



# *Chest Pain Emergency Management*

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# Financial Disclosures

- Nothing to disclose

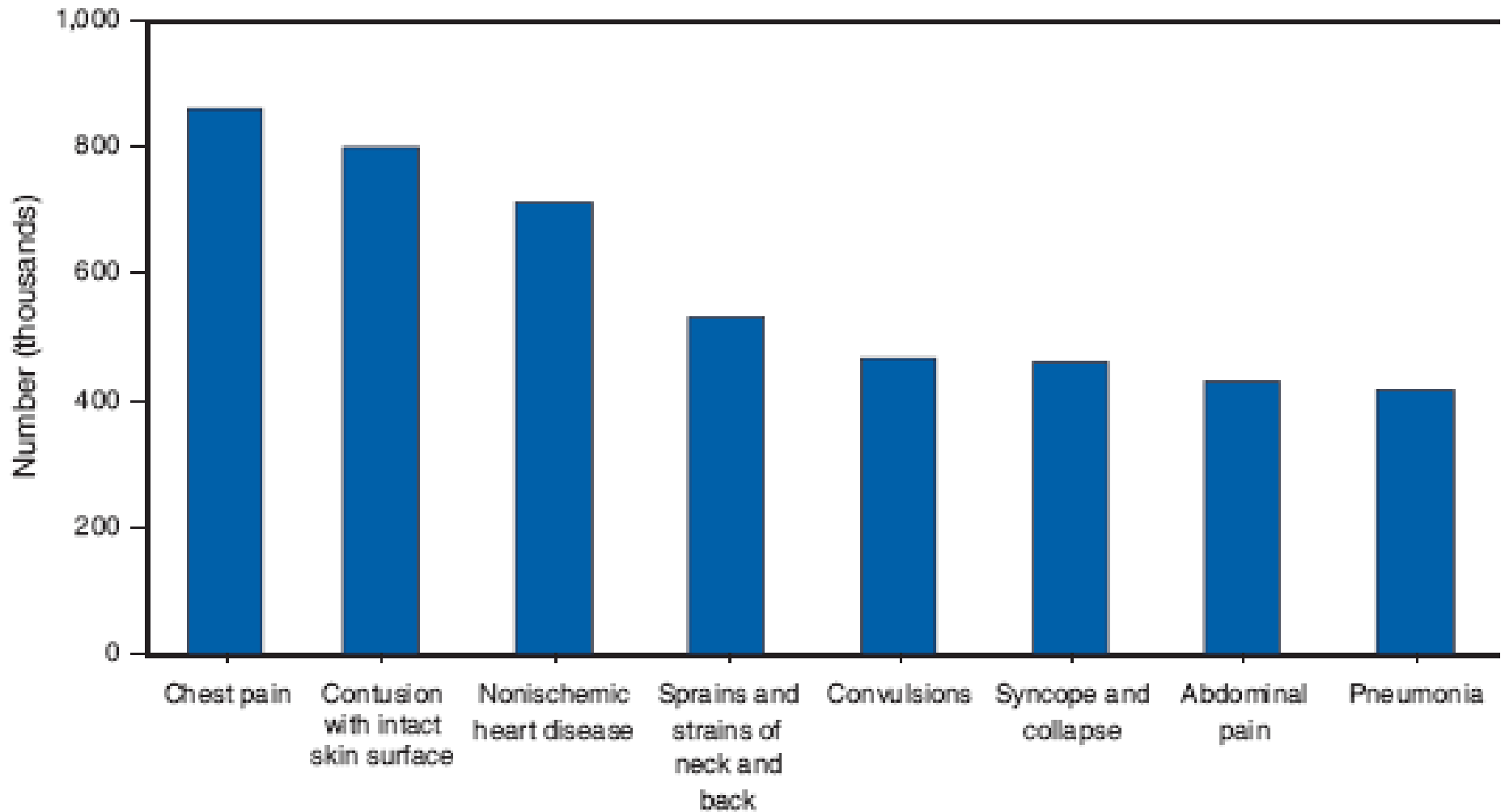
# Presentation Objectives

- Describe the leading causes of acute chest pain.
- List a differential diagnosis, including associated signs, for acute chest pain.
- Describe emergency management of acute myocardial infarction.



**What are the most common adult medical emergencies?**





## Most Common Medical Emergencies

# Most Common Medical Emergency Diagnoses

- Chest pain
- Contusion
- Congestive Heart Failure
- Sprain of neck and back
- Convulsion
- Syncope
- Abdominal pain
- Pneumonia

# Scope Of Chest Pain:



Represents 25 percent of  
visits to emergency  
departments

# Community-Based Emergency Treatment By Primary Care Physicians

- In many communities, primary care physicians are the only ones available
- And, management of such emergencies is within the capability of primary care physicians

# Definition of “Acute Chest Pain”

- Severe pain, usually abrupt onset
- Frequently accompanied by nausea, anxiety & shortness of breath
- Causes patients to immediately seek medical attention

# **“The Worst Pain Of My Life”**



# Chest Pain Case Study



35-year-old female with acute chest pain

**What Is Your  
Differential  
Diagnosis?**



# Adult Chest Pain

## Differential Diagnosis

- Psychological causes
- Chest wall causes
- Gastrointestinal causes
- Pulmonary causes
- Cardiovascular causes

# Chest Pain Differential Diagnosis

- What are some psychological causes of severe chest pain



# Psychological Causes of Chest Pain

- Panic attack
- Depression or anxiety
- Psychiatric disorders like  
Post Traumatic Stress  
Disorder (PTSD)

# Chest Pain

## Differential Diagnosis

- What are the chest wall causes of severe chest pain?



# Chest Wall Causes of Chest Pain

- Costochondritis
- Muscle strain
- Fibromyalgia
- Rheumatoid arthritis

# Chest Pain Differential Diagnosis

- What are gastrointestinal causes of severe chest pain?



# Gastrointestinal Causes of Chest Pain

- Esophagitis
- Gastritis
- Peptic ulcer disease
- Pancreatitis
- Cholecystitis

# Chest Pain

## Differential Diagnosis

- What are pulmonary causes of severe chest pain?



# Pulmonary Causes of Chest Pain

- Pneumonia
- Pleuritis
- Pneumothorax
- Pulmonary embolism

# Chest Pain

## Differential Diagnosis

- What are cardiovascular causes of severe chest pain?



# Cardiovascular Causes of Chest Pain

- Acute Coronary syndrome (ACS)
- Pericarditis
- Cardiac tamponade
- Aortic dissection

# Chest Pain

## Differential Diagnosis

- What are the most deadly causes of severe chest pain?



# Deadly Causes of Chest Pain

- STEMI/MI
- Pulmonary Embolism
- Aortic Dissection
- Pneumothorax
- Esophageal Rupture
- Cardiac Tamponade

What are  
common  
problems in  
managing chest  
pain?



# Common Chest Pain Management Problems

- Failure to consider a complete differential diagnosis.
- Failure to make an appropriate assessment for risk of the most common, lethal cause: acute coronary syndrome.

What clues to the cause of chest pain can be learned from the patient history?



# Chest Pain Clues from Patient History

- Age influences probability of etiologies
- Gender also influences probability of etiologies
- Prior surgery, such as cholecystectomy
- Underlying diseases: known hypertension, mental illness

What are the most important risk factors for Coronary Artery Disease?



