Chest Pain In Emergency Department

Presented by:

Mohammad Mousa

Yazan Alkarsh

Abdelrahman Aljwazneh

Zeinab Qatawneh

Batool Qaraqe

Yaqeen Abu Taifour

Supervised by: Dr. Abdullah Alma'aitah

INTRODUCTION

Millions of patients present to emergency departments (EDs) each year with acute nontraumatic chest pain.

Varied clinical presentations coupled with a wide differential diagnosis make patients with chest pain some of the most challenging cared for by emergency care providers.

An organized approach will assist clinicians when differentiating acute coronary syndrome (ACS) from other causes of chest pain.

definition

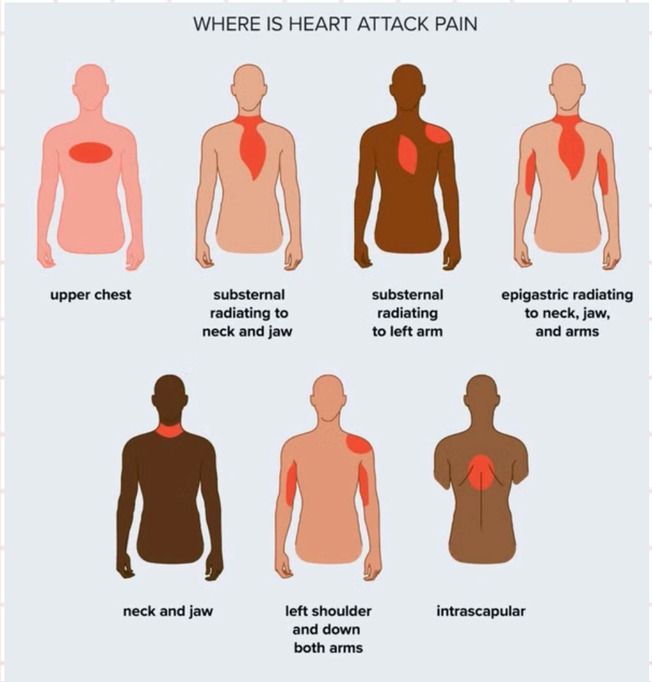
Chest pain :

A sensation of discomfort, pressure, tightness, or pain felt anywhere in the chest (between the neck and upper abdomen), which may originate from cardiac, pulmonary, gastrointestinal, musculoskeletal, or psychological causes.

History Taking

SOCRATES :

- **Site –** Where is the pain?
- **Onset –** When did it start? Sudden or gradual?
- **Character –** Sharp, dull, crushing, burning?
- **Radiation –** Does it spread anywhere
  - Examples:
  - Left arm, jaw, neck
  - Back :between scapulae
  - Shoulder tip
  - Epigastrium
  - No radiation)



History Taking

- Associated symptoms – Nausea, sweating, dyspnea, palpitations , syncope?
- Timing – Constant, intermittent, related to exertion or meals?
- Exacerbating/relieving factors – Worse with movement, breathing, exertion, meals? Better with rest?
- Severity – Pain score (0–10).

PHYSICAL EXAMINATION

General Appearance → distress, diaphoresis, anxiety

Vital Signs → tachycardia, bradycardia, hypotension, fever, hypoxia

Skin →pallor, cyanosis, rash

Neck → JVP, carotid pulse, bruits

Chest Inspection & Palpation → deformity, tenderness

PHYSICAL EXAMINATION

Cardiac exam → heart sounds, murmurs, rubs

Lung exam → crackles, decreased breath sounds, wheeze

Abdominal exam → tenderness, hepatomegaly, epigastric pain

Extremities → edema, calf tenderness, pulses

Neurological status → altered sensorium, focal deficits

laboratory Investigations

Cardiac:

- Troponins
- CK–MB
- BNP/NT–proBNP

Pulmonary:

- D–dimer
- ABG
- CBC

Renal:

Electrolytes (K^+, Mg^{2+}, Ca^{2+})

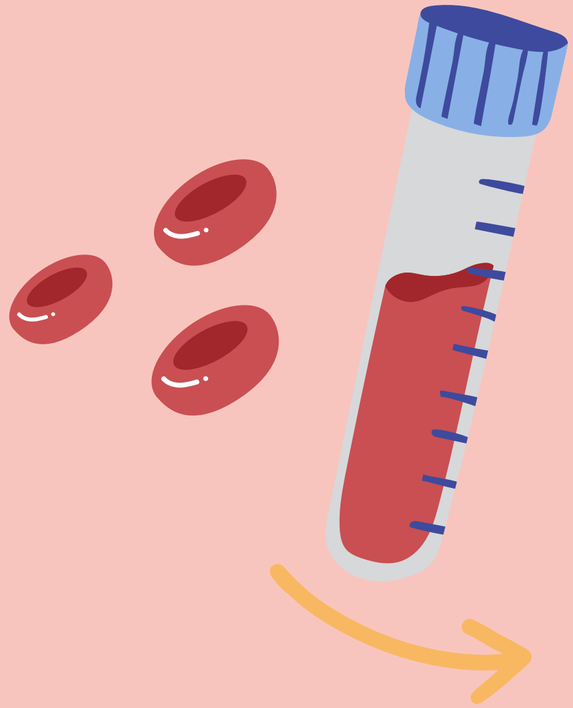
Renal function (urea, creatinine)

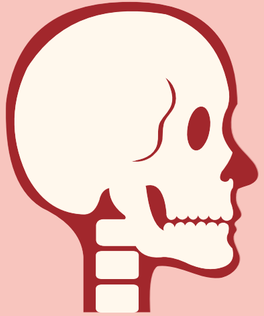
Liver / systemic:

Liver function tests

CRP/ESR

Coagulation profile





Imaging

Cardiac

- ECG
- Echocardiography
- Coronary angiography (CT or invasive)

Liver / GI

- Abdominal ultrasound
- CT abdomen

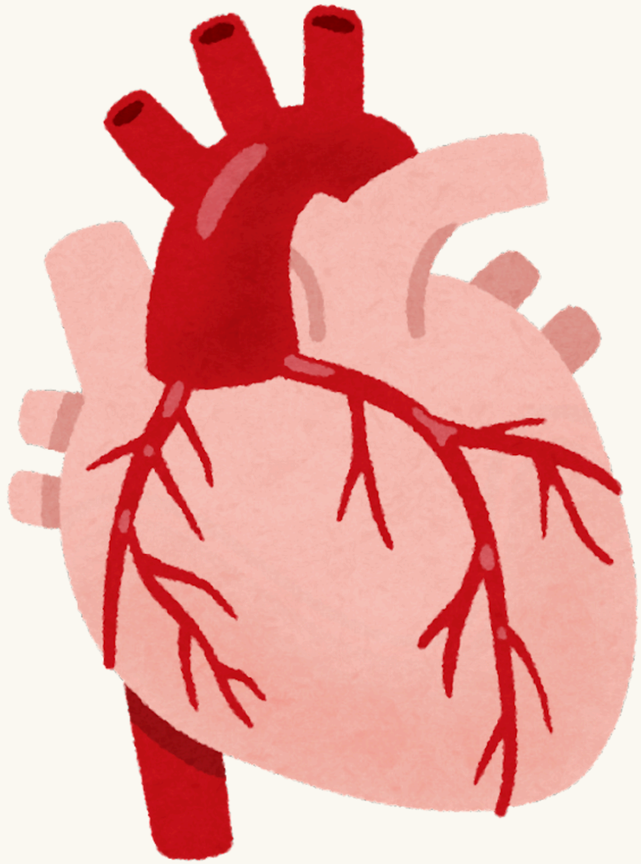
Pulmonary

- Chest X-ray
- CT pulmonary angiography
- V/Q scan

Differential diagnosis of chest pain

- Acute Chest Discomfort
  - Cardiovascular
    - Cardiac
      - Acute Myocardial Injury
      - Pericarditis
    - Vascular
      - Aortic Dissection
      - Pulmonary embolism
      - Pulmonary hypertension
  - Pulmonary
  - Gastrointestinal
  - Musculoskeletal
  - Infectious
    - e.g. Herpes Zoster
  - Psychological

Cardiovascular Causes



Acute Myocardial Infarction (MI)

1 Definition:

Myocardial necrosis due to prolonged ischemia lasting at least 20 to 40 minute

2 Risk Factors:

Hypertension, diabetes, hyperlipidemia, smoking, age >45 (men) / >55 (women), family history of CAD.

prior MI.

