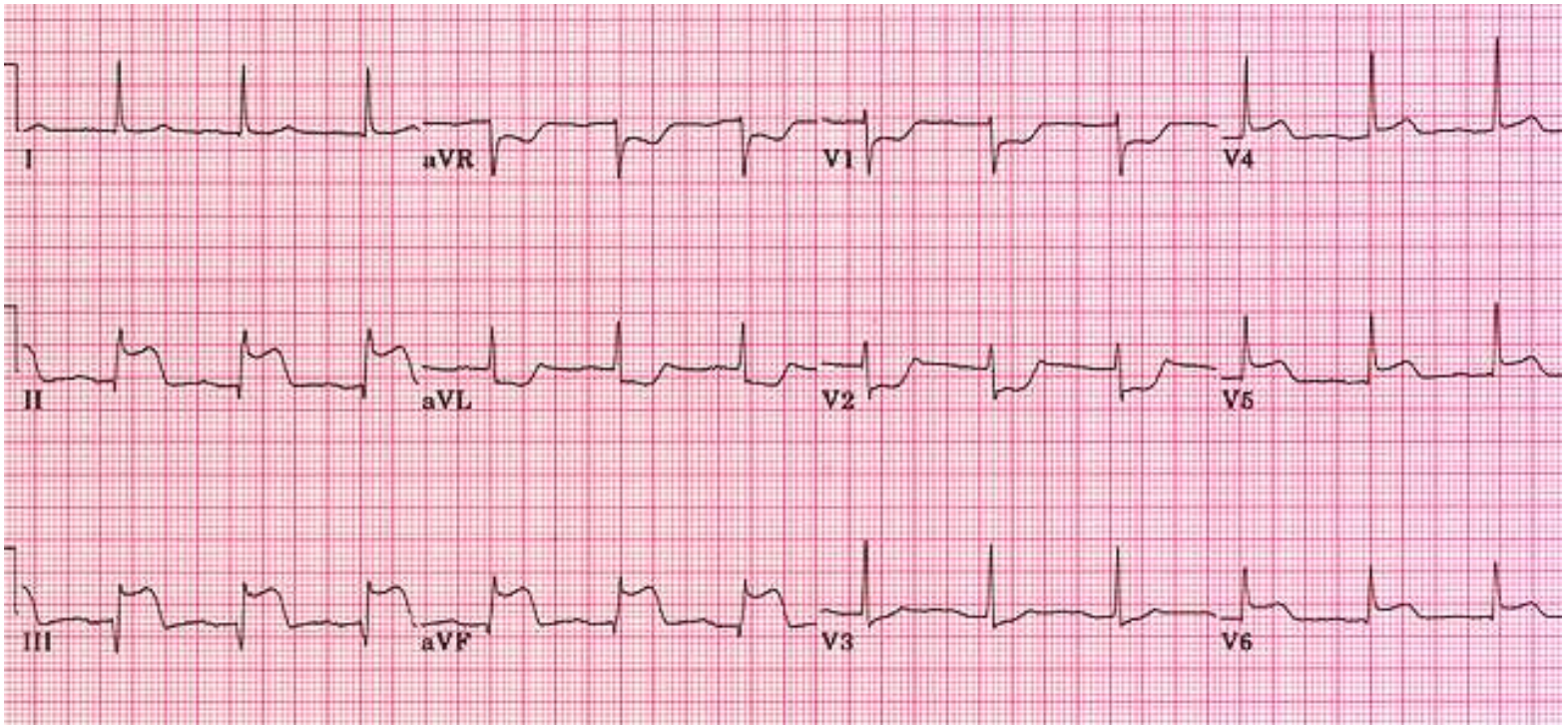


Q WAVES



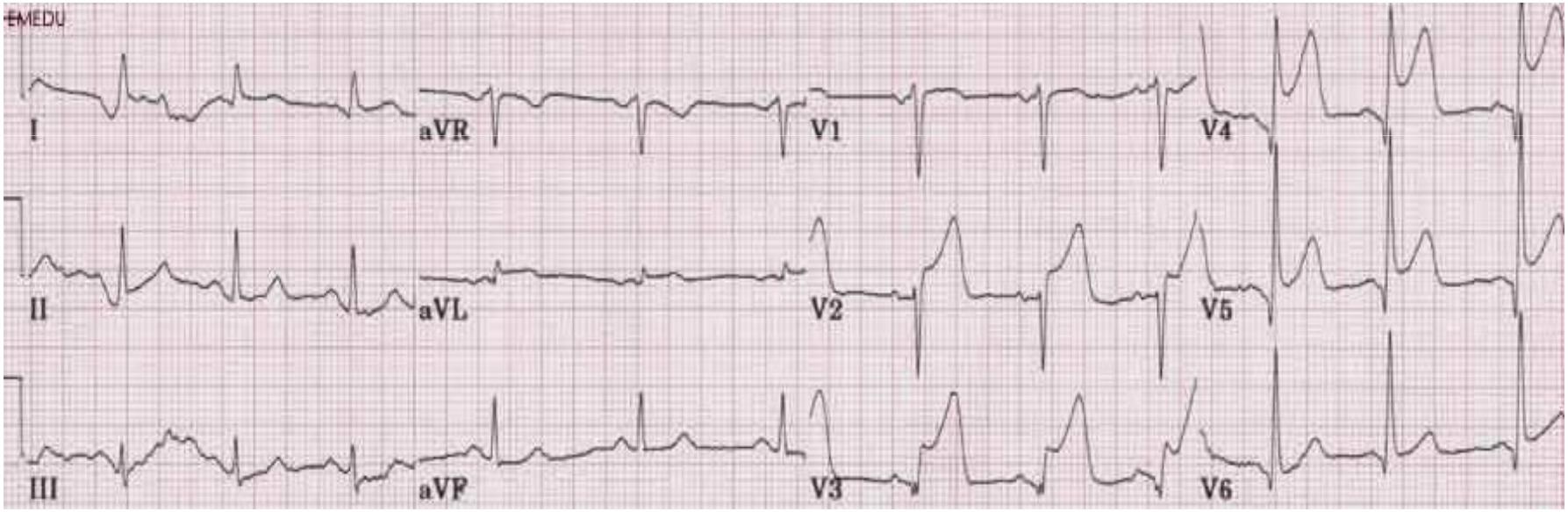
LBBB

ACUTE MYOCARDIAL INFARCTION



- ST ELEVATION II, III, AVF

ACUTE MYOCARDIAL INFARCTION



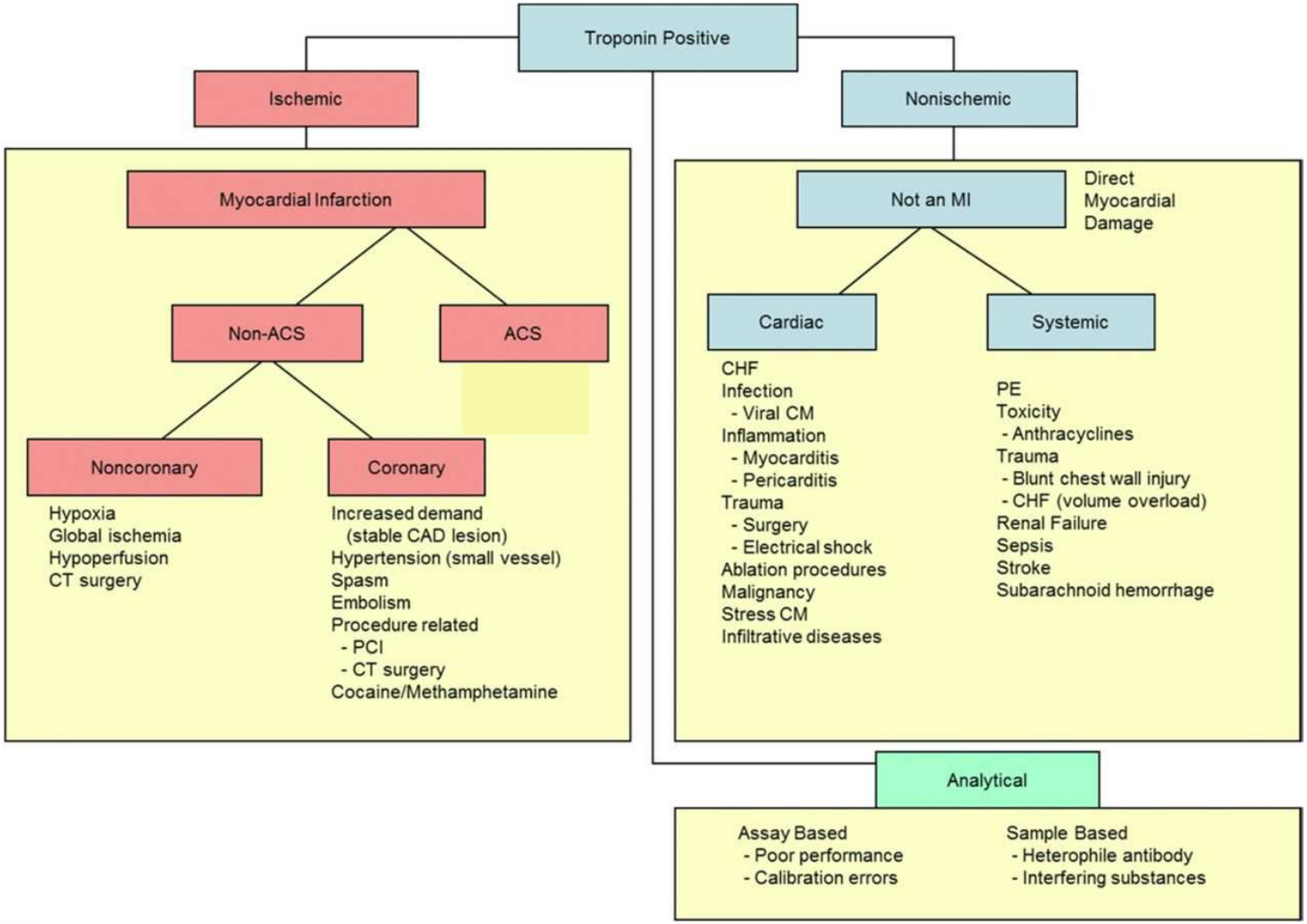
- ST SEGMENT ELEVATION V2-4

ISCHEMIC CHEST PAIN: DIAGNOSTIC TESTS

- **CARDIAC ENZYMES**

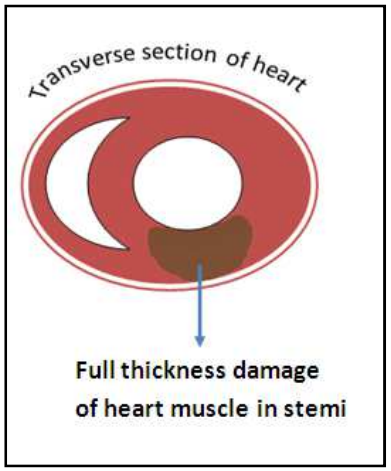
  - **Myoglobin**
    * Will rise within **3 hours,** peak within 4-9 hours, and return to baseline within 24 hrs.
  - **CK-MB**
    * Will rise within **4 hours,** peak within 12-24 hours and return to baseline in 2-3 days
  - **TROPONIN I**
    * Will rise within **6 hours,** peak in 12 hours and return to baseline in 3-4 days **(High Sensitive)**