# Coronary Artery Disease Risk Assessment

- Most important is assessing risk factors:
  1. Smoking
  2. Obesity
  3. Sedentary lifestyle
  4. Family History of CAD
  5. Underlying diseases: diabetes, hypertension, hyperlipidemia

Describe a person who  
would be at low risk for  
Coronary Artery Disease

# Low Risk for CAD

- Nonsmoker
- Total cholesterol less than 200 mg/dL, HDL cholesterol greater than 40 mg/dL
- Systolic BP less than 120, diastolic BP less than 80
- No diabetes
- No obesity
- No family history of CAD

Describe a person who  
would be at high risk for  
Coronary Artery Disease

# High Risk

- Diabetes
- Smoker
- Total cholesterol greater than 200 mg/dL, HDL cholesterol less than 40 mg/dL
- Hypertension
- Over age 65
- Other known vascular disease

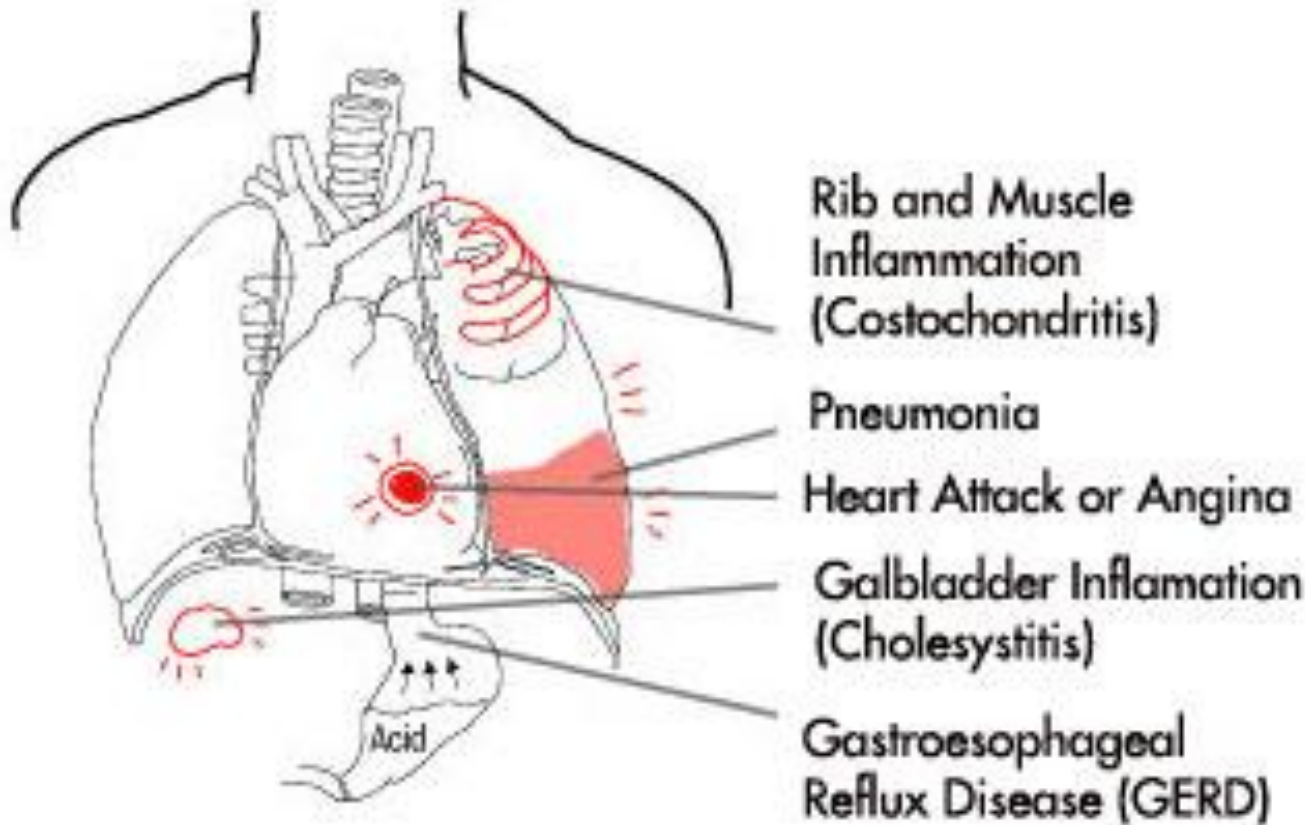
What clues to the cause of chest pain can be learned from the physical exam?