3 MI Types

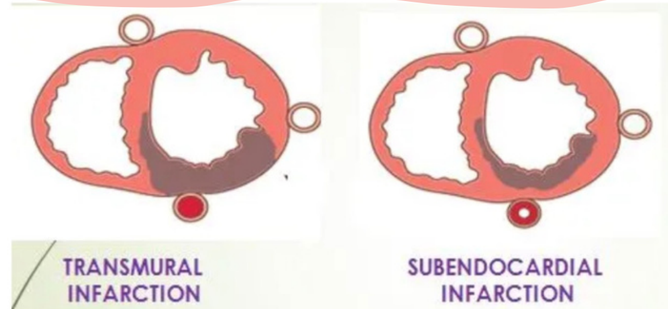
MI types according to thickness involvement

1.Transmural infarctions (ST-segment elevated MIs (STEMIs).

- involve the full thickness of the ventricle & are caused by epicardial vessel occlusion

2.Subendocardial infarctions (non-ST-segment elevated MIs" /"NSTEMIs).

- are limited to the inner third of myocardium.



Acute Myocardial Infarction (MI)

4 History

Severe, crushing retrosternal pain, >20 min, not relieved by rest/nitro, may radiate, associated with diaphoresis, nausea, syncope.

*ASSOCIATED FEATURES INCLUDE:
–restlessness, breathlessness
and a feeling of impending death (angor animi)
–Autonomic stimulation may result in sweating, pallor, nausea and vomitting

5 Exam

Tachycardia, hypotension, S4, pulmonary crackles if HF, new murmur if mechanical complication.

Acute Myocardial Infarction (MI)

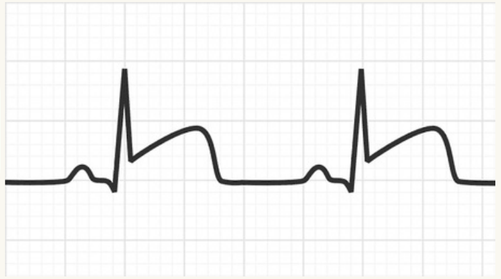
Typical and atypical presentations of myocardial infarction:
Typical symptoms prompt timely care, while atypical symptoms may delay diagnosis and treatment, increasing the risks of heart failure and sudden cardiac death.

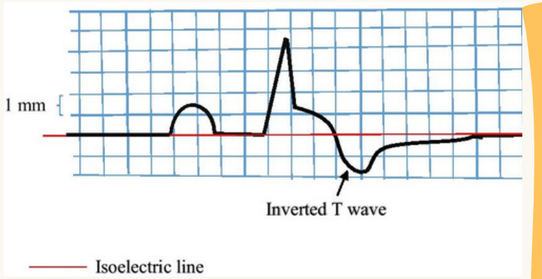
Atypical symptoms like :epigastric pain , back pain, or a burning/stabbing sensation, and may be accompanied by shortness of breath, anxiety, or indigestion
Atypical symptoms are more common in women and elderly
it can lead to delayed diagnosis and poorer outcomes

Acute Myocardial Infarction (MI)

5 Investigations

ECG (ST elevation/depression, deep Q wave)





troponins ↑ (gold-standard) (⩾0.04 ng/mL)
[Rise: 3-6 hours after myocardial injury Peak: 12-24 hours
Remains elevated: 7-10 days]
+ other markers (CK-MB, myoglobin, Heart-type fatty acid binding protein (H-FABP), Ischemia modified albumin (IMA))

Echo, coronary angiography.

6 Complications

- Arrhythmias (ventricular tachycardia, fibrillation, heart block)
- Heart failure (left ventricular failure, pulmonary edema)
- Cardiogenic shock
- Myocardial rupture

Acute Myocardial Infarction (MI)

7

Management

MONA:Morphine ,Oxygen,nitrate and aspirin

+ dual antiplatelet

Anticoagulation (heparin)

Beta-blockers, ACEI, statins

Angina pectoris

Definition

Transient chest discomfort due to myocardial ischemia without myocardial necrosis.

Risk factors

Hypertension, diabetes, hyperlipidemia, smoking,
age >45 (men) / >55 (women) (?), family history of CAD.

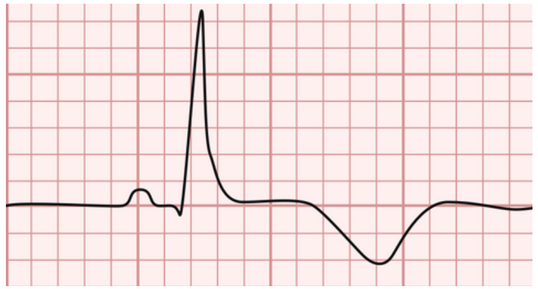
History

Substernal chest pressure, heaviness, or squeezing.

- Duration: 15 sec–15 min.
- Radiation to left arm, neck, jaw, or back.
- Triggered by exertion or emotional stress, relieved by rest or nitroglycerin.
- Associated symptoms: diaphoresis, mild dyspnea, nausea

Key investigations

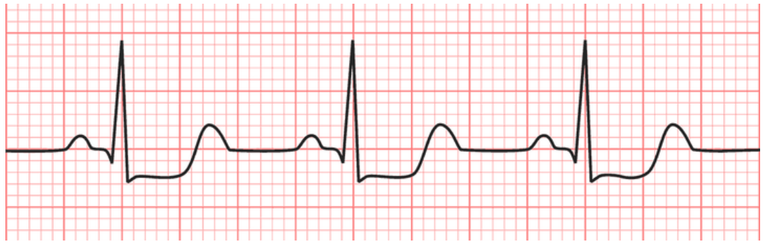
inverted T-wave



ECG

Normal at rest; may show ST depression or T-wave inversion during episodes

ST depression



Stress testing:

Exercise ECG, stress echo

Coronary angiography:

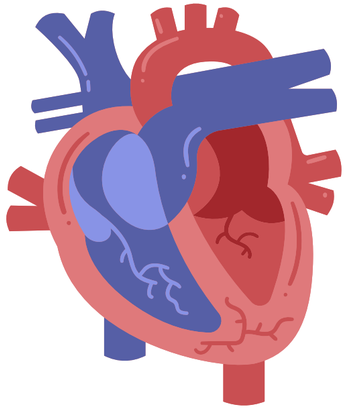
If high-risk or considering revascularization

Cardiac biomarkers:

Usually normal (troponin negative).

Complications

- Myocardial infarction (MI)
- Life-threatening arrhythmias (e.g., ventricular tachycardia, fibrillation)
- Sudden cardiac death
- Chronic heart failure



Management

–Oxygen, ECG, monitoring

MONA: Morphine (if severe), Oxygen

Nitrates, Aspirin

Beta-blockers, statins, heparin

(unstable cases)

–Admit for cardiology evaluation

Acute pericarditis

1 **Definition**

Inflammation of the pericardium

2 **Risk Factors**

-Viral infections (MC ?)
-Post-MI
(Dressler's syndrome → autoimmune reaction to necrotic tissue after MI).
-Autoimmune pericarditis
-Uremic pericarditis

3 **History**

Sharp, pleuritic chest pain, improves sitting forward, worse lying down, may radiate to trapezius.

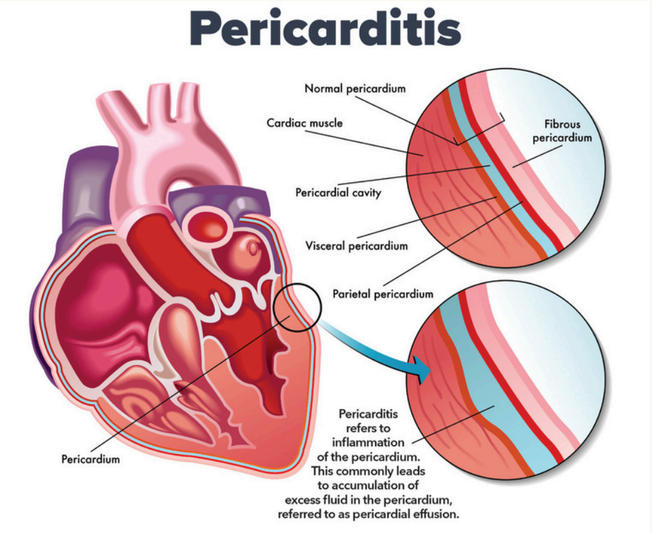
Acute pericarditis

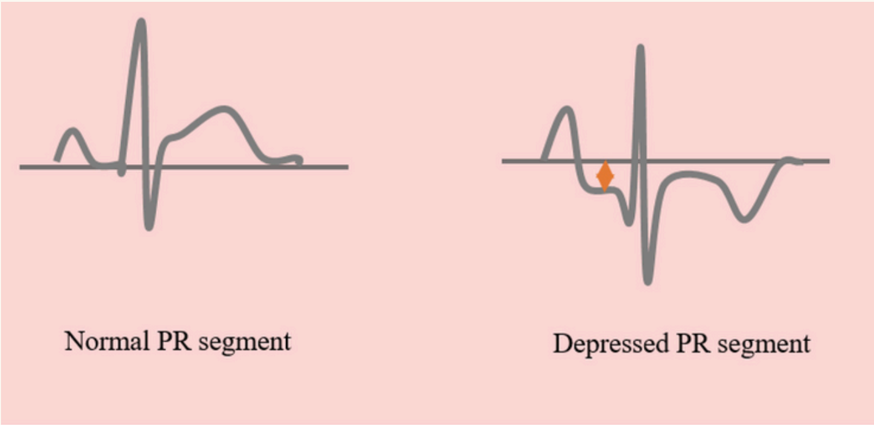
4 Exam

Pericardial friction rub, sometimes mild fever, tachycardia.