Diagnostic algorithm for troponin positivity



Matthew W. Sherwood, and L. Kristin Newby J Am Heart Assoc 2014;3:e000403

STEMI TREATMENT



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American Heart Association®

ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction: A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines

Patrick T. O'Gara, Frederick G. Kushner, Deborah D. Ascheim, Donald E. Casey, Jr, Mina K. Chung, James A. de Lemos, Steven M. Ettinger, James C. Fang, Francis M. Fesmire, Barry A. Franklin, Christopher B. Granger, Harlan M. Krumholz, Jane A. Linderbaum, David A. Morrow, L. Kristin Newby, Joseph P. Ornato, Narith Ou, Martha J. Radford, Jacqueline E. Tamis-Holland, Carl L. Tommaso, Cynthia M. Tracy, Y. Joseph Woo and David X. Zhao

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STEMI

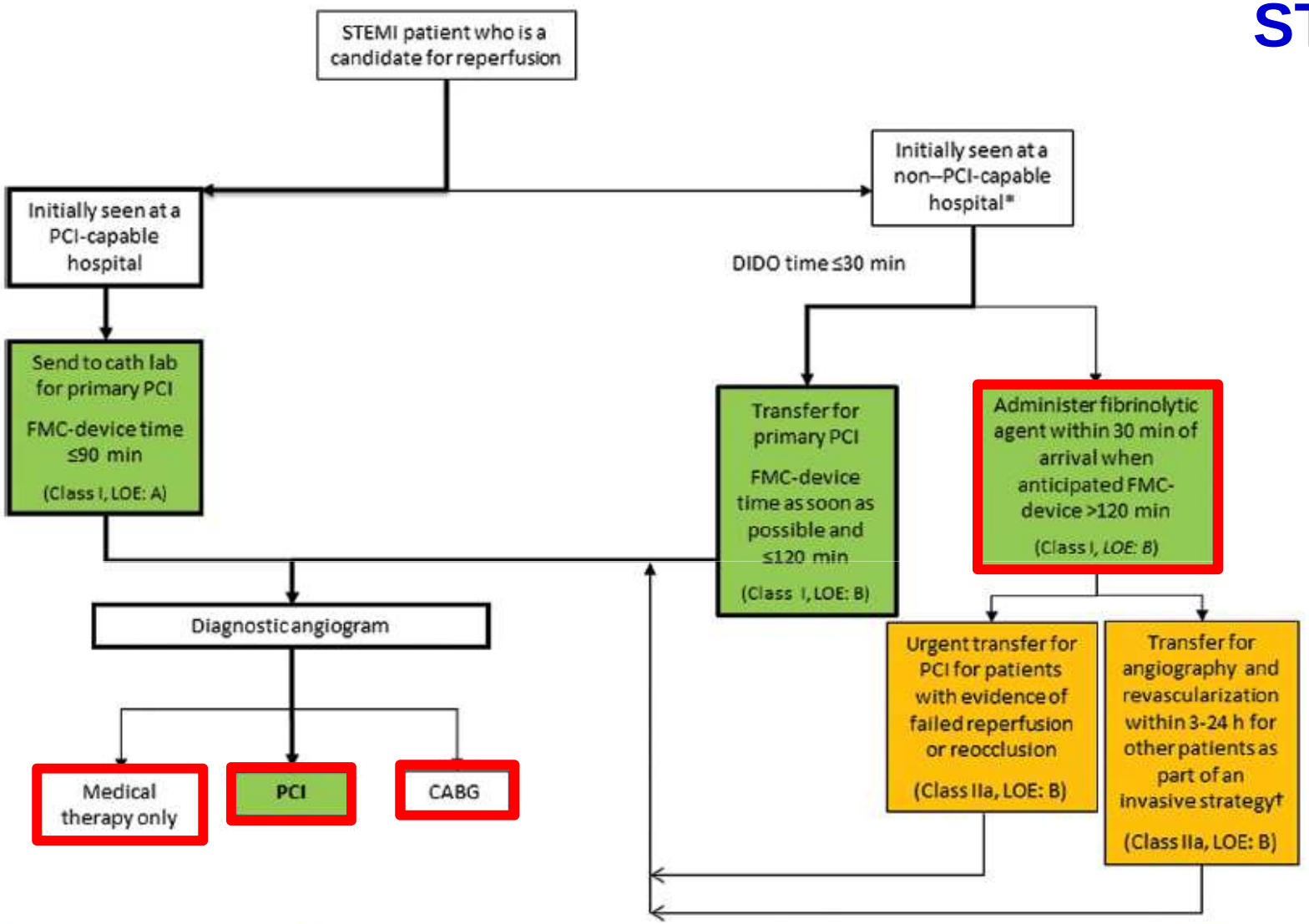


Figure 2. Reperfusion therapy for patients with STEMI. The bold arrows and boxes are the preferred strategies. Performance of PCI is dictated by an anatomically appropriate culprit stenosis. *Patients with cardiogenic shock or severe heart failure initially seen at a non–PCI-capable hospital should be transferred for cardiac catheterization and revascularization as soon as possible, irrespective of time delay from MI onset (*Class I, LOE: B*). †Angiography and revascularization should not be performed within the first 2 to 3 hours after administration of fibrinolytic therapy. CABG indicates coronary artery bypass graft; DIDO, door-in–door-out; FMC, first medical contact; LOE, Level of Evidence; MI, myocardial infarction; PCI, percutaneous coronary intervention; and STEMI, ST-elevation myocardial infarction.

Table 5. Fibrinolytic Agents

Fibrinolytic Agent	Dose	Fibrin Specificity*	Antigenic	Patency Rate (90-min TIMI 2 or 3 flow)
Fibrin-specific:				
Tenecteplase (TNK-tPA)	Single IV weight-based bolus†	++++	No	85%[328]
Reteplase (rPA)	10 U+10-U IV boluses given 30 min apart	++	No	84%[314]
Alteplase (tPA)	90-min weight-based infusion‡	++	No	73% to 84%[314,324,326]
Non–fibrin-specific:				
Streptokinase§	1.5 million units IV given over 30–60 min	No	Yes‖	60% to 68%[324,329]

*Strength of fibrin specificity; "++++" is more strong, "++" is less strong.

†30 mg for weight <60 kg; 35 mg for 60–69 kg; 40 mg for 70–79 kg; 45 mg for 80–89 kg; and 50 mg for ≥90 kg.

‡Bolus 15 mg, infusion 0.75 mg/kg for 30 min (maximum 50 mg), then 0.5 mg/kg (maximum 35 mg) over the next 60 min; total dose not to exceed 100 mg.

§Streptokinase is no longer marketed in the United States but is available in other countries.

‖Streptokinase is highly antigenic and absolutely contraindicated within 6 mo of previous exposure because of the potential for serious allergic reaction.

IV indicates intravenous; rPA, reteplase plasminogen activator; TIMI, Thrombolysis In Myocardial Infarction; TNK-tPA, tenecteplase tissue-type plasminogen activator; and tPA, tissue-type plasminogen activator.

STEMI

Table 12. Selected Routine Medical Therapies

Therapy	Indications	Dose/Administration	Avoid/Caution
Beta-Receptor Antagonists	• Oral: All patients without contraindication • IV: Patients with refractory hypertension or ongoing ischemia without contraindication	Individualize: • Metoprolol tartrate 25 to 50 mg every 6 to 12 h orally, then transition over next 2 to 3 d to twice-daily dosing of metoprolol tartrate or to daily metoprolol succinate; titrate to daily dose of 200 mg as tolerated • Carvedilol 6.25 mg twice daily, titrate to 25 mg twice daily as tolerated • Metoprolol tartrate IV 5 mg every 5 min as tolerated up to 3 doses; titrate to heart rate and BP	• Signs of HF • Low output state • Increased risk of cardiogenic shock • Prolonged first-degree or high-grade AV block • Reactive airways disease
ACE Inhibitors	• For patients with anterior infarction, post-MI LV systolic dysfunction (EF ≤ 0.40) or HF • May be given routinely to all patients without contraindication	Individualize: • Lisinopril 2.5 to 5 mg/d to start; titrate to 10 mg/d or higher as tolerated • Captopril 6.25 to 12.5 mg 3 times/d to start; titrate to 25 to 50 mg 3 times/d as tolerated • Ramipril 2.5 mg twice daily to start; titrate to 5 mg twice daily as tolerated • Trandolapril test dose 0.5 mg; titrate up to 4 mg daily as tolerated	• Hypotension • Renal failure • Hyperkalemia
ARB	• For patients intolerant of ACE inhibitors	• Valsartan 20 mg twice daily to start; titrate to 160 mg twice daily as tolerated	• Hypotension • Renal failure • Hyperkalemia
Statins	• All patients without contraindications	• High-dose atorvastatin 80 mg daily	• Caution with drugs metabolized via *CYP3A4*, fibrates • Monitor for myopathy, hepatic toxicity • Combine with diet and lifestyle therapies • Adjust dose as dictated by targets for LDL cholesterol and non–HDL cholesterol reduction
Nitroglycerin	• Ongoing chest pain • Hypertension and HF	• 0.4 mg sublingual every 5 min up to 3 doses as BP allows • IV dosing to begin at 10 mcg/min; titrate to desired BP effect	• Avoid in suspected RV infarction • Avoid with SBP <90 mm Hg or if SBP >30 mm Hg below baseline • Avoid if recent (24 to 48 h) use of 5′-phosphodiesterase inhibitors
Oxygen	• Clinically significant hypoxemia (oxygen saturation <90%) • HF • Dyspnea	• 2 to 4 L/min via nasal cannula • Increase rate or change to face mask as needed	• Caution with chronic obstructive pulmonary disease and CO_2 retention
Morphine	• Pain • Anxiety • Pulmonary edema	• 4 to 8 mg IV initially, with lower doses in elderly • 2 to 8 mg IV every 5 to 15 min if needed	• Lethargic or moribund patient • Hypotension • Bradycardia • Known hypersensitivity

ACE indicates angiotensin-converting enzyme; ARB, angiotensin receptor blocker; AV, atrioventricular; BP, blood pressure; CO_2, carbon dioxide; EF, ejection fraction; HDL, high-density lipoprotein; HF, heart failure; IV, intravenous; LDL, low-density lipoprotein; LV, left ventricular; MI, myocardial infarction; RV, right ventricular; and SBP, systolic blood pressure.