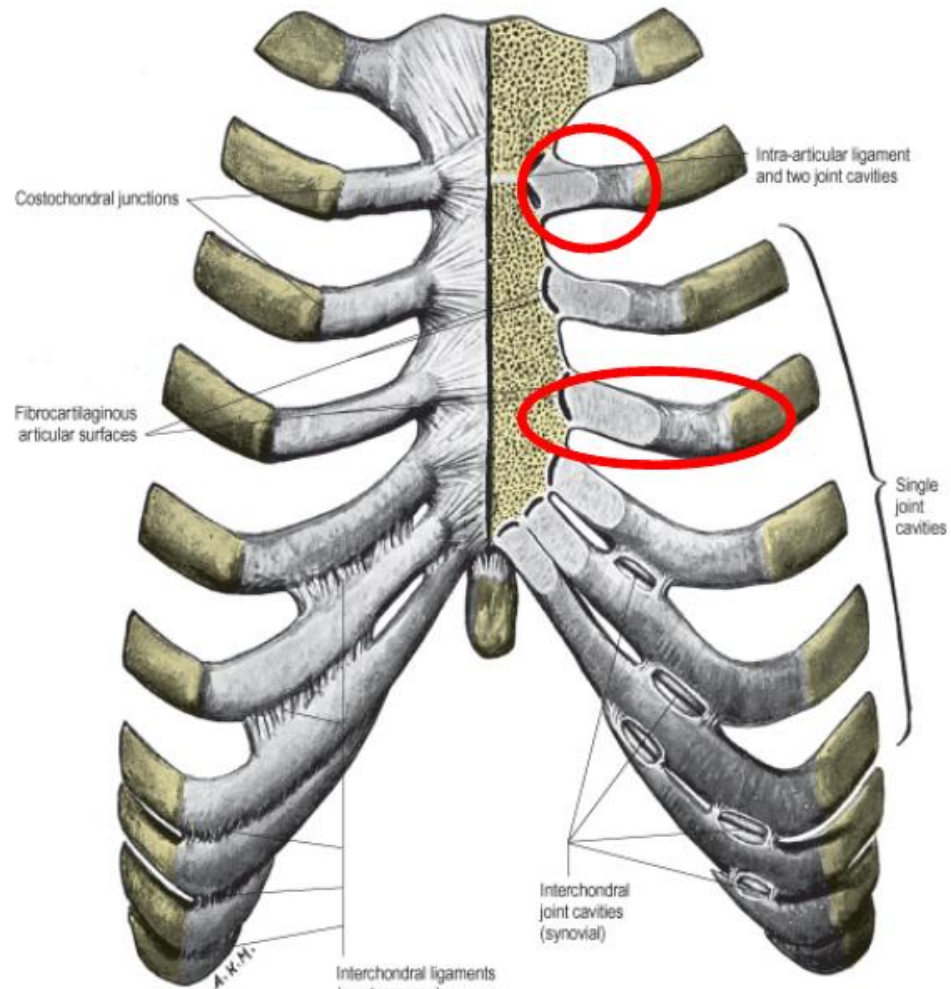
# Chest Pain Clues from Physical Exam

- Vital signs
- Chest palpation
- Heart exam
- Chest exam
- Abdominal exam

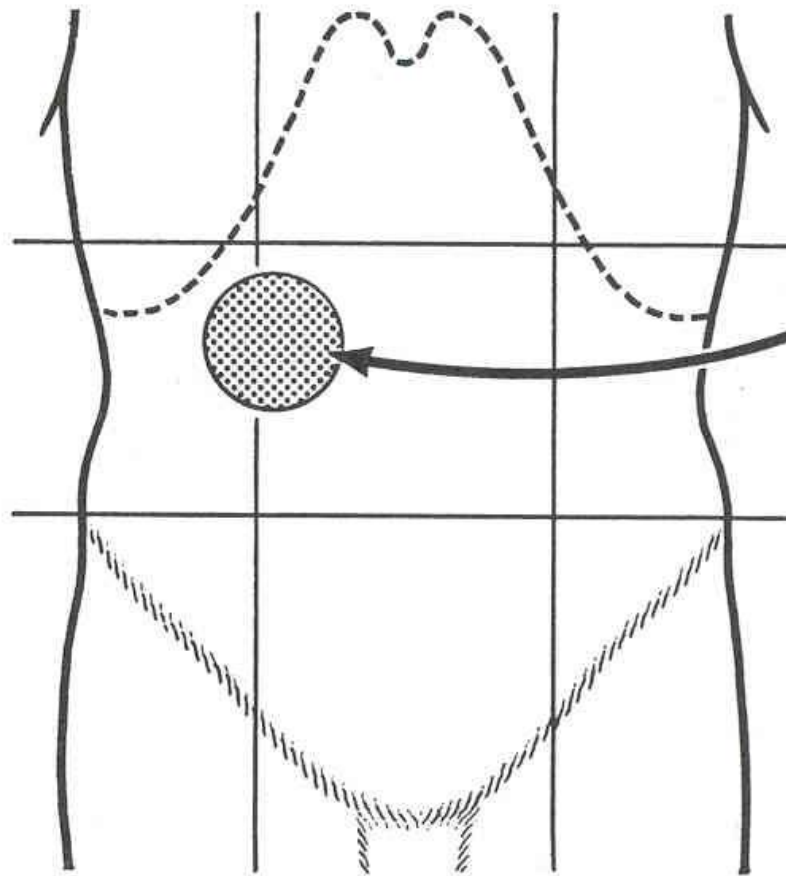
# Chest Pain Locations



# Chest Pain from Costochondritis



What right upper quadrant disease can cause chest pain?



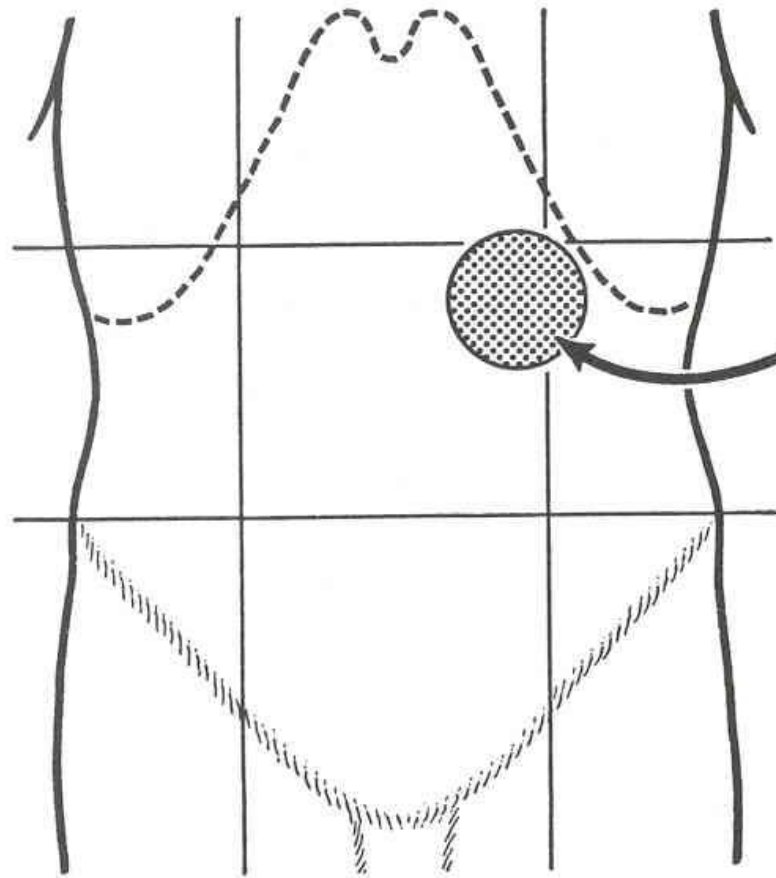
# Pain Location

## Differential Diagnosis

### RIGHT UPPER QUADRANT:

- Cholelithiasis, cholecystitis
- Hepatitis
- Gastritis, peptic ulcer disease
- Pleuritis
- Nephrolithiasis (kidney stone)

What left upper quadrant disease can cause chest pain?



# Pain Location

## Differential Diagnosis

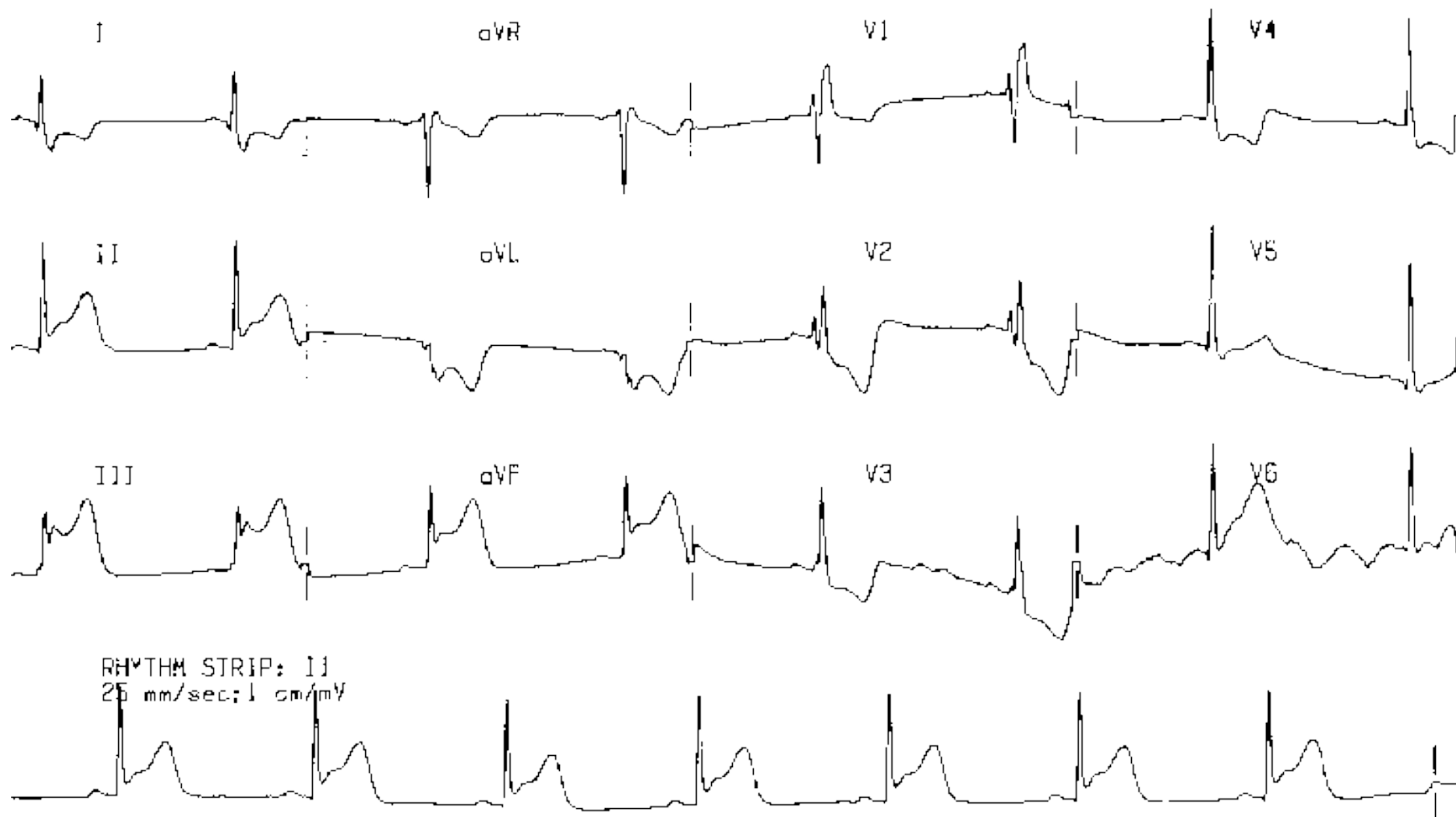
### LEFT UPPER QUADRANT:

- Colitis
- Myocardial infarction
- Acute splenomegaly
- Nephrolithiasis (kidney stone)

# Initial Evaluation – EKG

- Observe for signs of rhythm disorder, ischemia, hypertrophy, pericarditis

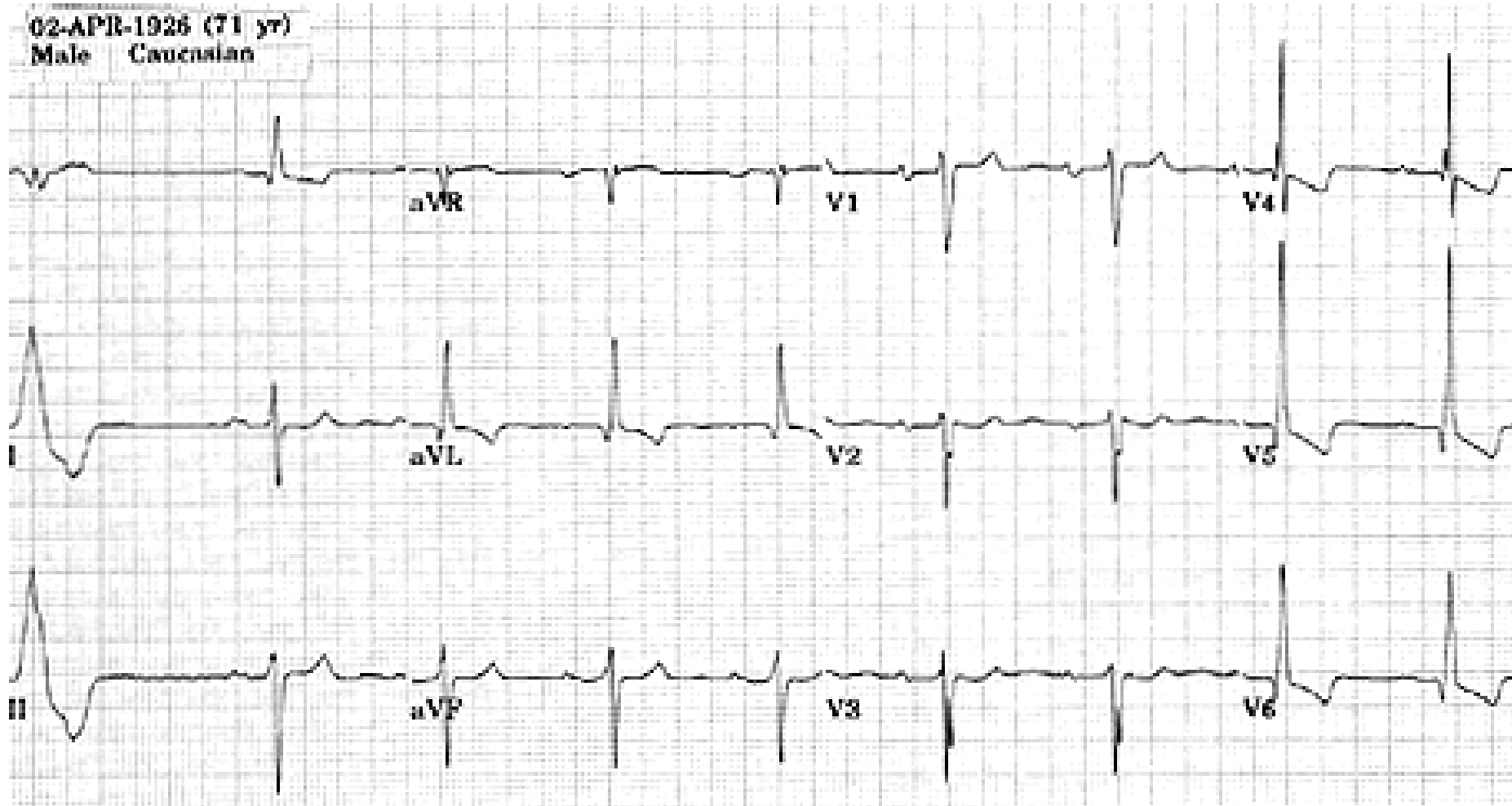
# What is this EKG interpretation?



# EKG Interpretation: Acute Inferior Myocardial Infarction

- ST segment elevation in leads II, III and aVF
- Reciprocal ST segment depression in leads I, aVR, aVL, and 2-4

# What is this EKG interpretation?

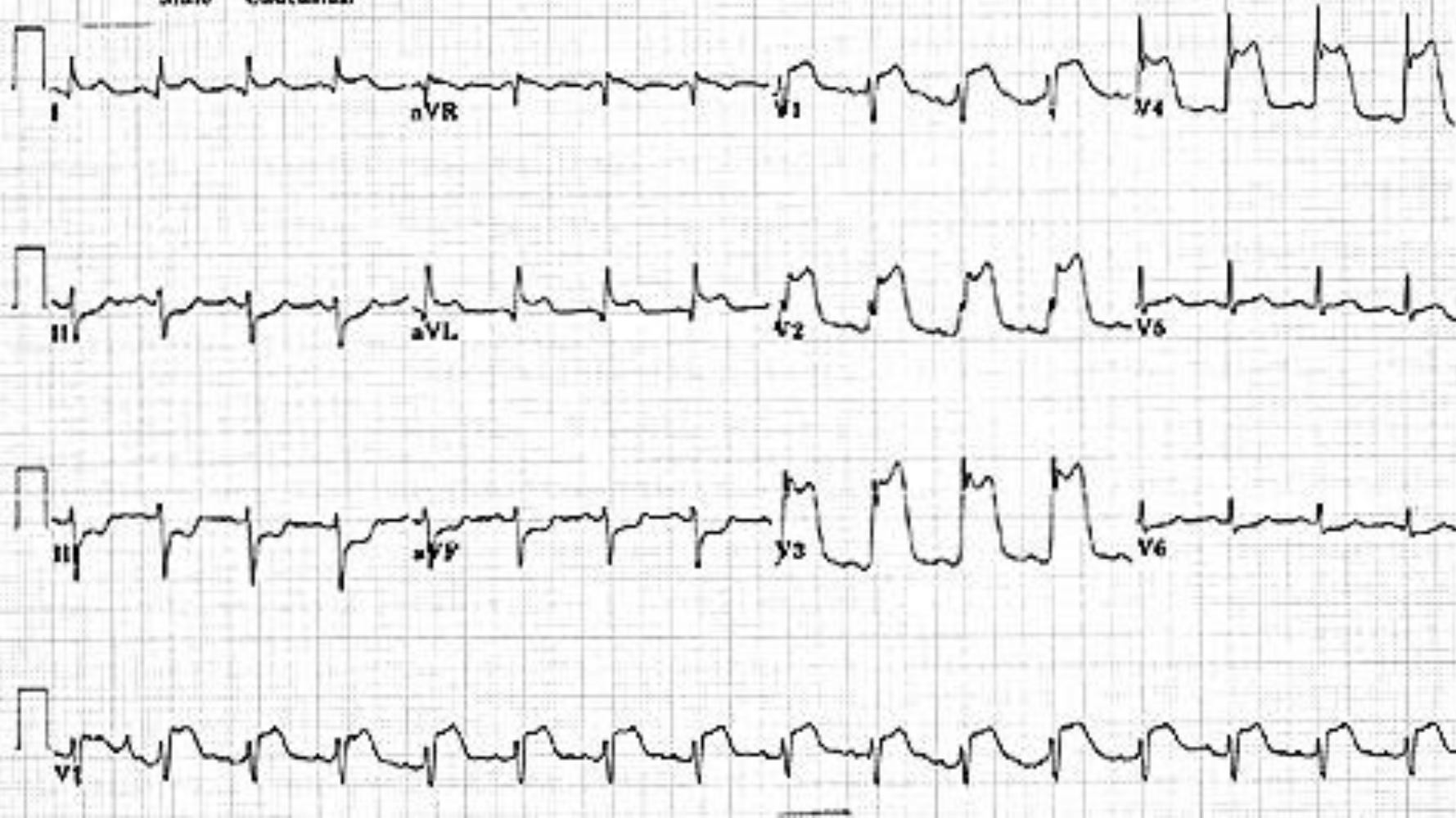


# EKG Interpretation: Left Ventricular Hypertrophy

- Height of V2 R-wave plus V5 S-wave is greater than 35mm

# What is this EKG interpretation?

11-OCT-1941 (53 yr)  
Male Caucasian



# EKG Interpretation: Acute Anterior Myocardial Infarction

- ST segment elevation in leads V1-4 and aVL
- Reciprocal ST segment depression and leads II, III, and aVF