5 Investigation

-ECG (diffuse ST elevation, PR Depression),
-Echocardiography (effusion),
-Inflammatory markers (e.g. CRP, ESR, Leukocytosis)





Acute pericarditis

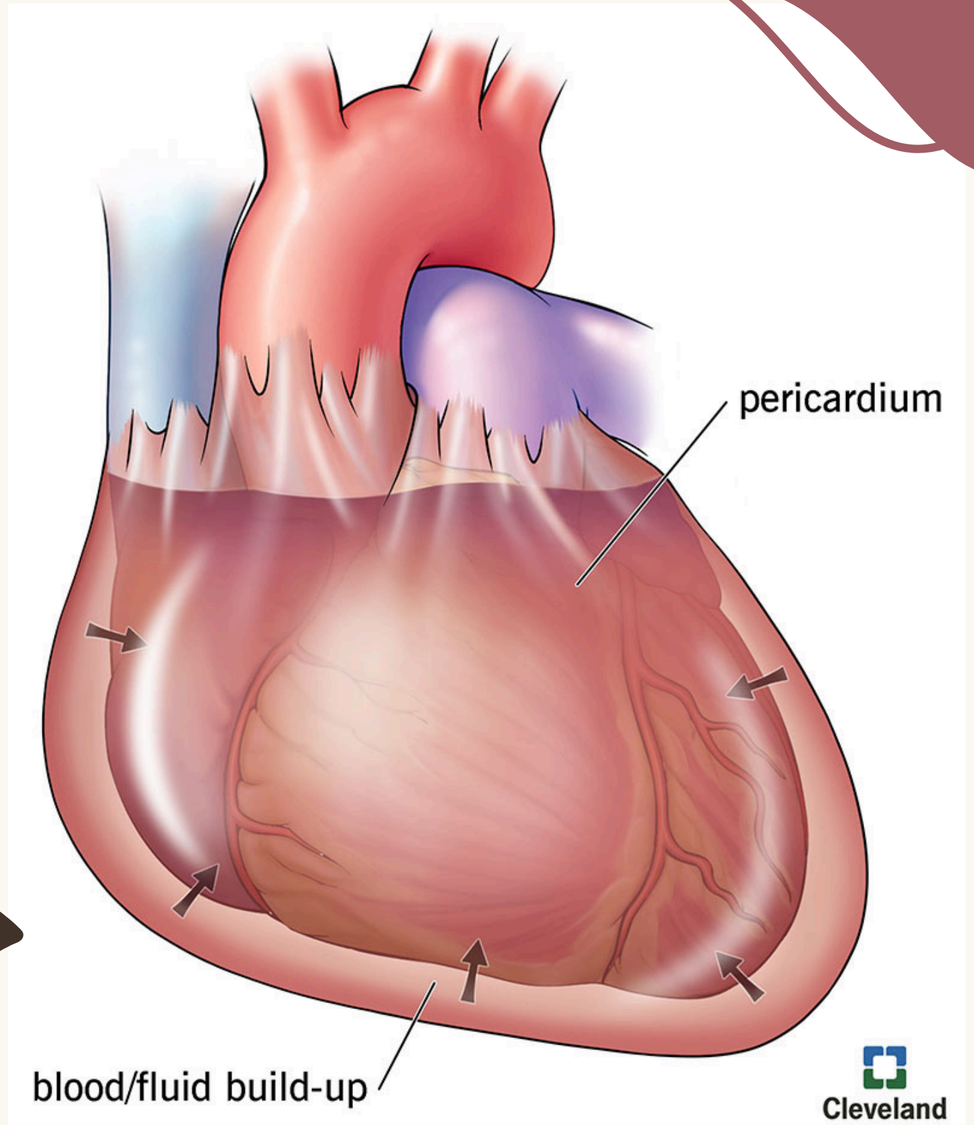
6

complication

-Pericardial effusion (can lead to tamponade if severe)

-Cardiac tamponade (life-threatening compression of the heart) (signs ?)

-Constrictive pericarditis



Acute pericarditis

7

Management

–NSAIDs (ibuprofen, aspirin) + colchicine

–Treat underlying cause

Avoid anticoagulants unless (↑ risk tamponade)

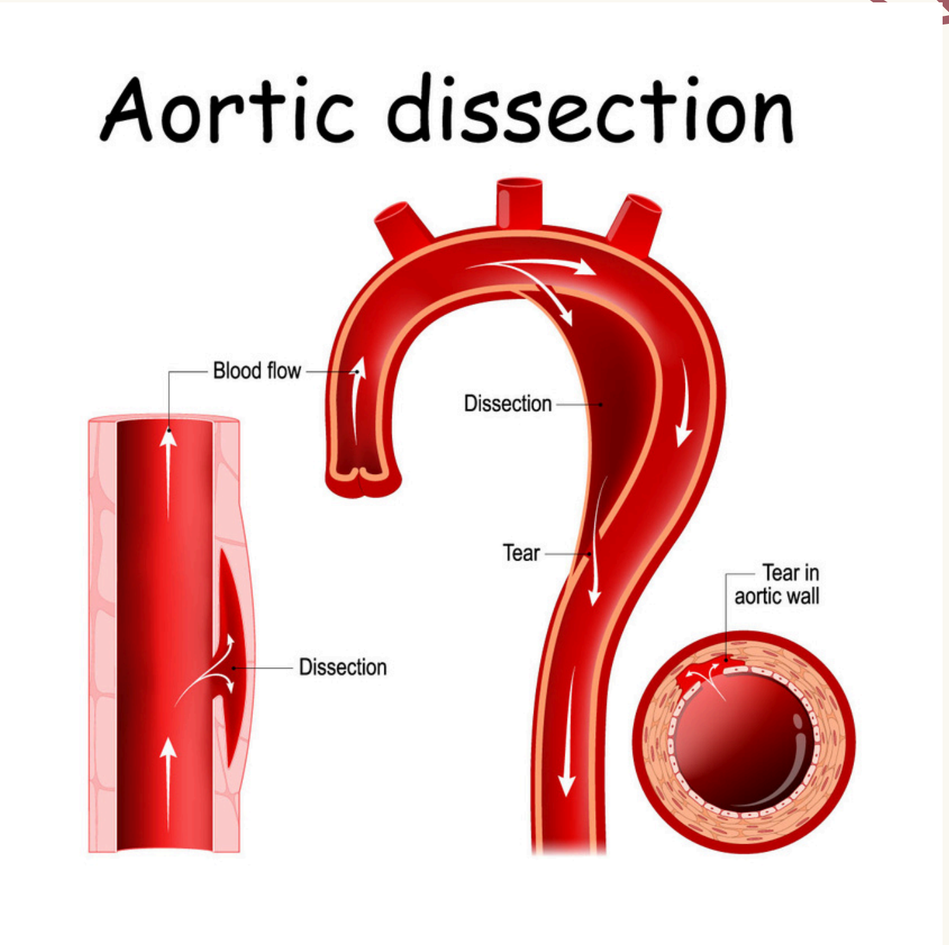
– Pericardiocentesis for cardiac tamponade

Aortic dissection

1

Definition

Tear in the aortic intima → blood between layers of the aortic wall



Aortic dissection

2 Risk Factors

Hypertension
Marfan/Ehlers–Danlos, bicuspid aortic valve, trauma.

3 History

Sudden
severe, tearing
chest/back pain,
radiates to back,
sometimes abdominal.

4 Pathophysiology

High_pressure blood enters false lumen → can rupture or compromise branches.

Aortic dissection

5 Exam

Asymmetrical BP, pulse deficits, murmur of aortic regurgitation, hypotension if rupture.