- **BETA BLOCCANTE**
- **ACE-I**
- **SARTANO**
- **STATINA**
- **NITRATO**
- **OSSIGENO**
- **MORFINA**

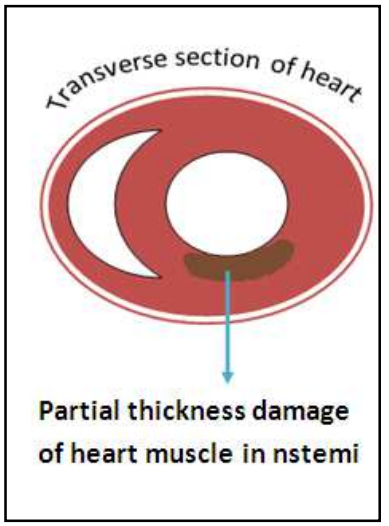
STEMI

Table 14 Plan of Care for Patients With STEMI

Plan of Care	Resources/References
Medications	
• Antithrombotic therapies	Sections 4.4, 5.1, 6.4
• Beta blockers	Section 8.1
• ACE inhibitors/ARBs/aldosterone antagonists	Section 8.2
• Statins	Section 8.3
	ESC STEMI Guideline[48]
	ACC/AHA 2012 SIHD Guideline[614]
Physical activity/cardiac rehabilitation	
• Physical Activity	AHA/ACC 2011 Update: Secondary Prevention and Risk Reduction Therapy[249]
• Cardiorespiratory fitness (MET capacity)	AACVPR/ACCF/AHA 2010 Update: Performance Measures on Cardiac Rehabilitation[616]
Risk factor modification/lifestyle interventions	
• Smoking cessation	AHA/ACC 2011 Update: Secondary Prevention and Risk Reduction Therapy[249]
	ACCP Tobacco Cessation Toolkit[615]
• Diet/nutrition	AHA/ACC 2011 Update: Secondary Prevention and Risk Reduction Therapy[249]
Management of comorbidities	
• Overweight/obesity	AHA/ACC 2011 Update: Secondary Prevention and Risk Reduction Therapy[249]
• Lipids	AHA/ACC 2011 Update: Secondary Prevention and Risk Reduction Therapy[249]
• Hypertension	NHLBI National Hypertension Education Program (JNC VII)[617]
• Diabetes	AHA/ADA CVD Prevention in DM Patients[618]
• HF	ACC/AHA/HFSA HF Guideline[619]
• Arrhythmia/arrhythmia risk	ACC/AHA/HRS DBT & AF Guidelines[496,501]
Psychosocial factors	
• Sexual activity	AHA Scientific Statement on Sexual Activity and Cardiovascular Disease[627a]
• Gender-specific issues	Cardiovascular Disease Prevention in Women Guidelines[620]
• Depression, stress, and anxiety	AHA Scientific Statement on Depression[621]
• Alcohol use	AHA/ACC 2011 Update: Secondary Prevention and Risk Reduction Therapy[249]
• Culturally sensitive issues	
Provider follow-up	
• Cardiologist	H2H Quality Initiative http://www.h2hqua
• Primary care provider	
• Advanced practice nurse/physician assistant	
• Other relevant medical specialists	
• Electronic personal health records	
• Influenza vaccination	Centers for Disease Control Adult Vaccin
Patient/family education	
• Plan of care for acute MI	AHA CPR Guideline[201]
• Recognizing symptoms of MI	
• Activating EMS, signs and symptoms for urgent vs emergency evaluations	
• CPR training for family members	
• Risk assessment & prognosis	
• Advanced directives	
• Social networks/social isolation	
Socioeconomic factors	
• Access to health insurance coverage	
• Access to healthcare providers	http://www.qualityforum.org/Topics/Care_Coordination.Aspx
• Disability	
• Social services	
• Community services	

- **Farmaci**
- **Att. Fisica**
- **Stile di vita**
- **Nutrizione**
- **Comorbidità**
- **Fatt. psicologici/sociali**
- **Follow-up medici**
- **Educazione pz e famiglia**
- **Fatt. socio-economici**

NON-STEMI TREATMENT



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2012 Writing Committee Members, Hani Jneid, Jeffrey L. Anderson, R. Scott Wright, Cynthia D. Adams, Charles R. Bridges, Donald E. Casey, Jr, Steven M. Ettinger, Francis M. Fesmire, Theodore G. Ganiats, A. Michael Lincoff, Eric D. Peterson, George J. Philippides, Pierre Theroux, Nanette K. Wenger and James Patrick Zidar

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NON STEMI

Appendix 6. Selection of Initial Treatment Strategy: Invasive Versus Conservative Strategy

Generally Preferred Strategy	Patient Characteristics
Invasive	Recurrent angina or ischemia at rest or with low-level activities despite intensive medical therapy
	Elevated cardiac biomarkers (TnT or TnI)
	New or presumably new ST-segment depression
	Signs or symptoms of HF or new or worsening mitral regurgitation
	High-risk findings from noninvasive testing
	Hemodynamic instability
	Sustained ventricular tachycardia
	PCI within 6 mo
	Prior CABG
	High-risk score (eg, TIMI, GRACE)
	Mild to moderate renal dysfunction
	Diabetes mellitus
	Reduced LV function (LVEF <40%)
Conservative	Low-risk score (eg, TIMI, GRACE)
	Patient or physician preference in the absence of high-risk features

CABG indicates coronary artery bypass graft; GRACE, Global Registry of Acute Coronary Events; HF, heart failure; LV, left ventricular; LVEF, left ventricular ejection fraction; PCI, percutaneous coronary intervention; TIMI, Thrombolysis In Myocardial Infarction; TnI, troponin I; and TnT, troponin T.

Reprinted from Anderson et al.[4]

TIMI Risk Score for STEMI

Historical	
Age 65-74	2 points
≥ 75	3 points
DM/HTN or angina	1 point
Exam	
SBP < 100	3 points
HR >100	2 points
Killip II-IV	2 points
Weight < 67 kg	1 point
Presentation	
Anterior STE or LBBB	1 point
Time to rx > 4 hrs	1 point
Risk Score = Total	(0 -14)

(FRONT)

Risk Score	Odds of death by 30D*	
0	0.1	(0.1-0.2)
1	0.3	(0.2-0.3)
2	0.4	(0.3-0.5)
3	0.7	(0.6-0.9)
4	1.2	(1.0-1.5)
5	2.2	(1.9-2.6)
6	3.0	(2.5-3.6)
7	4.8	(3.8-6.1)
8	5.8	(4.2-7.8)
>8	8.8	(6.3-12)

*referenced to average mortality (95% confidence intervals)

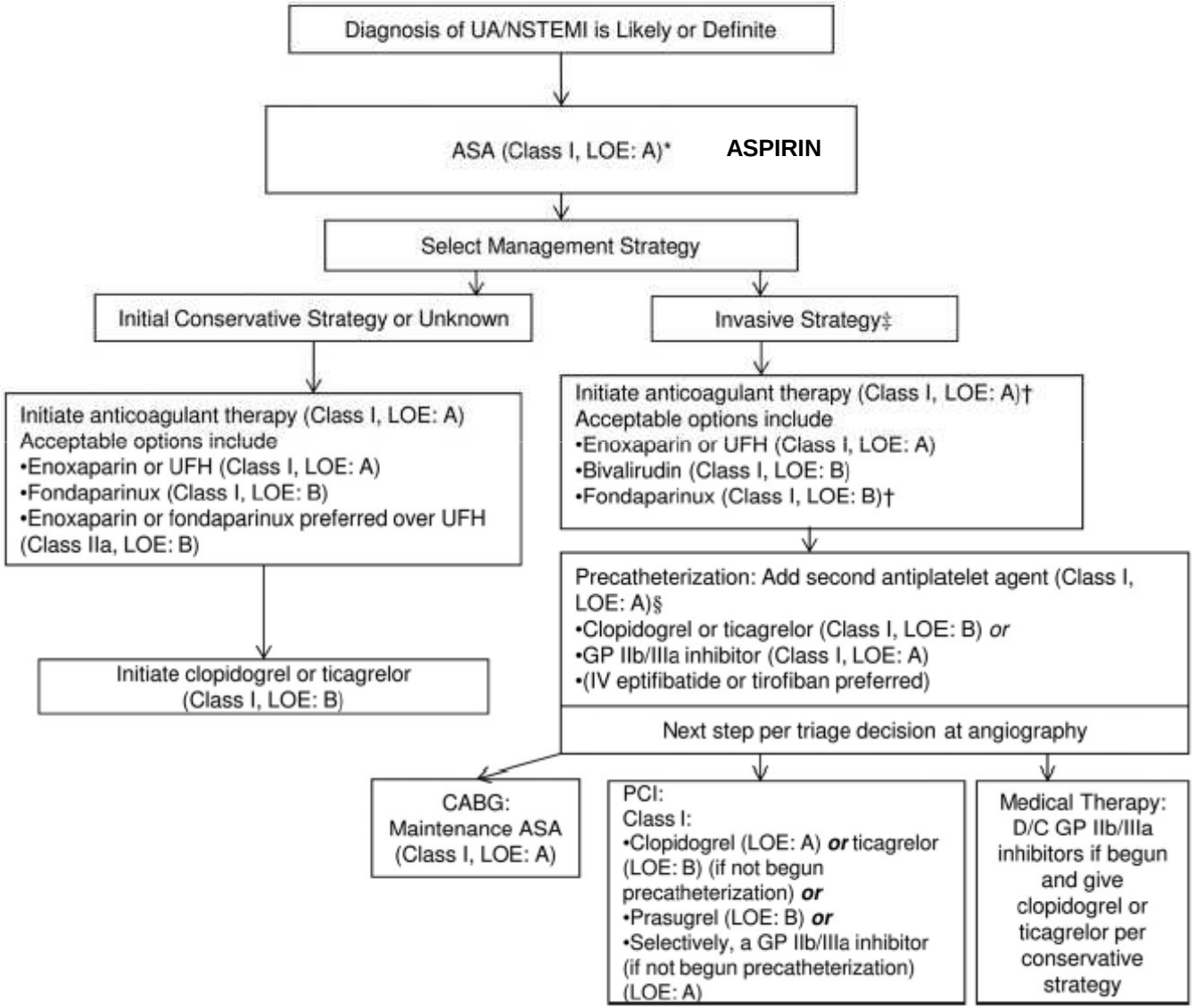
(BACK)

The Killip Classification System

Class I: No clinical heart failure
Class II: Rales 1/2 way up lung fields
Class III: Rales in all lung fields (APE)
Class IV: Cardiogenic shock

NON STEMI

Appendix 5. Flowchart for Class I and Class IIa Recommendations for Initial Management of UA/NSTEMI



ATYPICAL CAD PAIN

- ***RISK FACTORS FOR DEVELOPING ATYPICAL PAIN:***
- ***Diabetes***
- ***Females***
- ***Non white patients***
- ***Elderly***
- ***Dementia***

- ***ATYPICAL SYMPTOMS:***
- ***GIT symptoms !***
- ***Syncope***
- ***Dyspnea***
- ***Pleuritic/positional pain***
- ***Chest wall tenderness***
- ***<u>No chest pain at all !!!</u>***

NO CHEST PAIN:

- increased risk of death
- more complications: hypotension, heart failure, stroke
- delayed presentation: delayed intervention !

LOW RISK CARDIAC CHEST PAIN

- If patient with chest pain but low CHD risk, you can consider serial EKGs and enzymes.