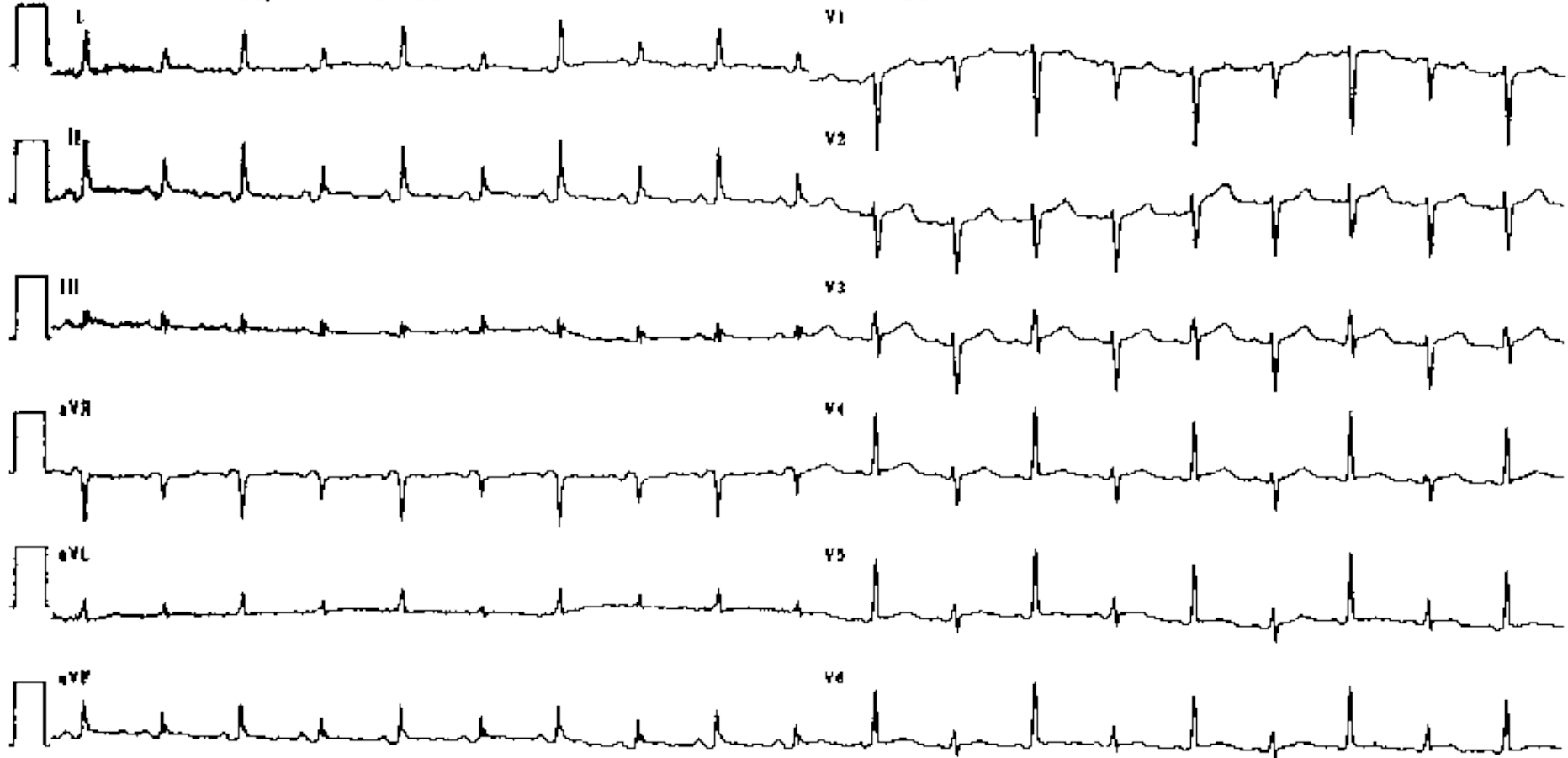
# EKG Interpretation

01:40

CART: 2834

25 mm/s  
10 mm/mV

ID:  
NAME:



# EKG Interpretation: Electrical Alternation indicating pericarditis or pericardial effusion

- Varying voltage in multiple leads

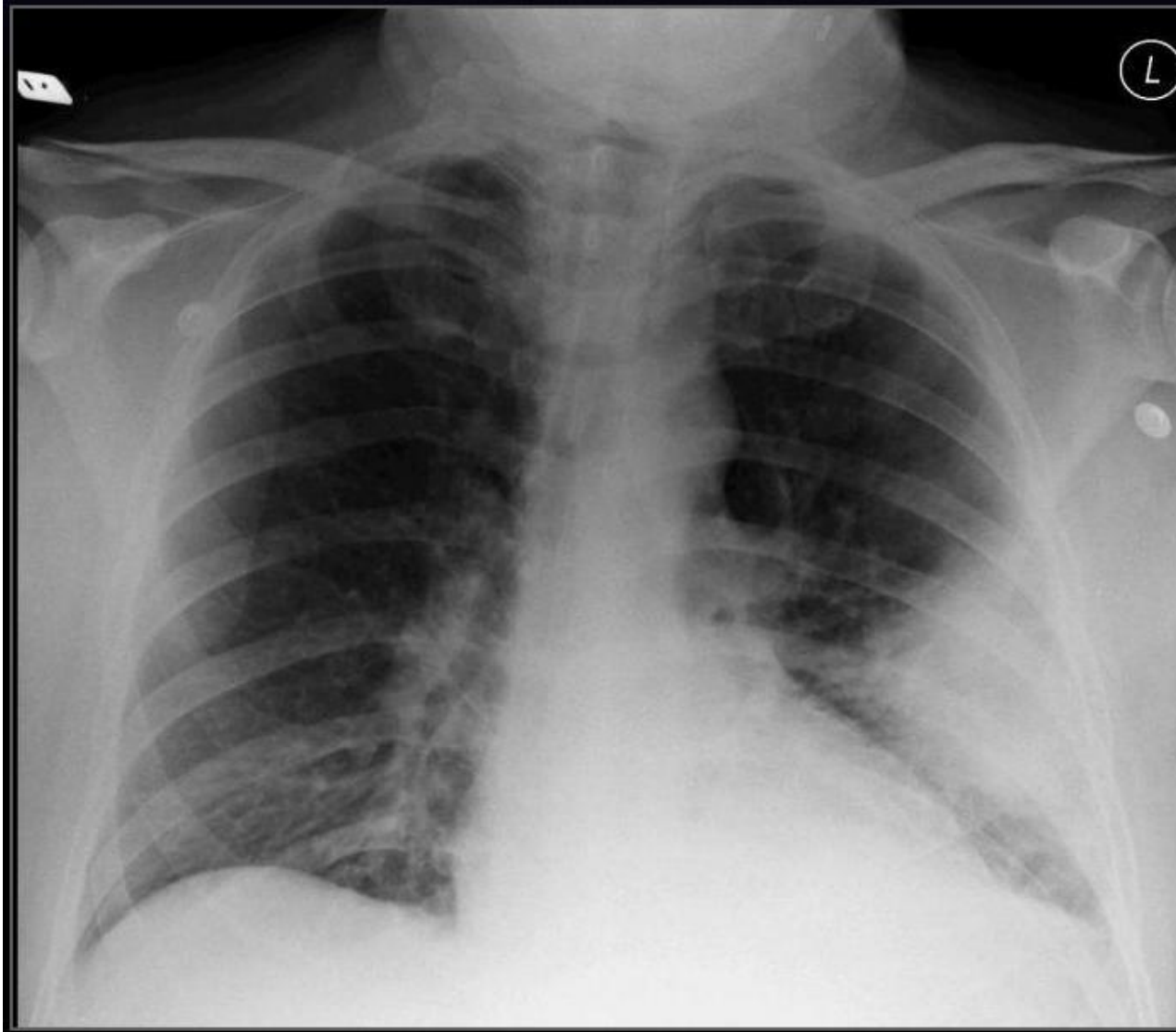
What radiology exams might be useful to evaluate chest pain?