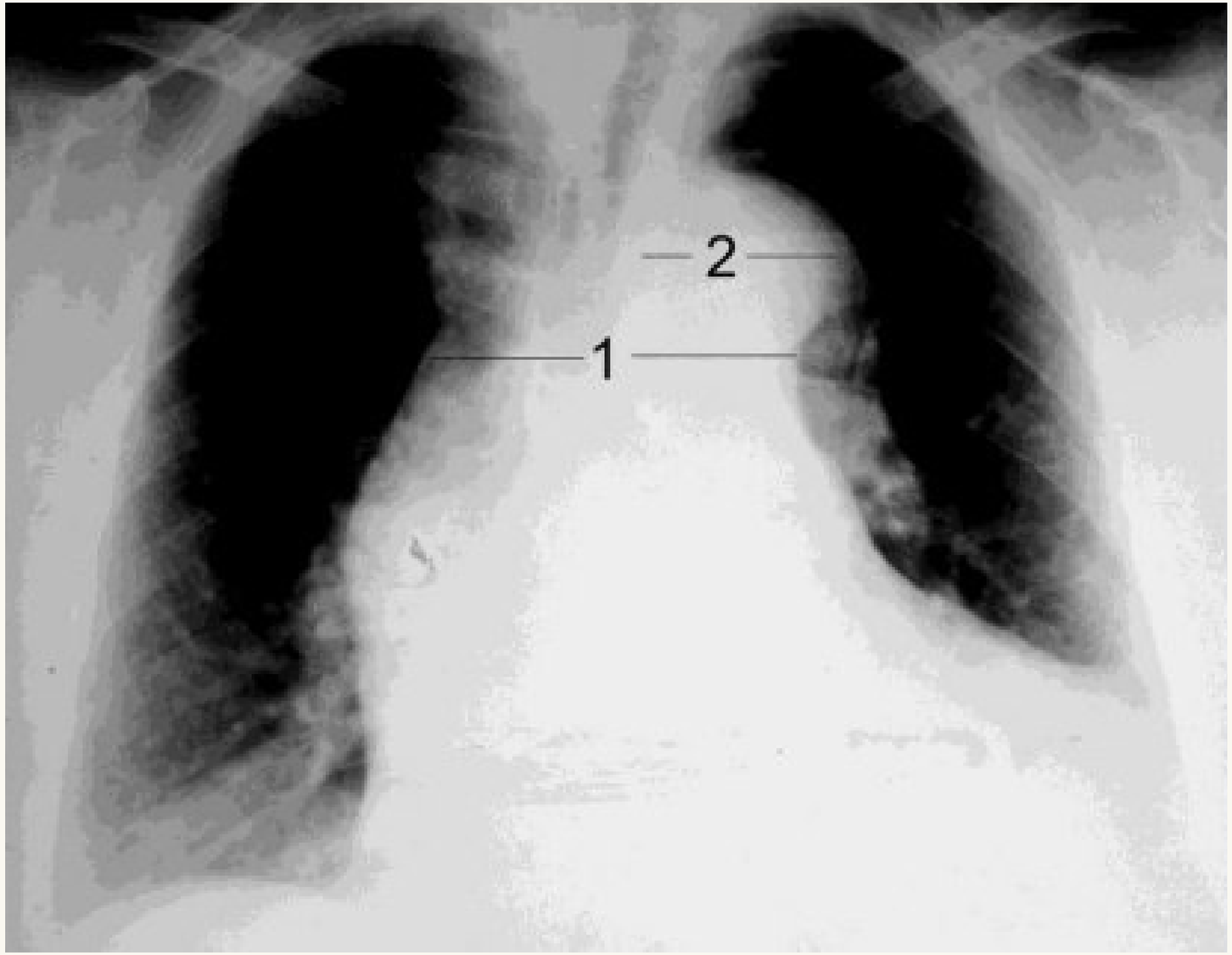
6 Investigation

CT angiography (gold standard), TEE, chest X-ray (mediastinal widening).

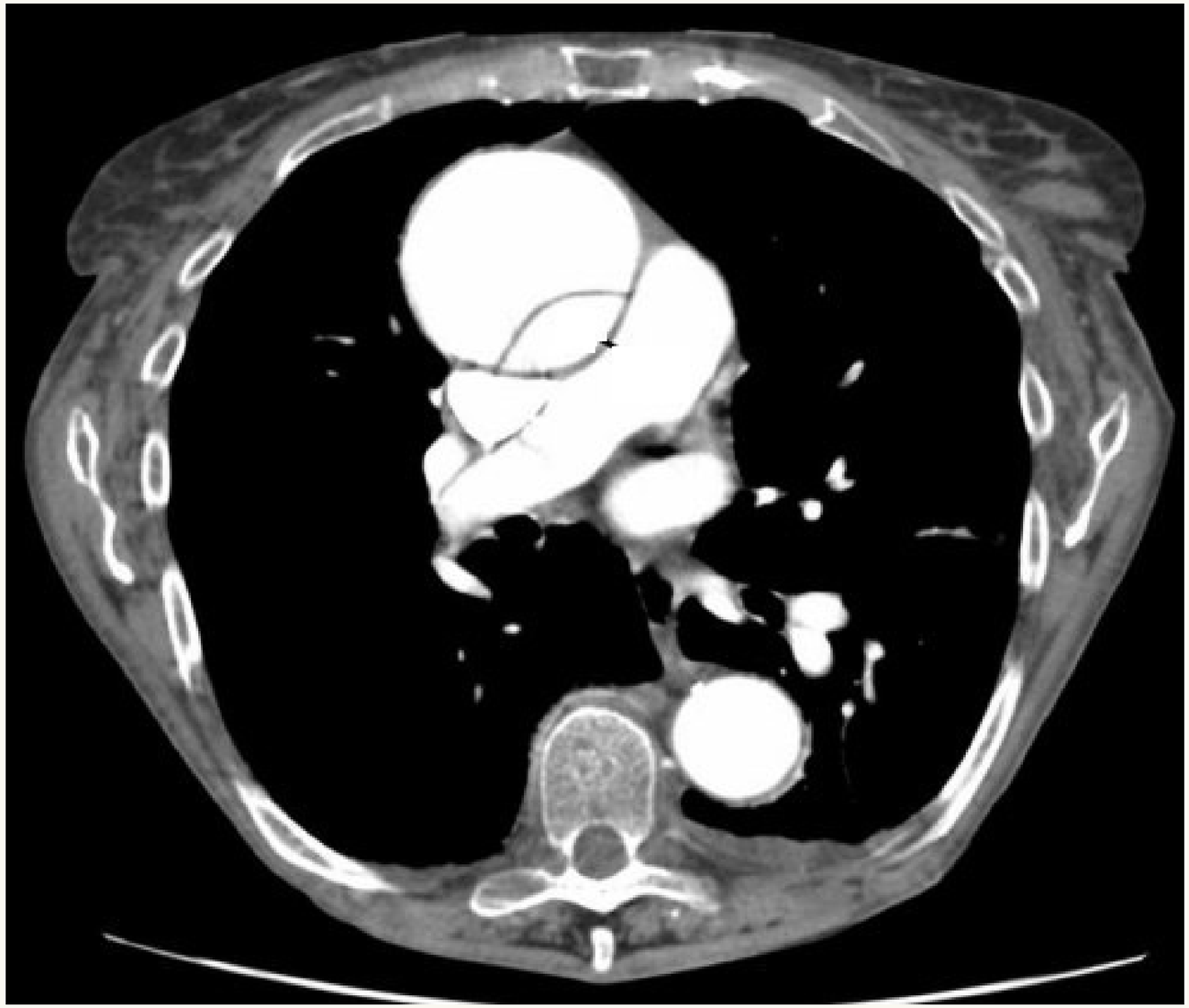
7 complication

-Aortic rupture
,Myocardial ischemia infarction,
Stroke or neurologic deficits,
Renal failure,
Mesenteric ischemia,
Limb ischemia