- If normal, you can order stress test (cyclo-ergometer)

VALVULAR HEART DISEASE

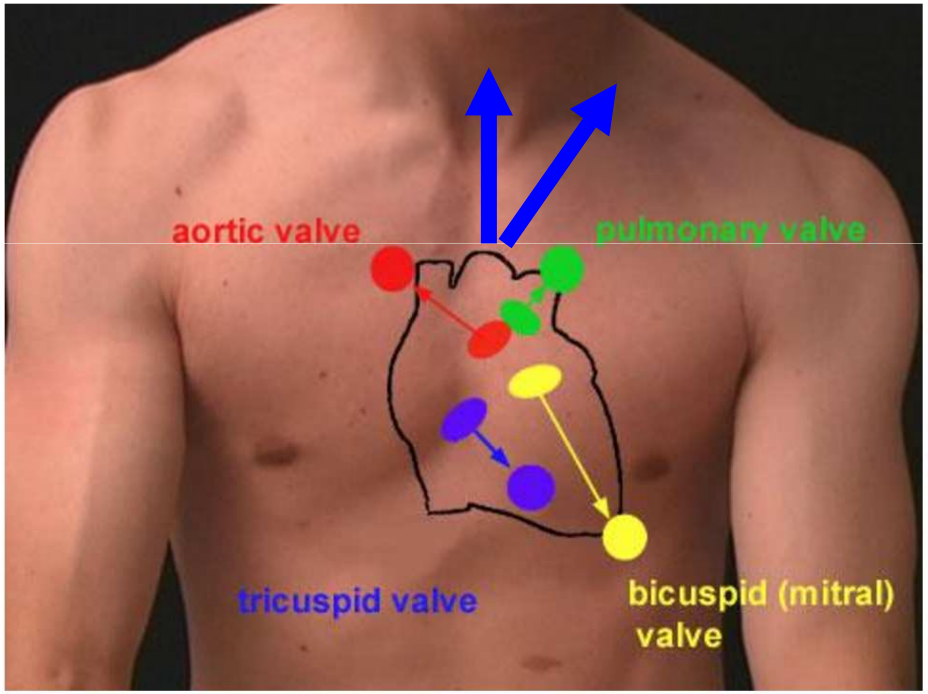
• AORTIC STENOSIS

* ***Classical TRIAD:*** ***dyspnea, chest pain, and syncope***
* Harsh systolic ejection murmur at right 2nd intercostal space radiating towards carotids
* Carotid pulse: slow rate of increase
* Try to avoid nitrates: theses patients are preload dependent !

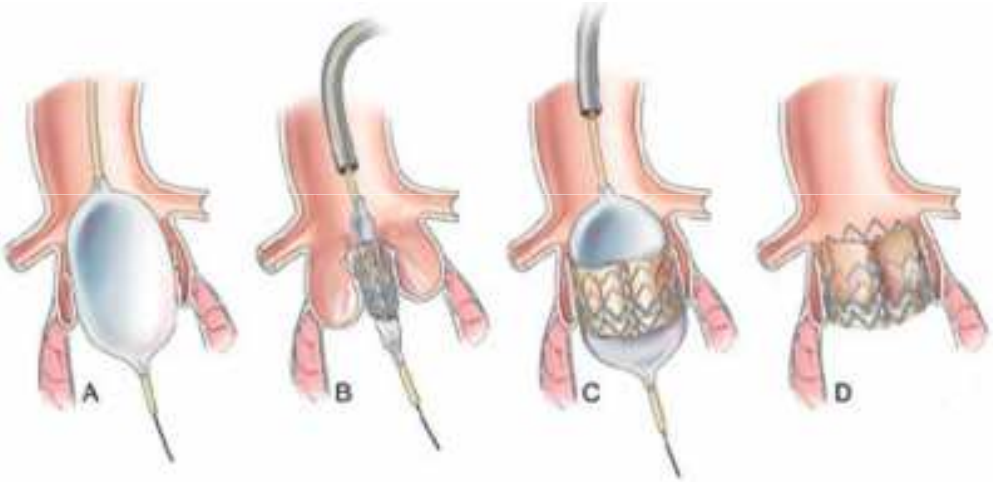
• MITRAL VALVE PROLAPSE

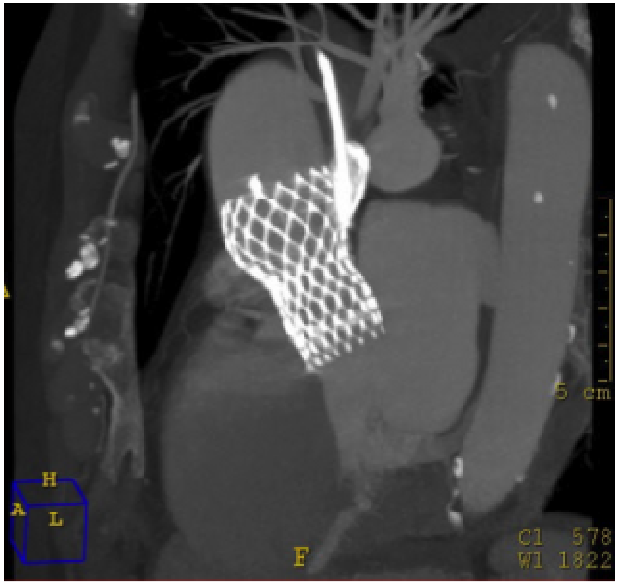
* Symptoms include atypical ***chest pain***, *palpitations, fatigue, dyspnea*
* Often hear mid-systolic click
* Patients with chest pain or palpitations often respond to beta blockers.

Heart Sounds & Murmurs



Transcatheter Aortic Valve Implantation (TAVI)





ACUTE PERICARDITIS

- **CLINICAL FEATURES**
  - **Sharp, stabbing chest pain**
  - Pleuritic chest pain
  - Pain often referred to left trapezoidal ridge
  - ***Pain more severe when supine***
  - ***Pain often relieved when sitting up and leaning forward***
  - Listen for pericardial friction rub

ACUTE PERICARDITIS

- **COMMON CAUSES**

  * IDIOPATHIC (?)
  * INFECTIOUS
  * MALIGNANCY (LUNG, METASTASIS)
  * UREMIA
  * RADIATION INDUCED
  * POST AMI (DRESSLER SYNDROME)
  * MYXEDEMA
  * DRUG INDUCED (PROCAINAMIDE, HYDRALAZINE)
  * SYSTEMIC RHEUMATIC DISEASES

ACUTE PERICARDITIS: DIAGNOSTIC TESTS

- **EKG**

  * ***Look for diffuse ST segment elevation and PR depression***.
  * If large pericardial effusion/tamponade, may see ***low voltage and electrical alternans***

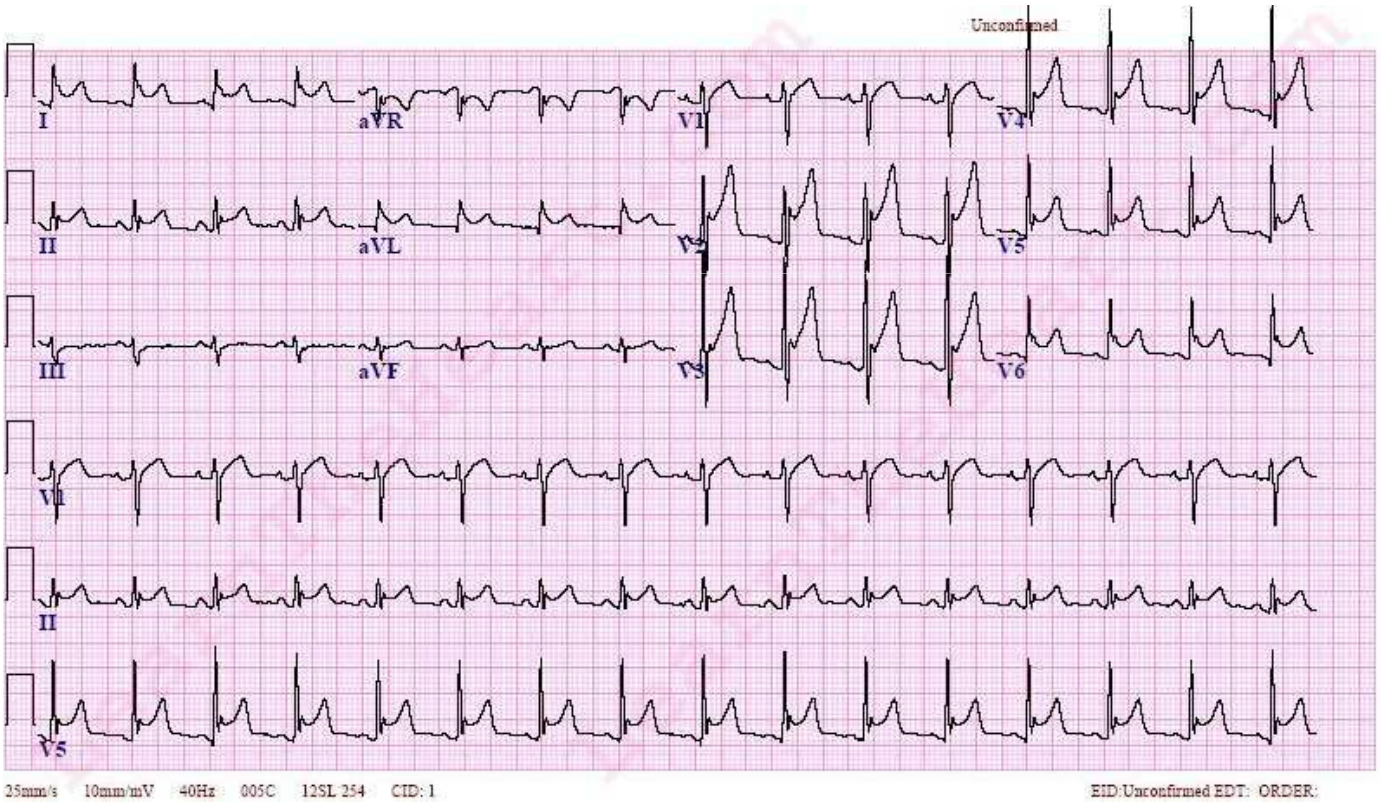
- **CXR**

  * Usually of limited value
  * Look at size of cardiac silhouette

- **ECHO**

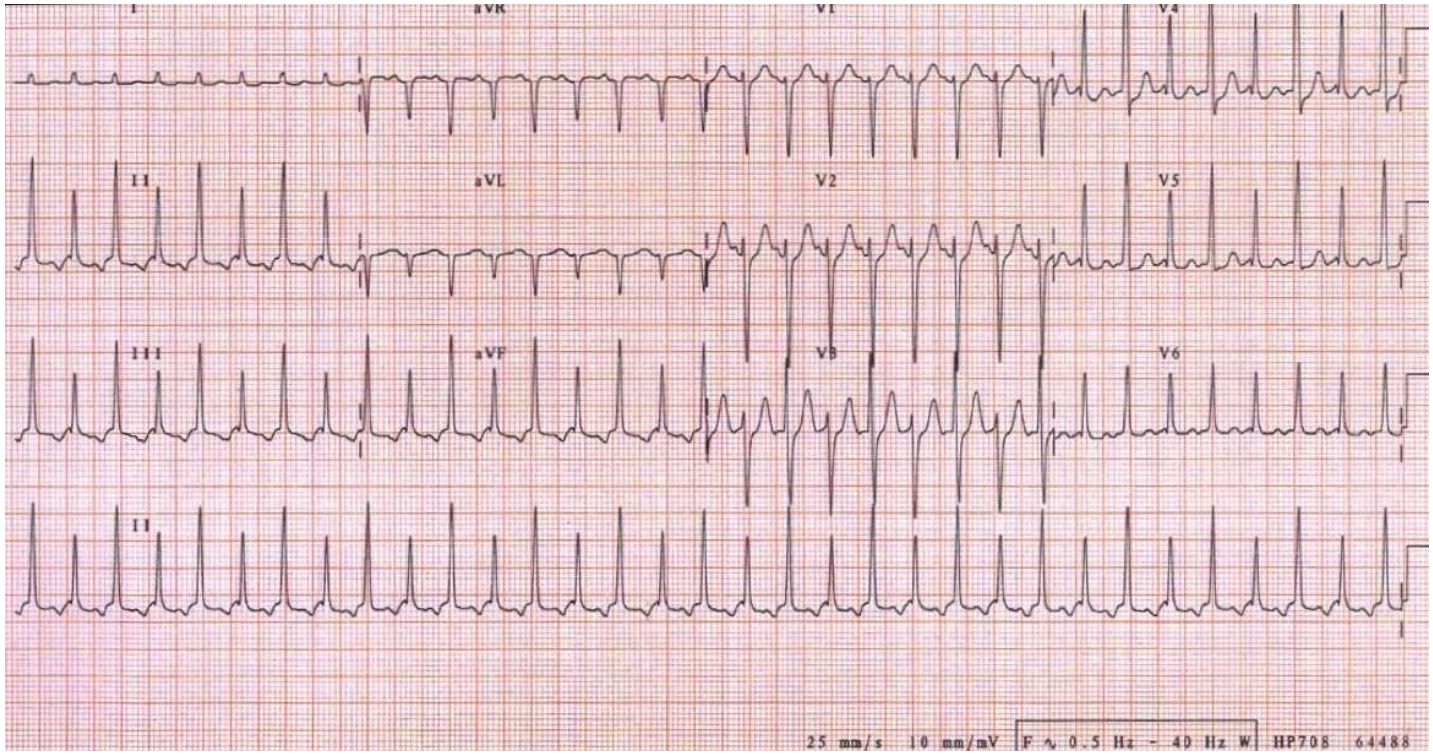
  * ***To look for pericardial effusion***