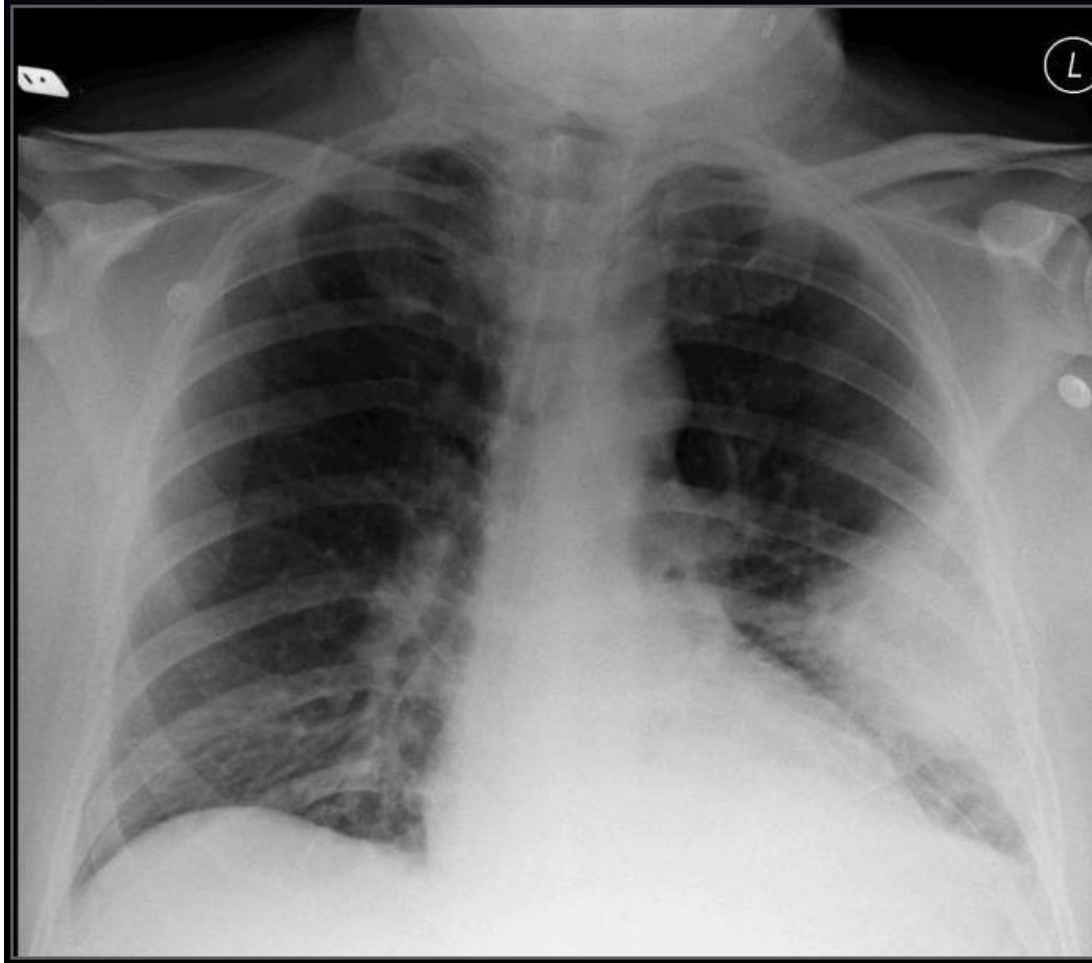
# Initial Evaluation – Radiology

- Plain Chest X ray: AP and lateral
- Abdominal X ray: upright and supine
- Ultrasound: gall bladder, pancreas
- CT chest
- CT abdomen, pelvis with contrast
- Bedside Ultrasound of heart, lungs, aorta or legs for DVT

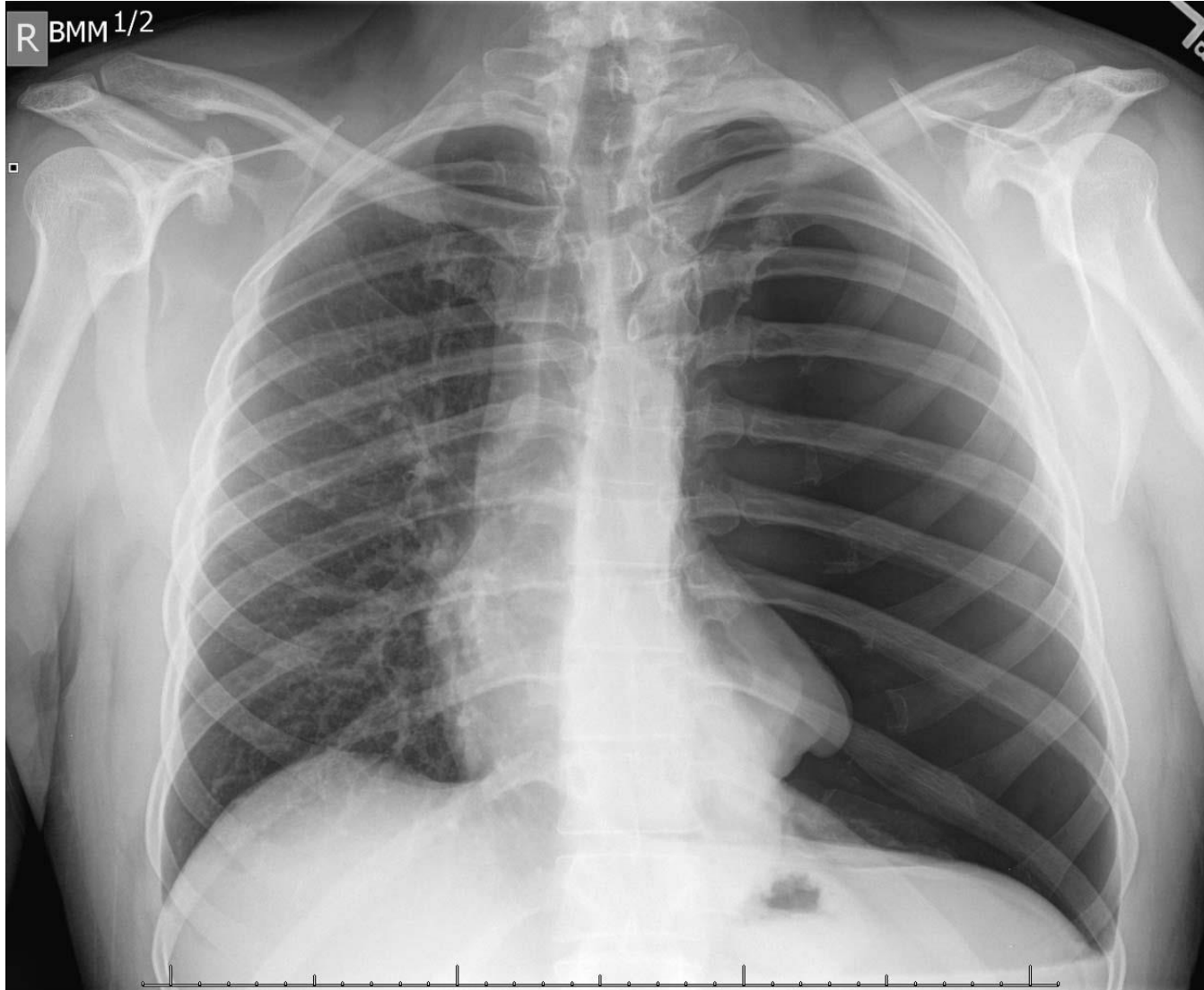
# What Is This?