Aortic dissection



Aortic dissection



Aortic dissection

8

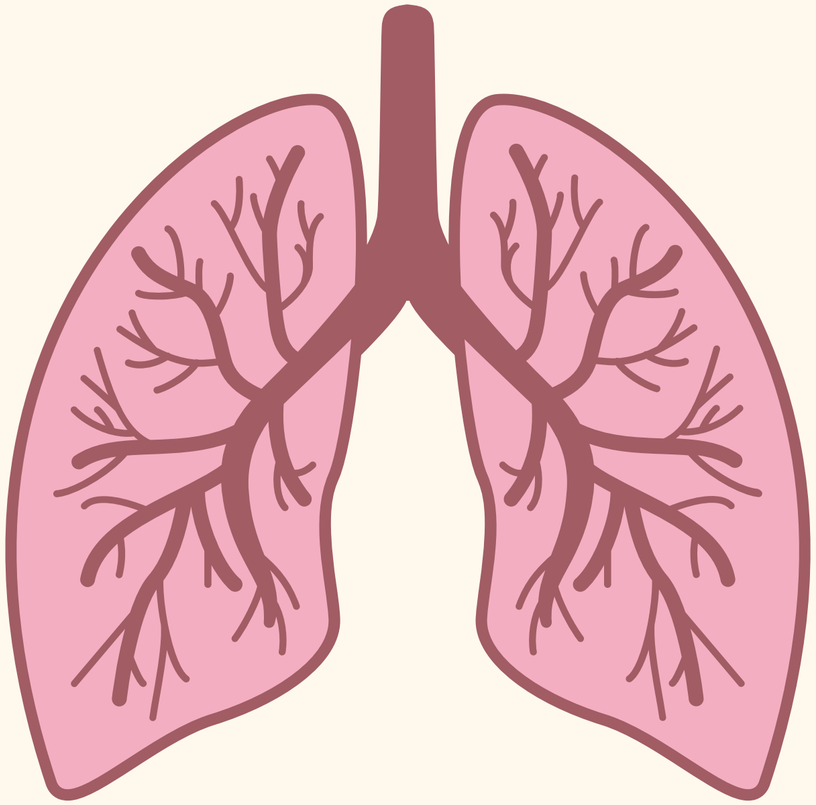
Management

IV beta-blocker (labetalol, esmolol) → reduce shear stress

Add vasodilator (nitroprusside) if BP still high

Immediate CT angiography

Surgery: Type A; medical management sometimes for Type B



Pulmonary Causes

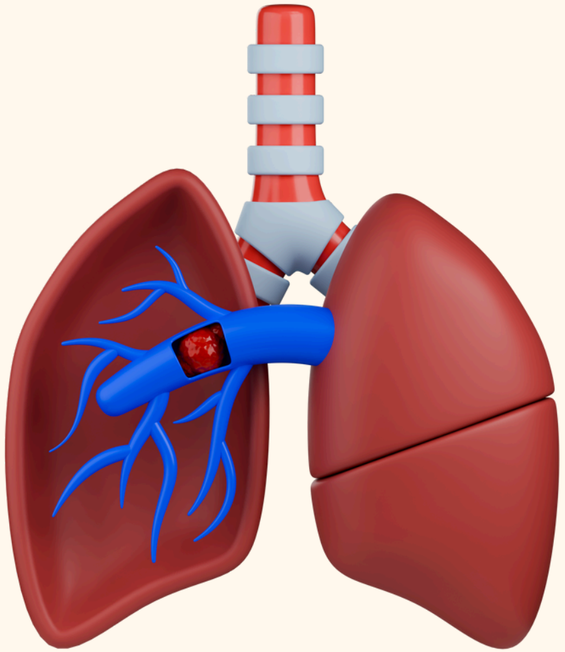
Pulmonary Embolism:

1. Definition:

Obstruction of pulmonary artery/branches by thrombus (or fat/air).

2. Risk Factors:

DVT, surgery, immobilization, cancer, OCP use, pregnancy.



3-History :

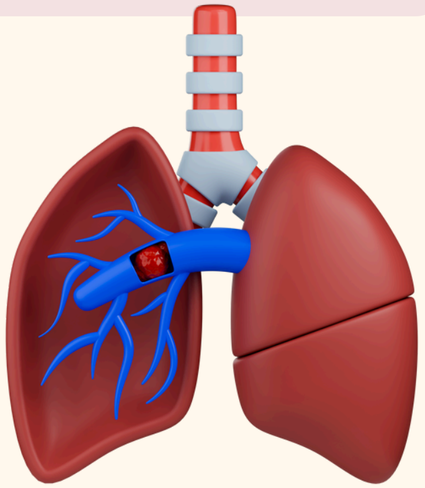
Sudden pleuritic chest pain, dyspnea, hemoptysis, syncope.

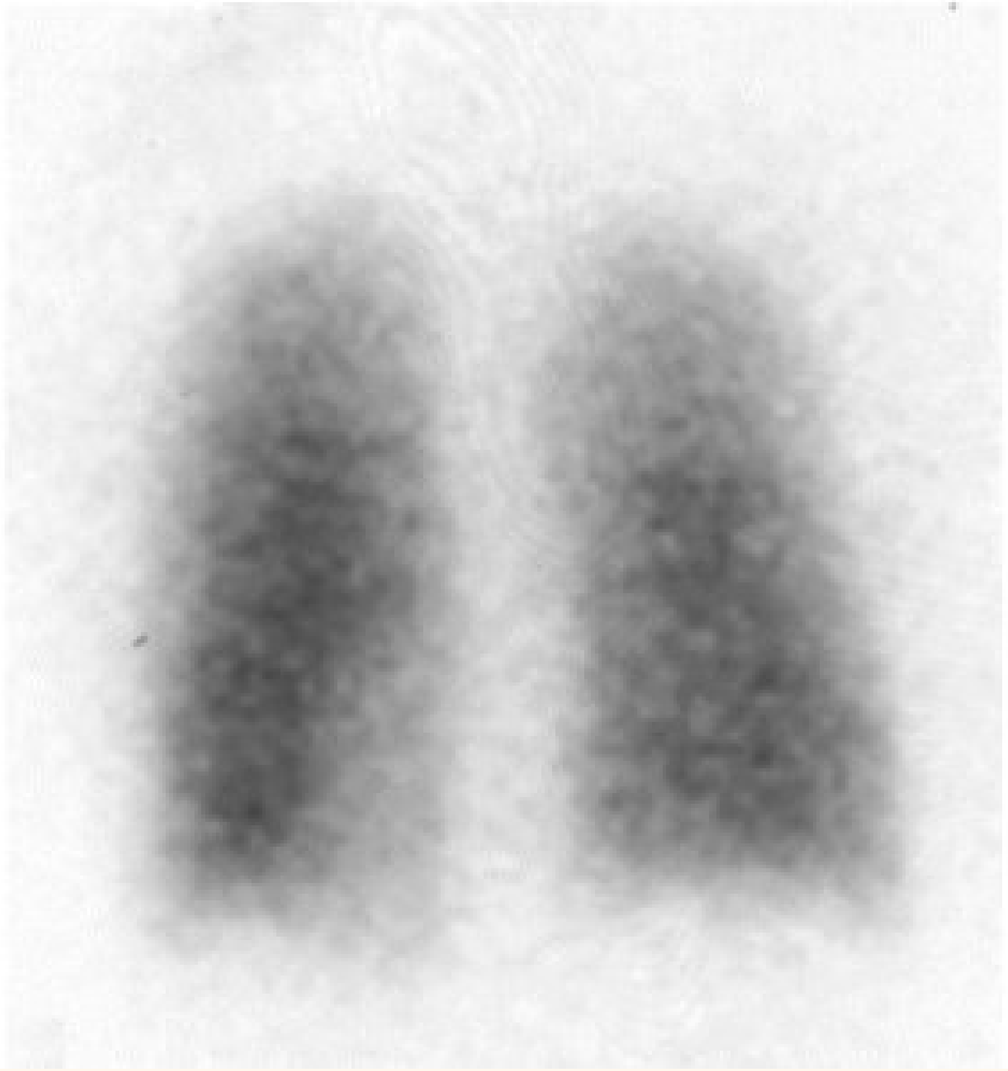
4-examination :