ACUTE PERICARDITIS



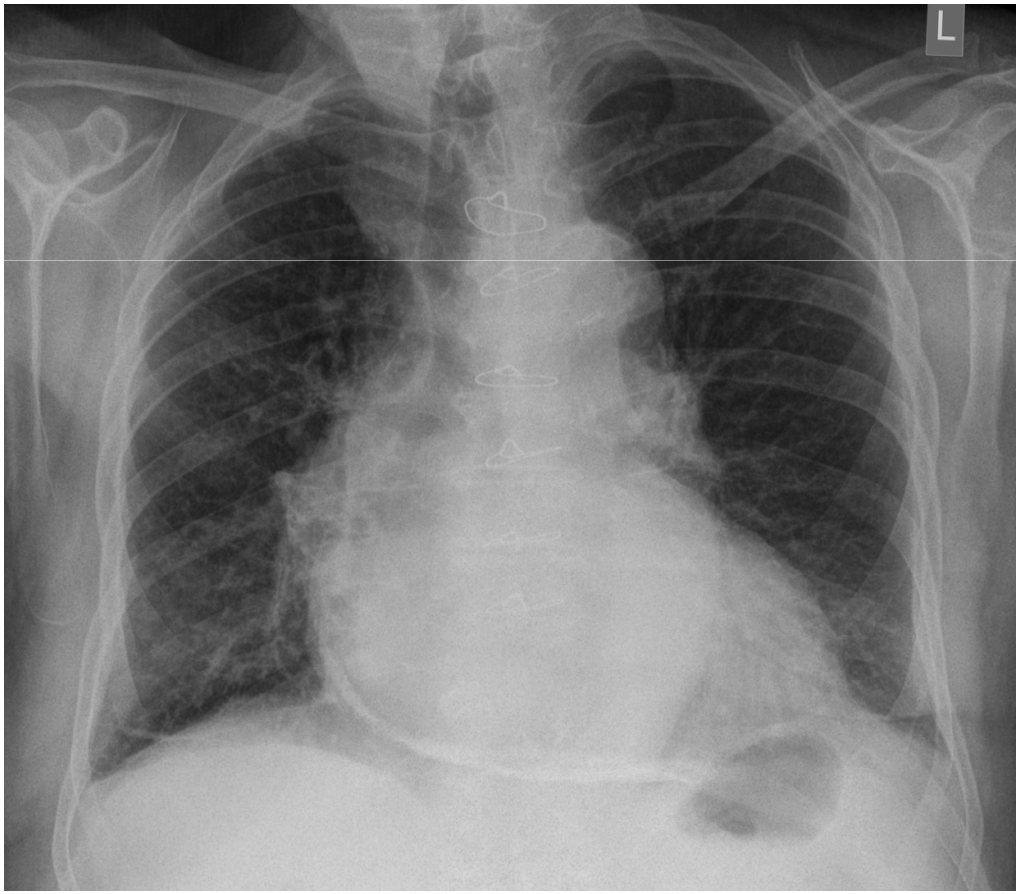
- ST segment elevation

TAMPONADE



- ELECTRICAL ALTERNANS

PERICARDITIS



ACUTE PERICARDITIS

- **TREATMENT:**

If idiopathic or suspected viral:

- **NSAIDs:** diclofenac, naproxen, ketoprofen
- **Steroids:** if refractory
- **Colchicine** (both in acute and chronic)
- **Diuretics:** may reduce liquid

Otherwise treat underlying pathology

Colchicine

- mechanism of action poorly understood
- reduces inflammatory response to deposited crystals
- diminishes PMN phagocytosis of crystals
- blocks cellular response to deposited crystals

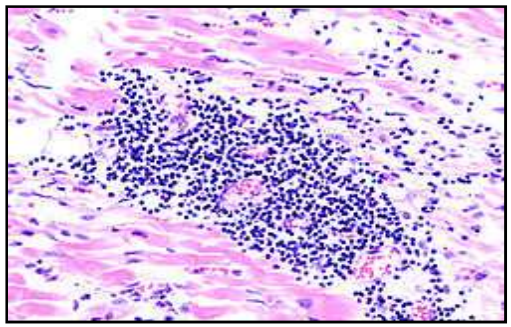
Colchicine - indications

Dose	*Indication*
high	treatment of acute gouty arthritis
low	prevention of recurrent gouty arthritis

Pericarditis, Ereditary Familial Fevers

MYOCARDITIS

- Inflammation of heart muscle
- Frequently accompanied by pericarditis
- **Chest pain;** fever is also often present
- ***Tachycardia out of proportion to fever***
- If mild, signs of pericarditis + fevers, myalgias, headache
- If severe: will also see signs of **heart failure**
- May see elevated cardiac enzymes
- Treatment: largely supportive

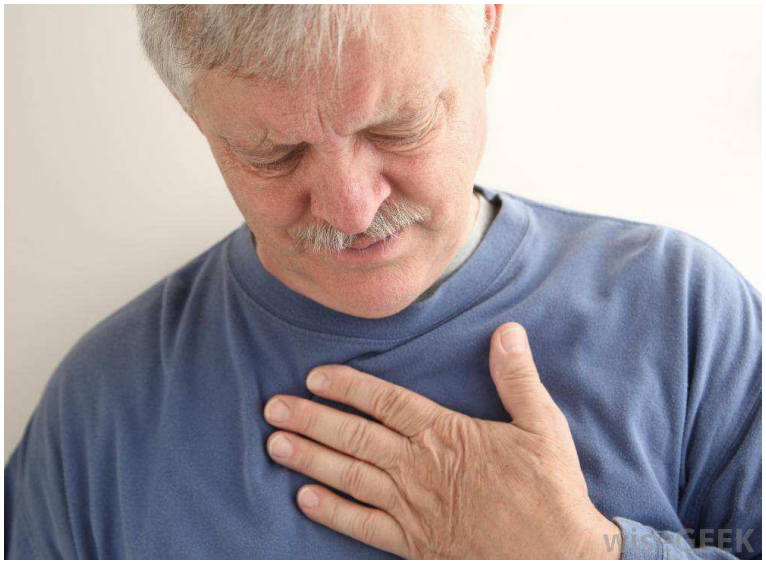


BOX

Etiology of human infectious and non-infectious inflammatory cardiomyopathy

- **Viral infections**
  - Adenoviruses
  - Enteroviruses (Coxsackie A/B, Echo)
  - Cytomegalovirus
  - Erythroviruses
  - Herpesviruses
  - Influenza A/B
  - HIV
  - Hepatitisvirus C
  - Poliovirus
  - Varicella zoster
  - Arboviruses
  - Mixed infections
- **(Auto-)Immune activation**
  - Postinfectious
  - Influenza vaccination
  - SLE (systemic Lupus erythematodes)
  - Sarcoidosis
  - Sjögren's syndrome
  - Churg-Strauss syndrome
  - Wegener's granulomatosis
  - Takayasu arteritis
  - Inflammatory bowel disorders
  - Giant cell myocarditis
- **Bacteria**
  - Mycobacteria
  - Chlamydia
  - Streptococci
  - Mycoplasma
  - Legionella spp
  - Salmonella spp
  - Rickettsia spp
  - Corynebacteria
  - Borrelia spp
- **Protozoa**
  - Trypanosoma cruzi
  - Toxoplasma gondii
  - Trichinosis/trichinellosis
  - Echinococci
- **Toxins**
  - Anthracyclines
  - Catecholamines
  - Cytokines
  - Cocaine
  - Alcohol
  - Chemotherapeutic drugs
- **Allergic/hypersensitive**
  - Penicillin
  - Tricyclic antidepressants
  - Clozapine
  - Antirheumatic drugs
  - Sulfonamides
  - Cephalosporins
- **Physical pathogens**
  - Arsenic
  - Lithium
  - Irradiation
  - Hypothermia
  - Heat stroke
- **Parasites**
  - Schistosomiasis
  - Larva migrans
- **Fungal infections**
  - Aspergillus
  - Candida
  - Cryptococus
  - Histoplasmodium spp

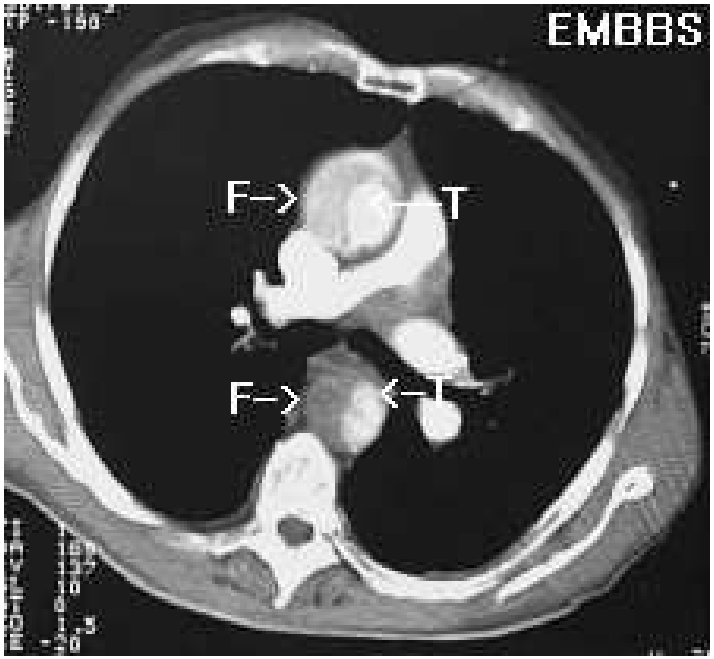
4. VASCULAR CAUSES OF CHEST PAIN



DDX: CHEST PAIN

- VASCULAR CAUSES

  - Aortic Dissection

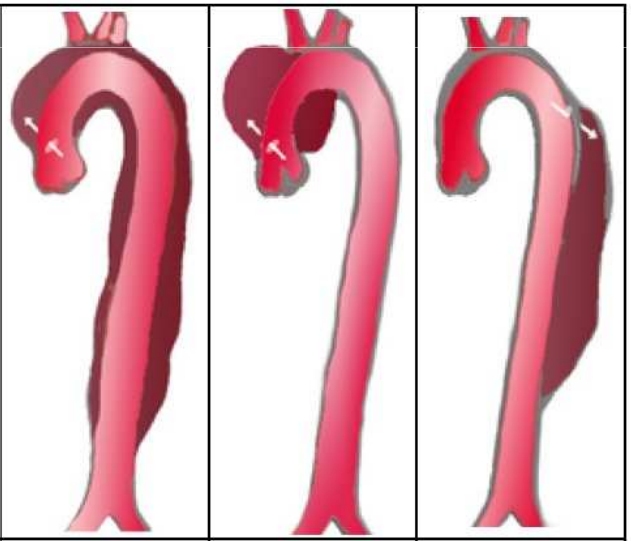


AORTIC DISSECTION

- RISK FACTORS

  - UNCONTROLLED HYPERTENSION
  - CONGENITAL HEART DISEASE
  - CONNECTIVE TISSUE DISEASE
  - PREGNANCY
  - IATROGENIC (AORTIC CATHETERIZATION OR CARDIAC SURGERY)