# Chest X-Ray Interpretation: Pneumonia



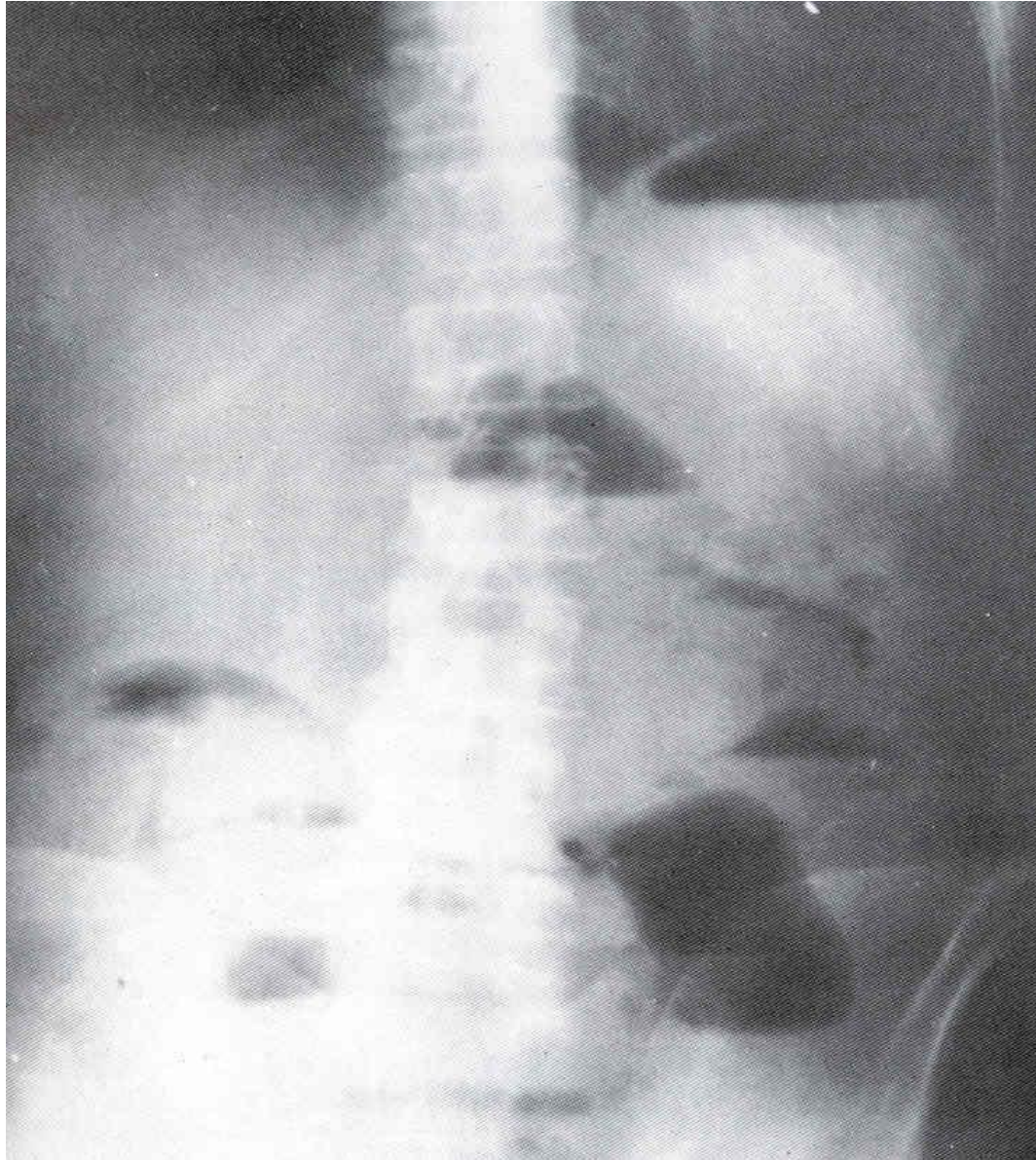
# What Is This?



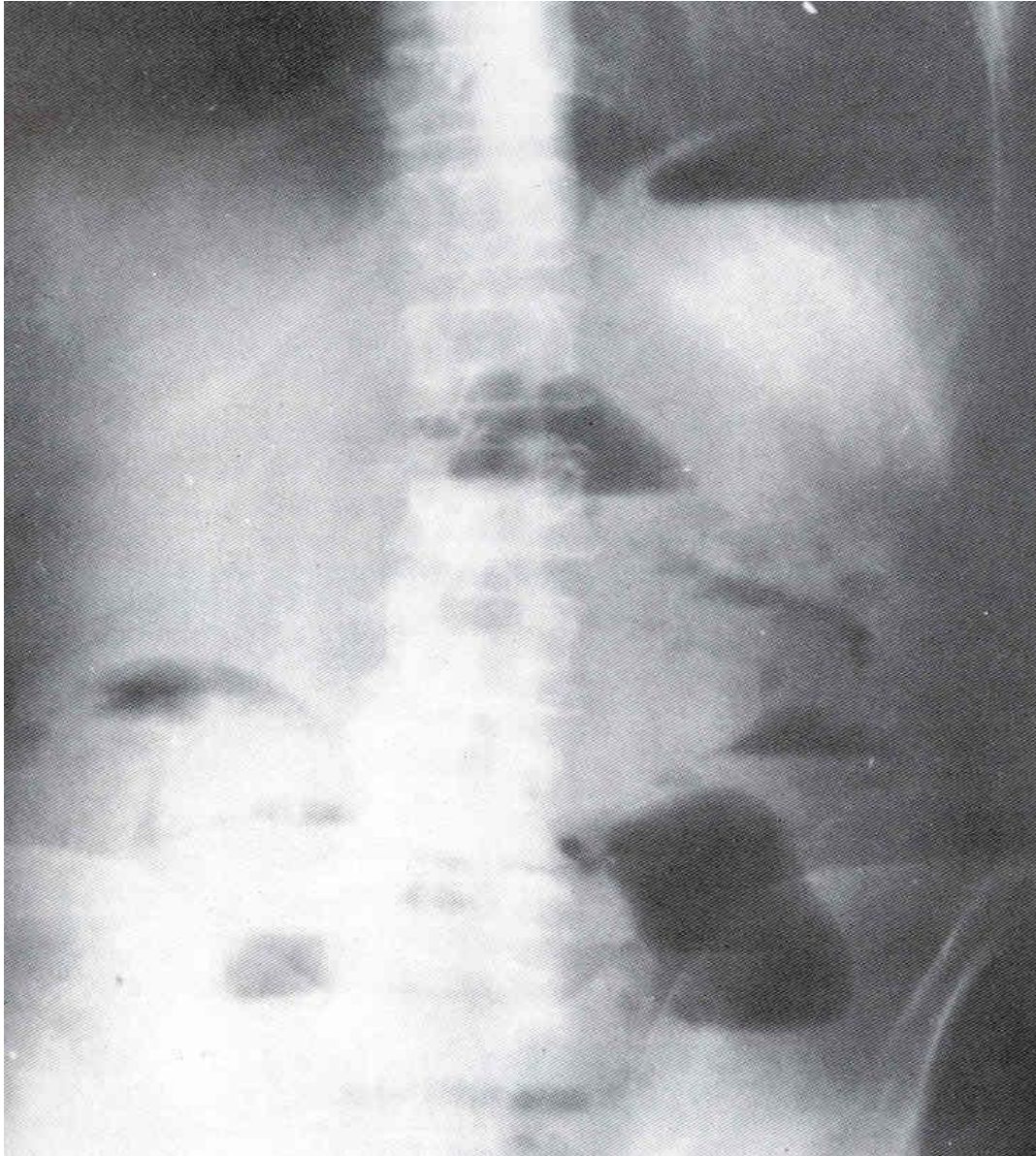
# Chest X-Ray Interpretation: Pneumothorax