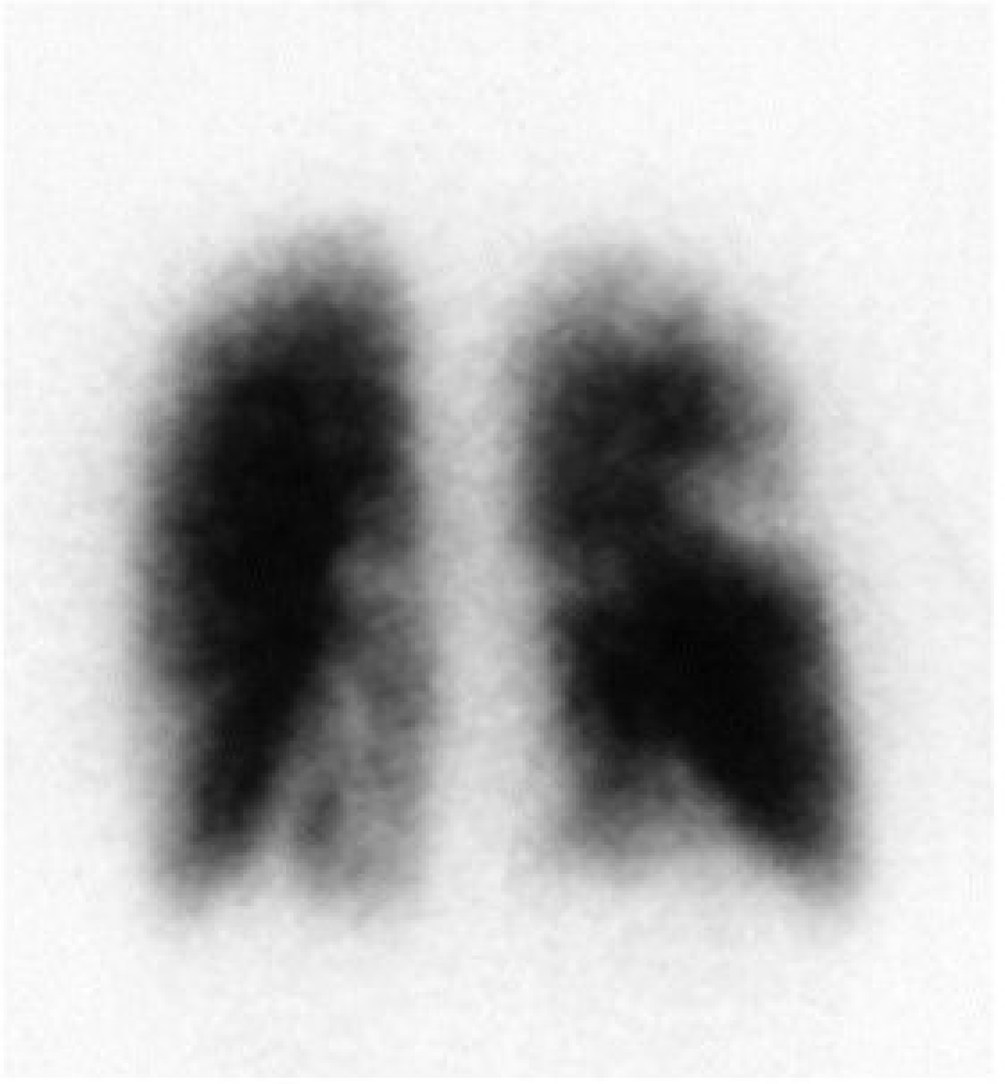
Tachypnea, tachycardia, hypoxemia, signs of DVT, possible RV heave.

5-Investigation:

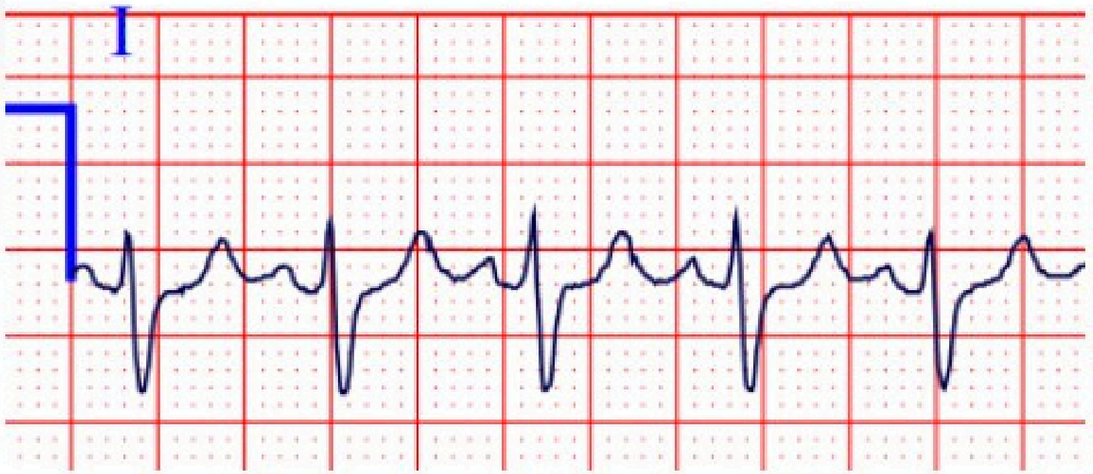
D-dimer, CTPA (gold standard), V/Q scan if contrast contraindicated, ECG (S1Q3T3), ABG.

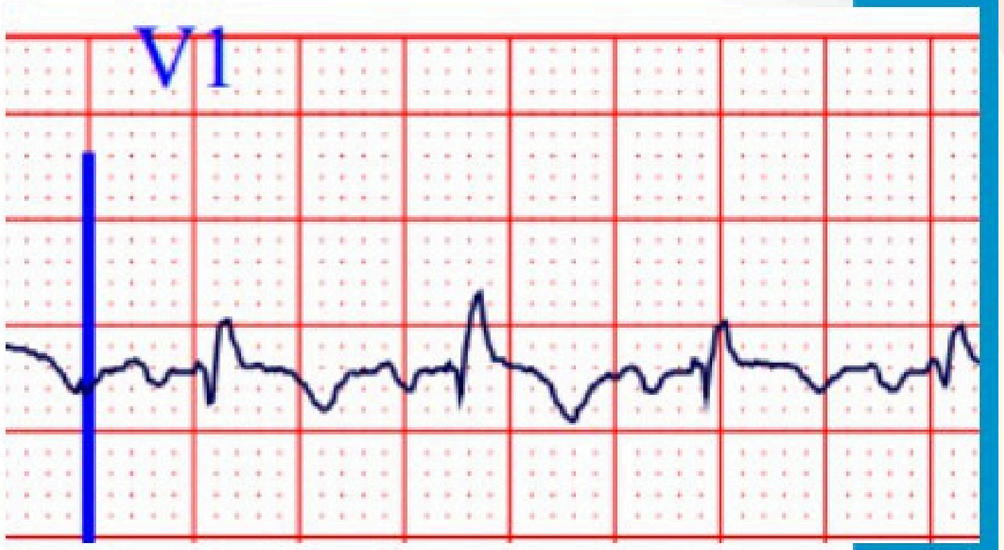


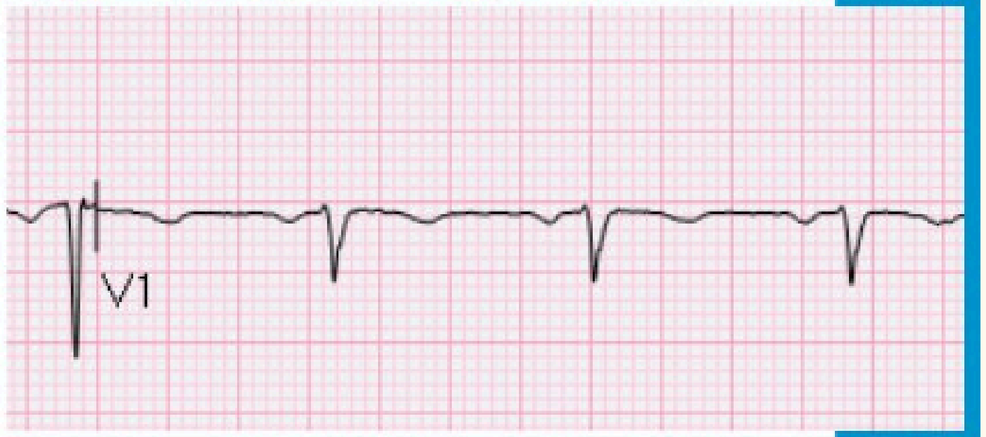


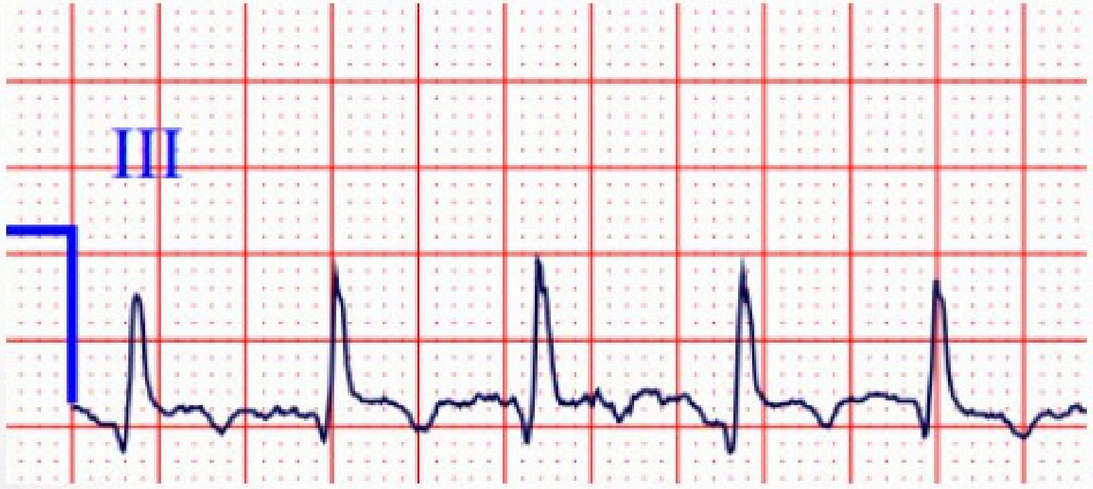


S1Q3T3









6- complications:

- Sudden death (from massive PE).
- Obstructive shock / acute right heart failure (cor pulmonale).
- Pulmonary infarction.
- Arrhythmias (especially atrial fibrillation).