Classification of aortic dissection



Percentage	60%	10–15%	25–30%
Type	DeBakey I	DeBakey II	DeBakey III
	Stanford A (Proximal)		Stanford B (Distal)

AORTIC DISSECTION

- **CLINICAL FEATURES**

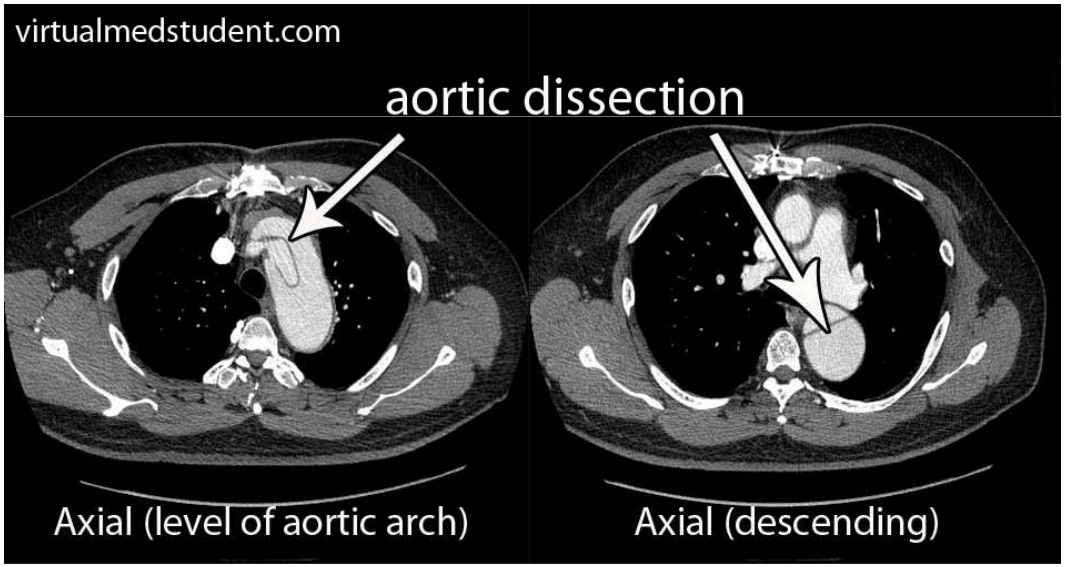
  * **Abrupt onset of Chest Pain or pain between scapulae**
  * Tearing (lacerante) - ripping pain
  * **Pain often worst at symptom onset**
  * As other vessels become affected, will see:
    - Stroke symptoms: carotid artery involvement
    - Tamponade: ascending dissection into aortic root
    - New onset aortic regurgitation
    - Abdominal/flank pain/limb ischemia: dissection into abdominal aorta, renal arteries, iliac arteries
    - AMI
  * ***Decreased pulsations in radial, femoral, carotid arteries***
  * ***Significant blood pressure differences between extremities***
  * Usually hypertension (but if tamponade, hypotension)

DIAGNOSIS: AORTIC DISSECTION

- CT SCAN
- ANGIOGRAPHY
- TRANS ESOPHAGEAL ECO
- CXR

** SUSPECTED DISSECTION MUST BE CONFIRMED RADIOLOGICALLY PRIOR TO OPERATIVE REPAIR.

AORTIC DISSECTION



AORTIC DISSECTION

- TREATMENT:

  - **ANTIHYPERTENSIVE THERAPY**

* Start with Beta-Blockers

* Can add vasodilators (Nitroprusside, Nitrates) if further BP control is needed ONLY after have achieved HR control with beta blockers

- If descending: may be able to medically manage

5. G.I. CAUSES OF CHEST PAIN

DDX: CHEST PAIN

- **G.I. CAUSES**

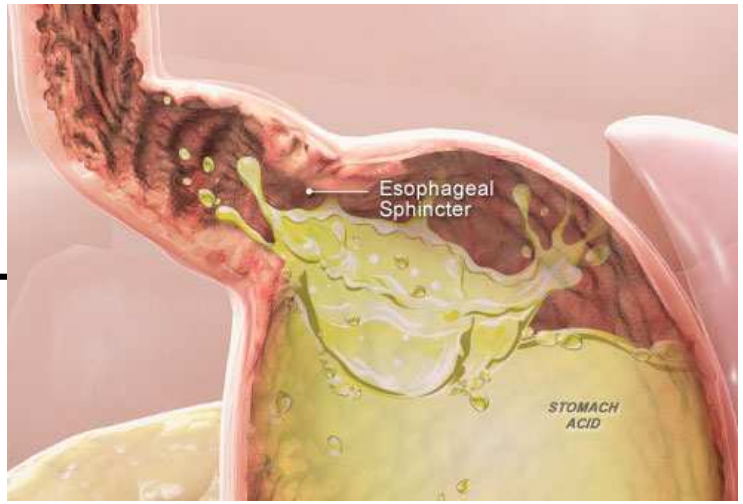
- ESOPHAGEAL:

- Reflux (NERD: Non Esophagitis Reflux Disease)
- Esophagitis (GERD: Gastro Esophageal Reflux Disease)
- Rupture (*Boerhaave Syndrome*)
- Spasm / motility disorder / foreign Body / secondary to stricture

- OTHER:

- Consider pain referred from peptic ulcer, biliary disease or pancreatitis

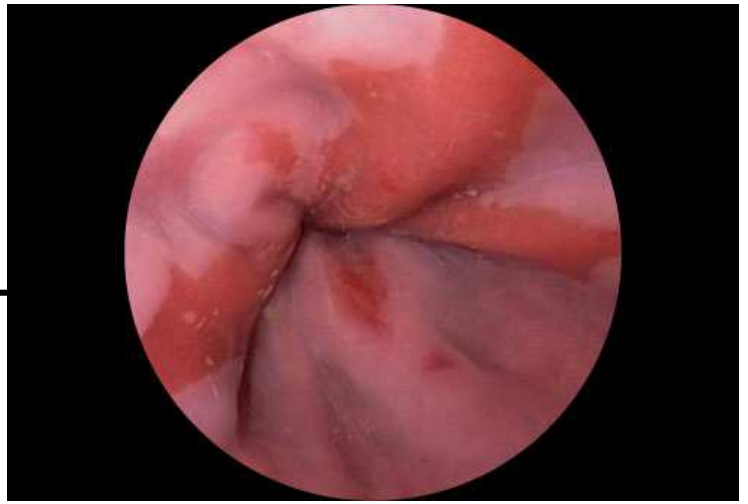
G E R D



- **RISK FACTORS:**

- High fat food
- Caffeine, Nicotine, Alcohol
- Medicines: Calcium Channel blockers,
- Nitrates, Anticholinergics
- Pregnancy
- Diabetes
- Scleroderma

G E R D

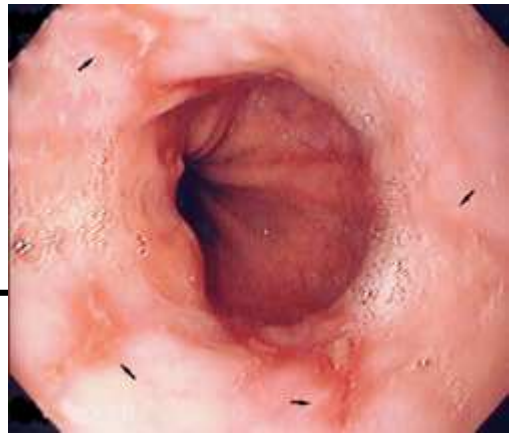


- **CLINICAL FEATURES**
  - ***Burning Pain***
  - Association with sour taste in mouth, nausea/vomiting
  - May be relieved by antacid drugs
  - May find association with food
  - **May mimic ischemic disease and vice versa**

- **TREATMENT**

- **PPI: esomeprazol 40 mg day / lansoprazol 30 mg day / pantoprazol 40 mg day or H2 blockers (ranitidine 300 mg day)**
- Behavior modification:
  - Avoid alcohol, nicotine, caffeine, and fatty foods
  - Avoiding eating prior to sleep (eating > 2 hours before sleep)
  - Sleep with elevated head of bed (3-5 cm)

ESOPHAGITIS



- **CLINICAL FEATURES**
  - **Chest pain** + odynophagia (pain with swallowing)
- Causes
  - Inflammatory process: GERD or med related
  - Infectious process: candida or herpes simplex virus (often seen in immunocompromised patients)
- DIAGNOSIS: Endoscopy with biopsy and culture
- TREATMENT: Address underlying pathology

ESOPHAGEAL PERFORATION

- CAUSES

  - Iatrogenic: endoscopy

  - ***Boerhaave Syndrome:*** spontaneous rupture secondary to increased intra-esophageal pressure

    - Often presents as *sudden onset of chest pain* immediately *following episode of forceful vomiting*

  - Trauma

  - Foreign body

ESOPHAGEAL PERFORATION

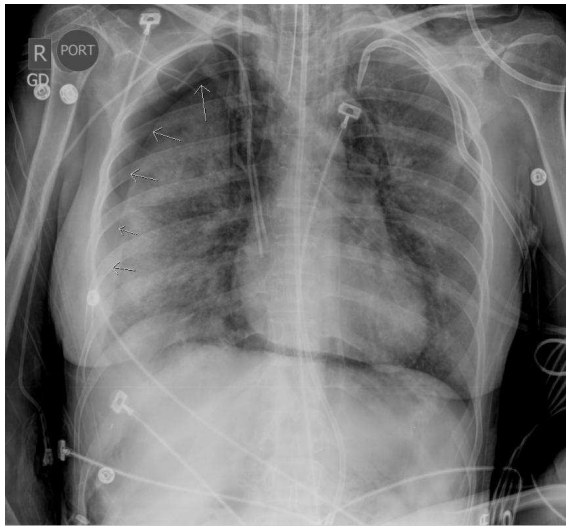
- **CLINICAL FEATURES**

- **Acute persistent chest pain that may radiate to back, shoulders, and neck**
- **Pain often worse with swallowing**
- **Shortness of breath**
- **Tachypnea and abdominal rigidity**
- If severe will see: fever, tachycardia, hypotension, sub-cutaneous emphysema, necrotizing mediastinitis
- Listen for Hamman's crunch (rasping sound, synchronous with the heart-beat typical of pneumo-mediastinum)