# What Is This?



# Diffuse Intestinal Ileus



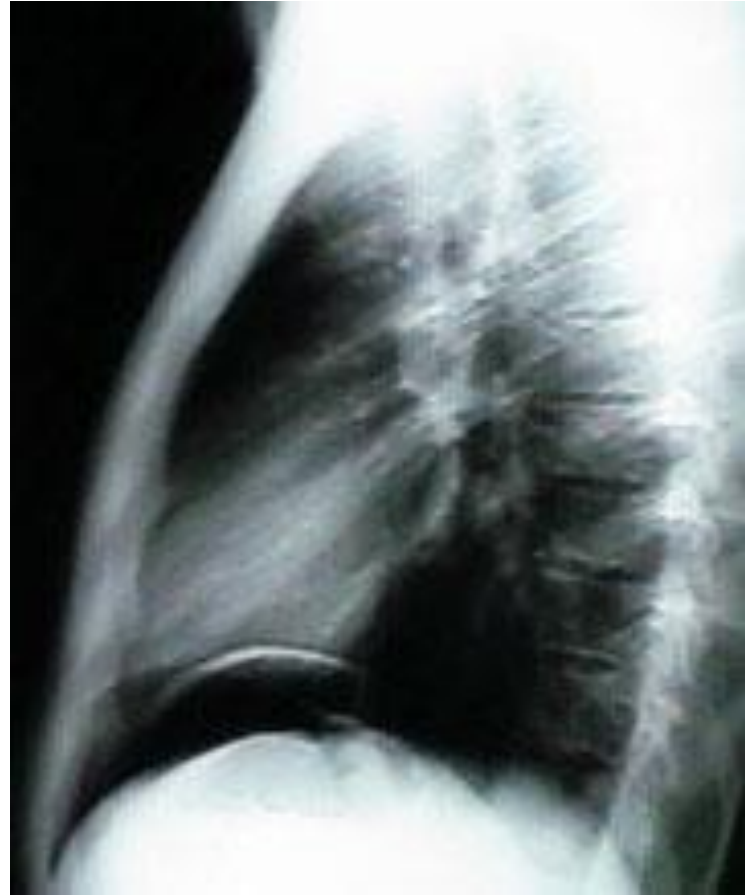
# What Is This?



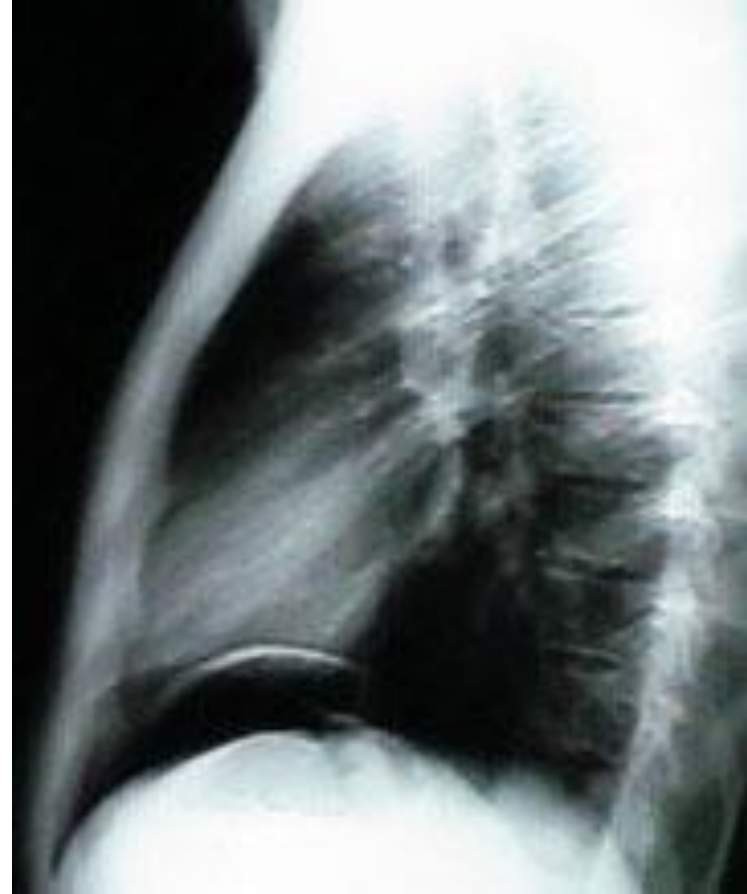
# Gall Stones: Gall Stones



# What Is This?



# Pneumoperitoneum



# What Is This?



# Pulmonary Embolism



What laboratory exams might be useful to evaluate chest pain?



# Initial Evaluation – Laboratory

- Cardiac enzymes: troponin, CPK
- Complete blood count CBC : CBC
- Oxygen saturation or arterial blood gas
- Blood chemistry: amylase, lipase, bilirubin, transaminase
- D-dimer

# Well's Criteria for PE and PERC

- Well's criteria helps stratify risk for PE and needs D-dimer
- PERC rules out PE without need for D-dimer if age < 50, no tachycardia, no cancer, no trauma/immobilization/surgery, no prior DVT/PE, no hemoptysis, no hypoxia, no unilateral leg swelling, and no hormone use

# Chest Pain Case Studies



30-year-old female

# Adult Chest Pain

## Differential Diagnosis

- Psychological causes
- Chest wall causes
- Gastrointestinal causes
- Pulmonary causes
- Cardiovascular causes

# 30-year-old Female Most Likely Causes of Chest Pain

- Psychological causes
- Chest wall causes
- Gastrointestinal causes

# Chest Pain Case Studies



45 year old male

# **45-year-old Male Most Likely Causes of Chest Pain**

- Psychological causes
- Gastrointestinal causes
- Pulmonary causes
- Cardiovascular causes

# Chest Pain Case Studies



60-year-old female

# 60-year-old Female Most Likely Causes of Chest Pain

- Gastrointestinal causes
- Pulmonary causes
- Cardiovascular causes

# Chest Pain Case Studies



75-year-old  
male

# **75-year-old Male Most Likely Causes of Chest Pain**

- **Gastrointestinal causes**
- **Pulmonary causes**
- **Cardiovascular causes**

What is emergency  
management acute  
coronary insufficiency  
(myocardial  
infarction)?



# Emergency Management: Myocardial Infarction

- Pain management: morphine, nitroglycerine
- Antiplatelet: aspirin, clopidogrel (Plavix)
- Anticoagulation: heparin, enoxaparin (Lovenox)
- Beta-blocker: metoprolol
- Calcium channel blocker: verapamil, diltiazem
- ACE-inhibitor: lisinopril, enalapril
- Oxygen

Review: What is  
emergency  
management acute  
coronary syndrome  
(ACS)



# ACS is a spectrum

- STEMI
- NSTEMI
- Unstable Angina

# STEMI

- Diagnosed on EKG
- Treated with Aspirin, Ticagrelor/Clopidogrel, Heparin, and thrombolytics
- Definitive treatment is Cardiac catheterization and percutaneous coronary intervention (PCI)

# NSTEMI

- Diagnosed with elevated troponin
- Treated with aspirin, heparin, and pain control
- May delay cardiac catheterization

# Unstable Angina

- Difficult diagnosis to make
- Based on clinical suspicion and risk
- HEART score to risk stratify
  - H – history of typical chest pain
  - E – EKG findings
  - A – Age  $> 65$  or  $< 50$
  - R – Risk factors for ACS
  - T – Troponin level measurement

# What Will You Do To Decrease Your Personal Risk Of Coronary Artery Disease?