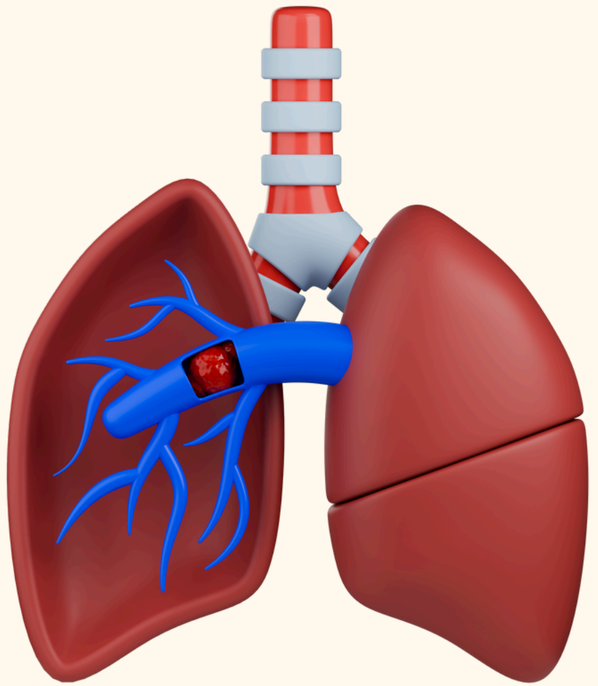
7- Management:

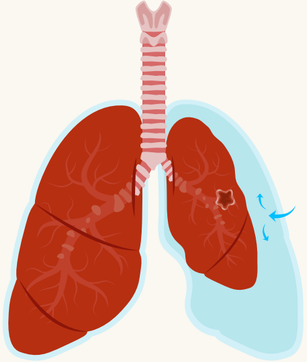
Oxygen, hemodynamic support

Anticoagulation (heparin → DOAC/warfarin)

Thrombolysis if massive PE with shock

Consider embolectomy if unstable





Pneumothorax

1-Definition:

Air in pleural space causing lung collapse.

2-Risk Factors

Tall thin males (spontaneous), trauma, underlying lung disease.

3-History:

Sudden unilateral pleuritic chest pain, dyspnea, sometimes cough.

Pneumothorax

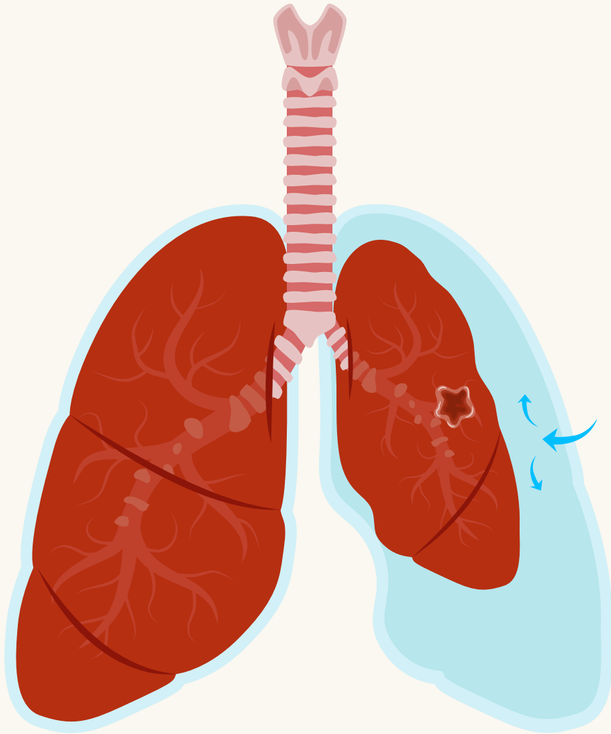
4-Exam:

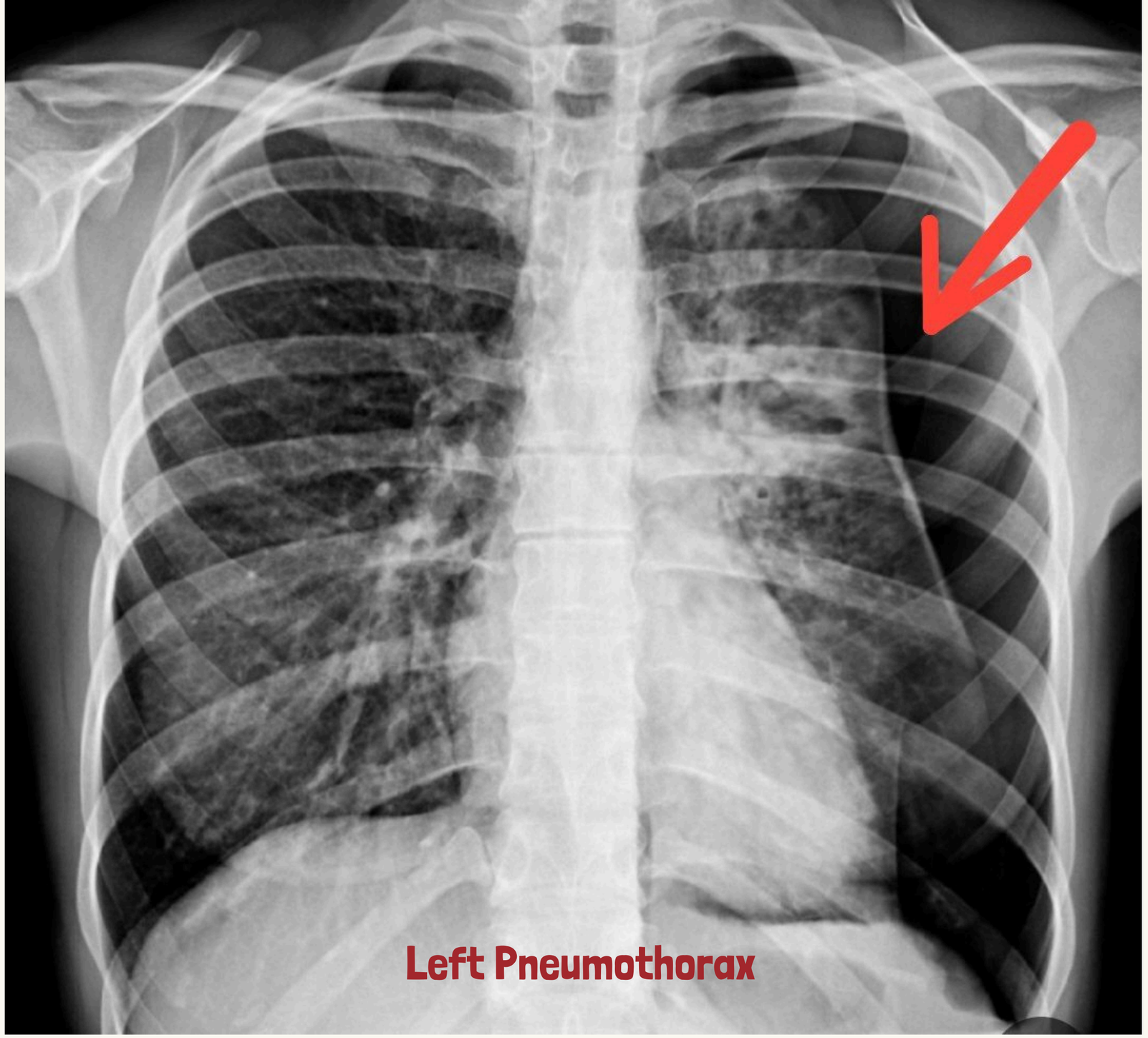
Decreased breath sounds on auscultation, hyperresonance, tracheal deviation if tension pneumothorax tachypnea

5-investigation :

Chest X-ray: (collapsed lung) visible plural line.

(ultrasound) in ER.