ESOPHAGEAL PERFORATION

- DIAGNOSIS
  - CXR: May see **pleural effusion** (usually on left)
    Also may see **subcutaneous emphysema, pneumomediastinum, pneumothorax**
  - CT chest
  - Esophageal endoscopy
- TREATMENT
  - Broad spectrum antibiotics
  - Immediate surgical consultation

ESOPHAGEAL PERFORATION



ESOPHAGEAL MOTILITY DISORDERS

- CLINICAL FEATURES:

  * **Chest pain** often induced by ingestion of liquids at extremes of temperature

  * Often will experience dysphagia

- DIAGNOSIS:

  * Esophageal manometry

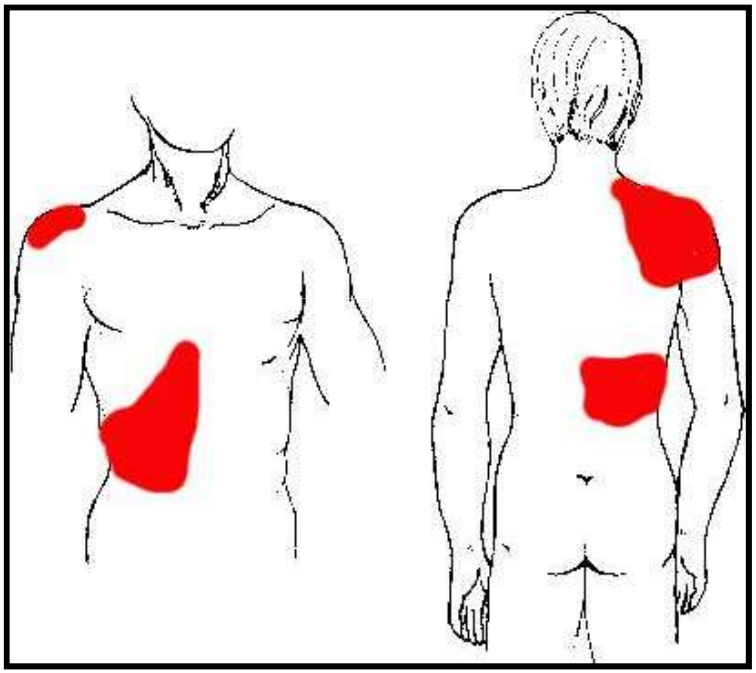
OTHER G.I. CAUSES

In appropriate setting you may also consider:

- **Peptic Ulcer Disease**
- **Biliary Disease**
- **Pancreatitis**

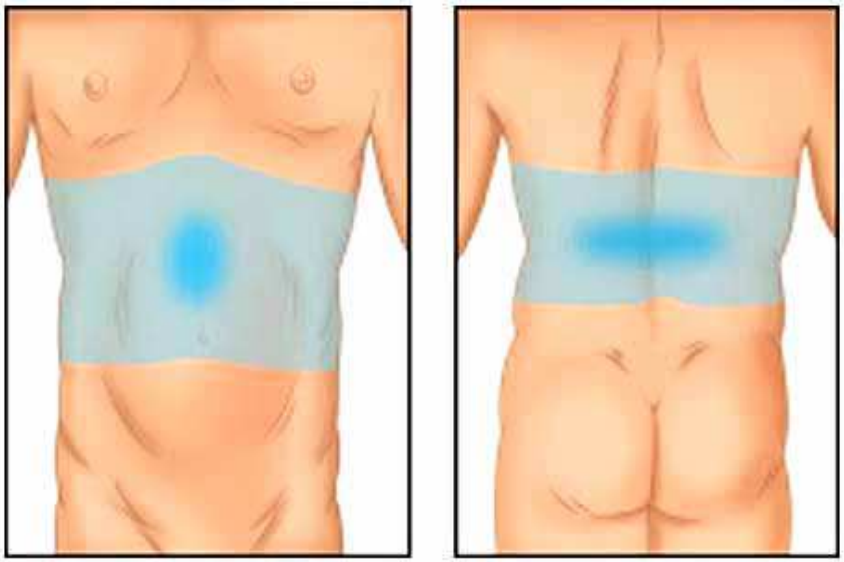
in the differential diagnosis of ***chest pain***

OTHER G.I. CAUSES



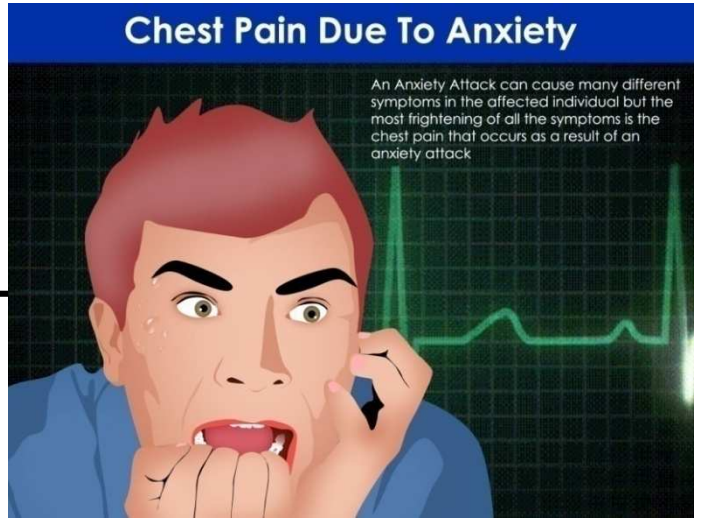
Biliary Disease

Pancreatic pain



6. PSYCHOLOGICAL CAUSES

PSYCHOLOGICAL



- It is only a diagnosis of exclusion !

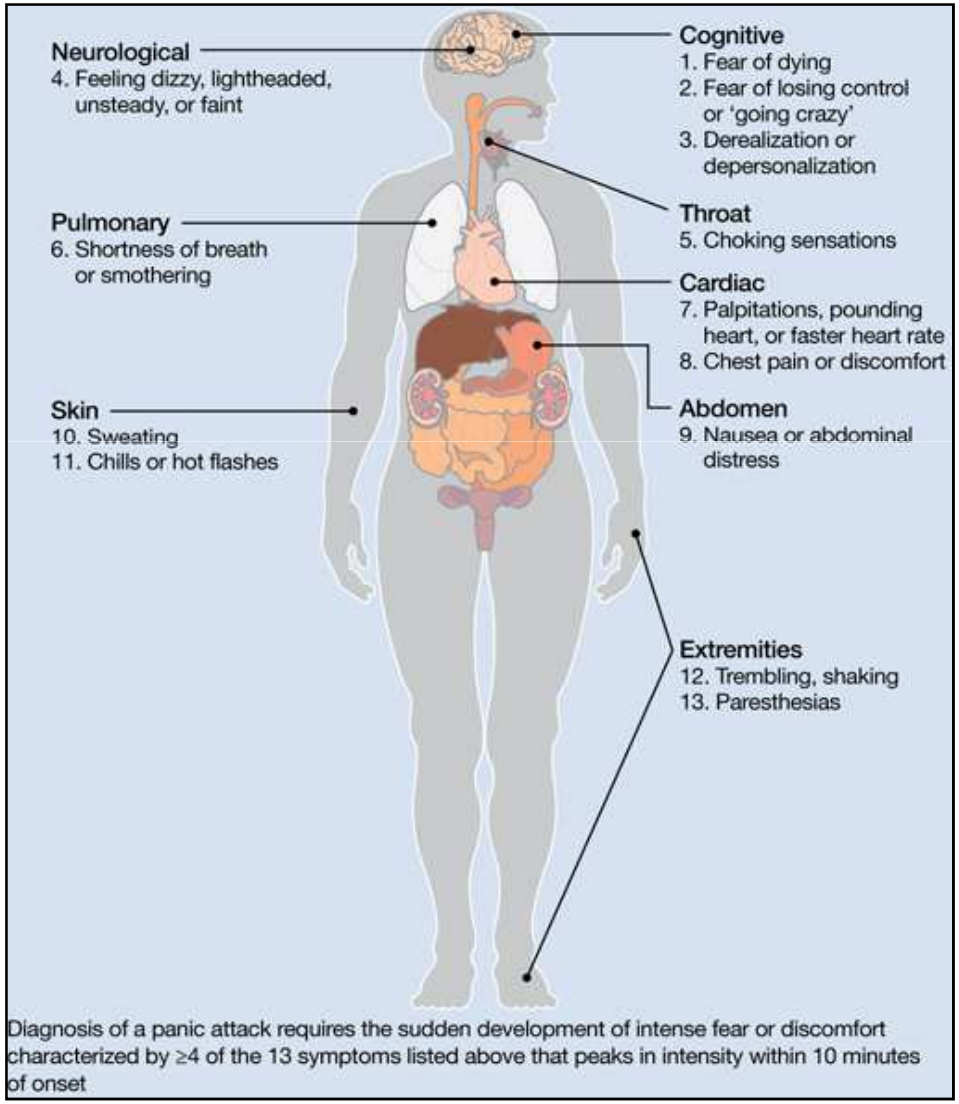
- PANIC DISORDER

- ANXIETY

- DEPRESSION

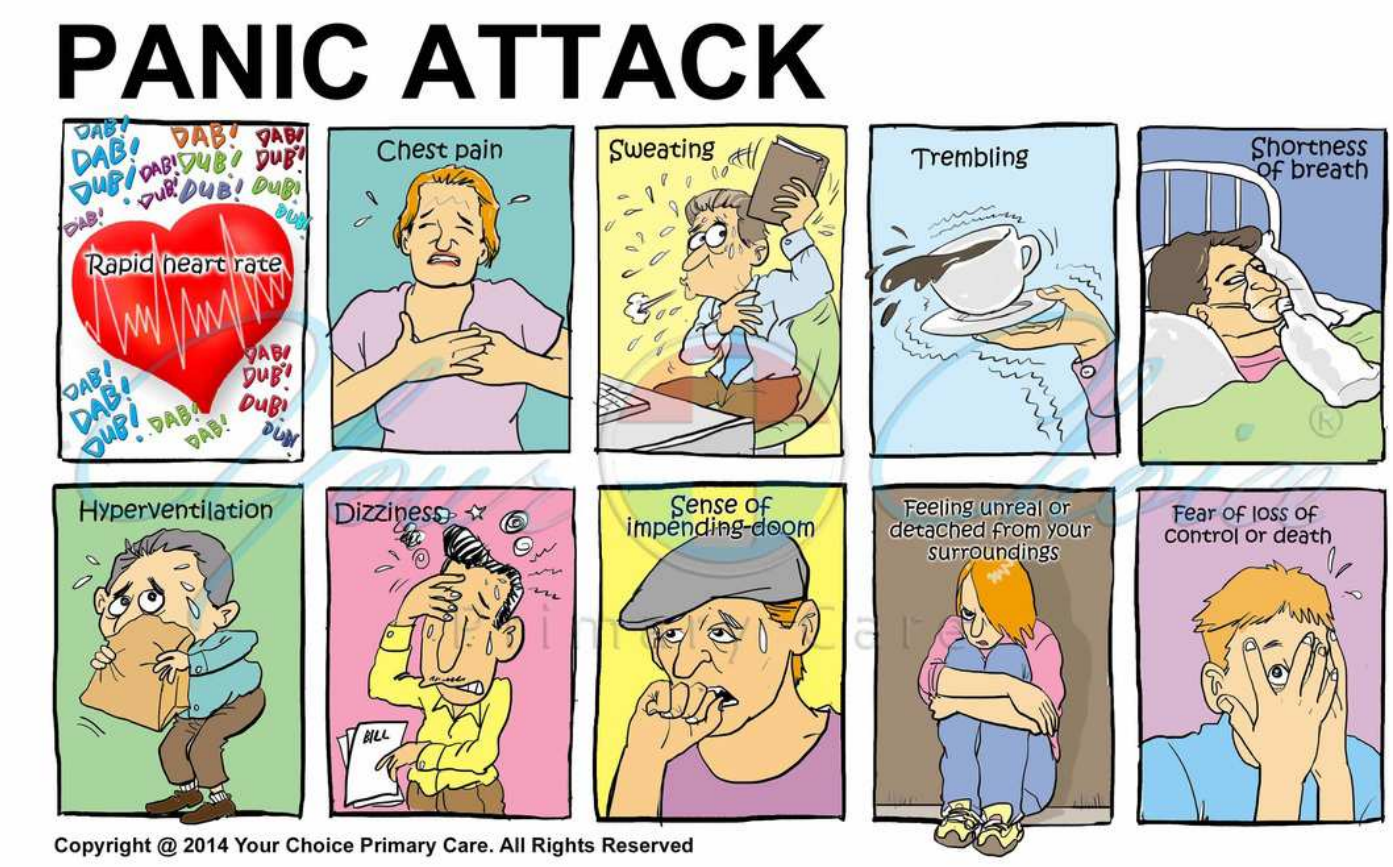
- SOMATOFORM DISORDERS

PANIC DISORDER



Diagnosis of a panic attack requires the sudden development of intense fear or discomfort characterized by ≥4 of the 13 symptoms listed above that peaks in intensity within 10 minutes of onset

PANIC DISORDER



SOMATOFORMS DISORDERS

- Somatoform disorders are a group of disorders in which patients are convinced that their sufferings come from undetected and untreated bodily derangements.

They include:

- **Somatization disorder**
- **Conversion & Dissociation disorder**
- **Pain disorder**
- **Hypochondriasis**
- **Body dysmorphic disorders**

HYPOCHONDRIASIS

- Is a condition were the patient misinterprets **trivial symptoms** as having a serious disease and the idea is **nondelusional** and usually lasts for at. least **6 months**
- The belief is not fixed and could be removed transiently by explanation and reasoning to have another belief about another organ of the body (doctor shopping).
- **The condition interferes with the patient's daily life and causes him distress**. It causes disability and physical dysfunction.
- Hypochondriacal symptoms could occur in most of the psychiatric disorders.

APPROACH TO THE PATIENT WITH CHEST PAIN

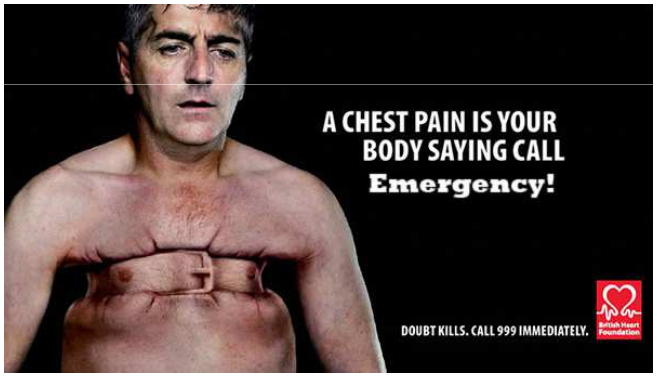
INITIAL APPROACH

Like everything else, if acute: ABC

A: Airway

B: Breathing

C: Circulation



- **IV line, O2, cardiac monitor**
- **Vital Signs**

CHEST PAIN: HISTORY

1. Time and character of onset
2. Quality of pain
3. Location and Radiation
4. Associated symptoms
5. Aggravating symptoms
6. Alleviating symptoms
7. Prior episodes
8. Severity
9. Review risk factors for CHD

CHEST PAIN: HISTORY

- When did the pain start?
- What were you doing when the pain started? Were you at rest, eating, walking?
- Did the pain start all of a sudden or gradually build up?
- Can you describe the pain?
- Does it radiate anywhere? Neck, jaw, back, down either arms …
- Have you had any nausea, vomiting, diaphoresis, or shortness of breath?
- Have you had any fevers, chills, URI symptoms, or cough?
- Have you been on any long plane trips, car rides, recent surgeries? Have you been bed- bound? Have you noticed any swelling in your legs?
- Have you had any tearing sensation in your back/chest?
- Does anything make the pain better or worse? Activity, food, deep breath, position, movement, NTG.
- Have you ever had this type of pain before. If so what was your diagnosis at that time?
- When was the last time you had a stress test, echo, cardiac cath, etc.
- <u>Remember to review risk factors!</u>

CHEST PAIN: HISTORY

1. TIME AND CHARACTER OF ONSET:

* Abrupt onset with **greatest intensity at start:**
  - ***Aortic dissection***
  - ***PTX***
  - Occasionally Pulmonary embolism will present in this manner.

Chest pain lasting seconds or constant over days weeks is NOT likely to be due to myocardial ischemia

CHEST PAIN: HISTORY

2. Quality:

* **Pleuritic Pain:** PE, Pleurisy, Pneumonia, Pericarditis, PTX
* **Esophageal:** burning, etc.
* **MI:** squeezing, tightness, pressure, heavy weight on chest. Can also be burning
* Sharp, tearing, ripping pain: Aortic Dissection

3. Location:

If pain is very localized: consider chest wall pain or pain of pleural origin

CHEST PAIN: HISTORY

4. RADIATION:

* To neck, jaw, down either arm: **consider Ischemia**

5. ASSOCIATED SYMPTOMS:

* Fevers, chills, URI symptoms, productive cough: **Pneumonia**
* Nausea, vomiting, diaphoresis, shortness of breath: **MI**
* Shortness of breath: **PE, PTX, MI, Pneumonia, COPD/Asthma**
* Asymmetric leg swelling: **PE and deep Vein Thrombosis**
* With new onset neurologic findings or limb ischemia: **consider aortic dissection**
* Pain with swallowing, acid taste in mouth: **Esophageal disease**

CHEST PAIN: HISTORY

6. AGGRAVATING SYMPTOMS:

* **Activity:** consider CHD
* **Food:** esophageal disease
* **Swallowing:** esophageal disease
* **Position:** If worse with laying back, consider pericarditis
* **Movement:** chest wall pain
* **Palpation:** chest wall Pain
* **Respiration:** PE, PTX, Pneumonia, Pleurisy

CHEST PAIN: HISTORY

7. ALLEVIATING SYMPTOMS

* Rest/ Cessation of Activity: CHD
* Response to NTG: Cardiac or esophageal
* Sitting up: Pericarditis
* Antacids: Usually G.I. system

8. PRIOR EPISODES

* Have they had this kind of pain before
* Does this feel like prior cardiac pain, esophageal pain, etc
* What diagnostic work-up have they had so far? Last echo, last stress test, last cath, last EGDS, etc.

CHEST PAIN: HISTORY

9. RISK FACTORS

- Hypertension, DM, high cholesterol, Metabolic Syndrome, tobacco, family history: **CHD**
- Long plane trips, car rides, recent surgery or immobility, hypercoagulable state: **PE**
- Uncontrolled Hypert/ Marfan's: **Dissection**
- Rheumatic Diseases: **Pleurisy**
- Heavy Smoking: **PTX, COPD, CHD**

CHEST PAIN: PHYSICAL EXAM

- **Review vital signs**
  * **Fever:** Pericarditis, Pneumonia
  * **Check BP in both arms:** Dissection
  * **Decreased sats:** More commonly in pneumonia, PE, COPD
  * **Unexplained sinus tachy:** consider PE

- **Neck:**
  * Look for **tracheal deviation:** PTX
  * Look for **Jugular Vein Distension:** Tension PTX, Tamponade, CHF
  * Look for **accessory muscle use:** Respiratory Distress COPD/ASTHMA
- **Chest wall exam**
  * Look for **lesions:** Herpes Zoster
  * Palpate for **localized tenderness:** Likely musculoskeletal cause
- **Lung exam**
  * Decreased breath sounds/hyperresonance: PTX
  * Look for signs of consolidation: Pneumonia
  * Listen for wheezing/prolonged expiration: COPD

CHEST PAIN: PHYSICAL EXAM

- **CV EXAM**
  * Assess heart rate
  * Listen for murmurs:
  * Pericardial friction rub: pericarditis
  * Hamman's crunch: Esophageal Perforation
  * Muffled heart sounds: Tamponade
  * Assess distal pulses

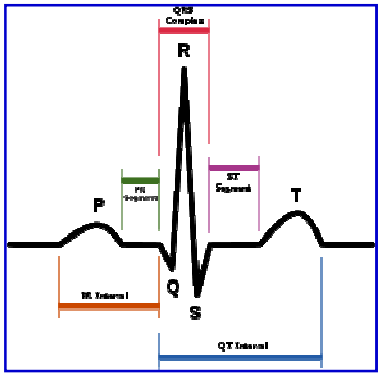
- **ABDOMINAL EXAM**
  * Assess RUQ and epigastrium (G.I. disorders that can cause chest pain)

- **NEURO EXAM**
  * Chest pain +neurologic findings: consider dissection

CHEST PAIN: ANCILLARY TESTING

- **LABS**
  * Baseline labs: CBC, BMP, PT/PTT
  * D dimer or XDP (PE)
  * ABG (EGA)
  * Blood cultures (pneumonia)
  * Sputum cultures (pneumonia)
  * Peak flow (Asthma)
  * Cardiac Enzymes (MI)
  * Urine tox (cocaine - MI)
  * CRP -BSR (pericarditis)

- **EKG**



CHEST PAIN: ANCILLARY TESTING

- **IMAGING**
  - **CXR**
  - Rib fractures
    - Hampton's Hump/ Westermark's sign: PE
    - Infiltrates: Pneumonia
    - Widened mediastinum: aortic dissection
    - Pneumothorax
    - Cardiac size: enlarged silhouette without CHF: pericardial effusion
  - **CT SCAN of CHEST** if suspect PE or Aortic Dissection
  - **VQ SCAN** (pulmonary scintigraphy): PE
  - **STRESS TESTS**: Angina
  - **CATHETERISM**: Ischemia
  - **ECHO**: PE
  - **EGDS**: Esophageal disease

CHEST PAIN: SUMMARY

- **Many symptoms may overlap!**
- The goal is first to ***rule out life threatening causes*** of chest pain.
- With appropriate history, physical exam, and ancillary tests, ***first rule out:***

  *** Pneumothorax**
  *** Aortic Dissection**
  *** Pulmonary Embolism**
  *** Unstable Angina**
  *** Myocadial Infarction**
  *** Esophageal Perforation**