Left Pneumothorax

Pneumothorax

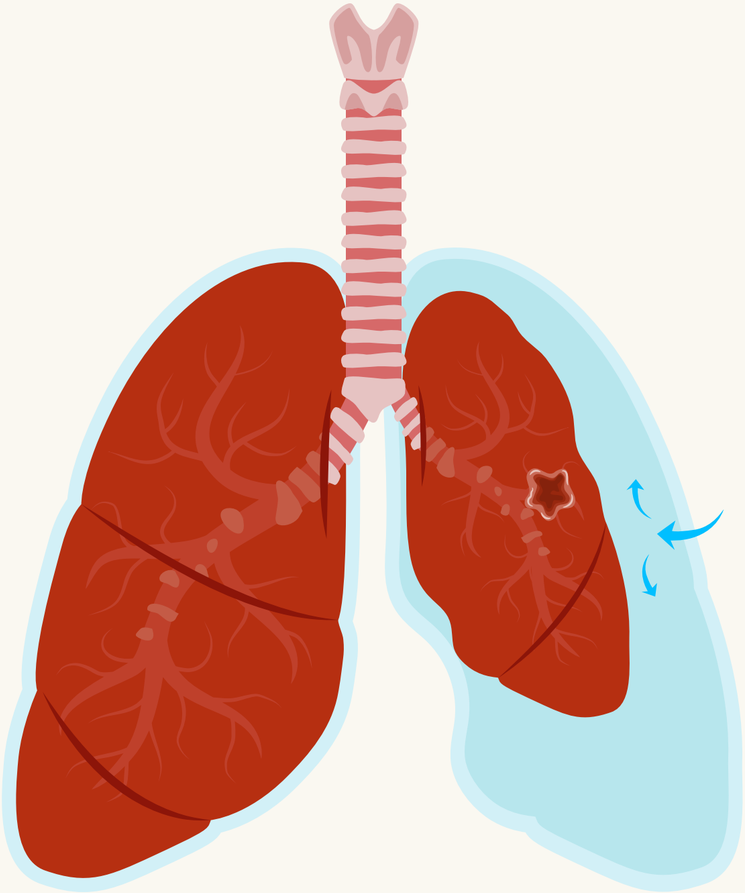
6- complications:

-Mediastinal shift, impaired venous return, shock (If tension pneumothorax)

-Respiratory failure (if bilateral or in patients with lung disease)

-Hypoxemia

Infection / empyema (secondary (complication if contaminated



Pneumothorax

7- Management:

depends on size and severity:

-Small, stable → oxygen + observation

-Large/symptomatic → needle decompression + chest tube

-Tension → immediate needle decompression + chest tube

Pneumonia / Pleuritis

1-Definition:

Infection of lung parenchyma or (pneumonia) pleural inflammation (pleuritis)

2-Risk Factors

Recent infection ,immunocompromised smoking, chronic lung disease

3-History:

Fever, cough ,pleuritic chest pain dyspnea, sometimes sputum

Pneumonia / Pleuritis

4-Exam

Fever, crackles
decreased breath
sounds if effusion
pleural rub

5- Investigations

Chest X-ray CBC
blood cultures
if severe: elevated in
CRP/ESR
(markers of
inflammation)

6-Pathophysiology

Inflammation
stimulates pleural
nerves ending→
pleuritic pain

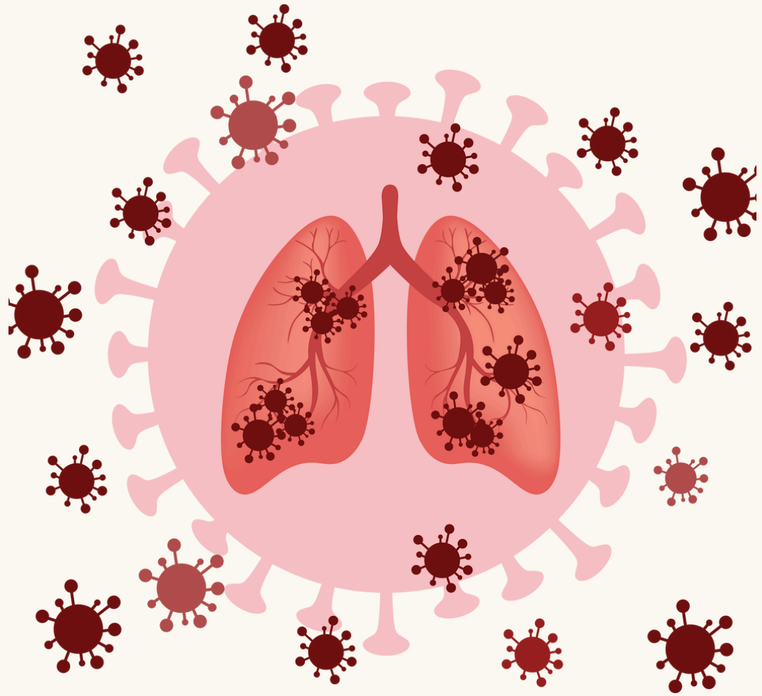
Pneumonia / Pleuritis

7-Red Flags

Empyema
sepsis
respiratory failure

8-Management

Oxygen if hypoxic
Antibiotics for infection
Analgesics for pain
, fluids
Treat effusion if present



Gastroesophageal Reflux Disease (GERD)

1. Definition: Reflux of gastric contents into the esophagus causing irritation.

2. Risk factors: Obesity, hiatal hernia, pregnancy, alcohol, smoking, spicy/fatty foods.

3. History: Retrosternal burning pain, worse after meals or lying down, relieved by antacids; may mimic angina.

Gastroesophageal Reflux Disease (GERD)

4. Exam: Often normal; sometimes pharyngeal erythema or dental erosions in chronic cases.

5. Investigations: Clinical diagnosis; endoscopy if red-flag symptoms; 24-h pH monitoring (gold standard).

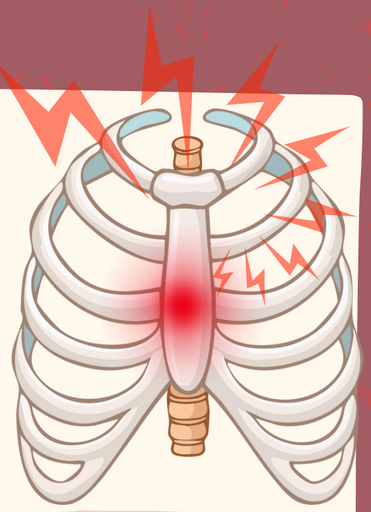
Gastroesophageal Reflux Disease (GERD)

6. Complications: Esophagitis, peptic stricture, Barrett's esophagus, adenocarcinoma.

7. management :

- Proton pump inhibitors (PPI)
- Lifestyle: weight loss, head elevation, avoid trigger foods

Musculoskeletal (MSK) Chest Pain



Definition

Chest wall pain due to muscle strain costochondritis, or trauma

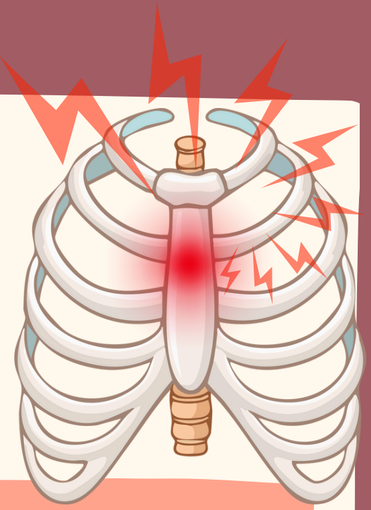
Risk factor

Recent heavy lifting ,coughing trauma poor posture Repetitive strain

History

Localized sharp pain worse with Movement or palpation not exertional

Musculoskeletal (MSK) Chest Pain



Exam

Reproducible tenderness on palpation of chest wall or costosternal junction.

Investigation

Clinical diagnosing imaging (X-ray, MRI) only if trauma or persistent symptoms

Complications

Chronic pain syndrome, reduced mobility, recurrent chest wall strain

Musculoskeletal (MSK) Chest Pain

Management

- NSAIDs, local heat/ice
- Rest, reassurance

Psychiatric causes

Feature	Anxiety	Panic Attack
Definition	Excessive, persistent worry with physical symptoms (palpitations, chest tightness).	Sudden intense fear with physical symptoms peaking within minutes.
Risk Factors	Stress, family history, caffeine, poor sleep.	Anxiety disorder, stress, stimulants, family history.
History	Gradual onset, constant worry, chest tightness, restlessness.	Sudden chest pain, palpitations, shortness of breath, fear of dying.
Examination	Usually normal; mild tachycardia possible.	Tachycardia, sweating, normal after attack.
Investigations	Normal; ECG, TSH to rule out causes.	ECG, thyroid tests — usually normal.
Management	Reassure, CBT, SSRIs, relaxation, avoid caffeine.	Reassure, breathing control, CBT, SSRIs short/long term.

Psychiatric causes

THANK YOU

Do you have any questions?

ما بالهوينا ينال المجدَ آمله

منيعة صعبة المرتقى منازله

لا يدرك المجد من لانت مآكله

لا تحسب المجد تمراً أنت آكله

لن تبلغ المجد حتى تلعق الصبرا