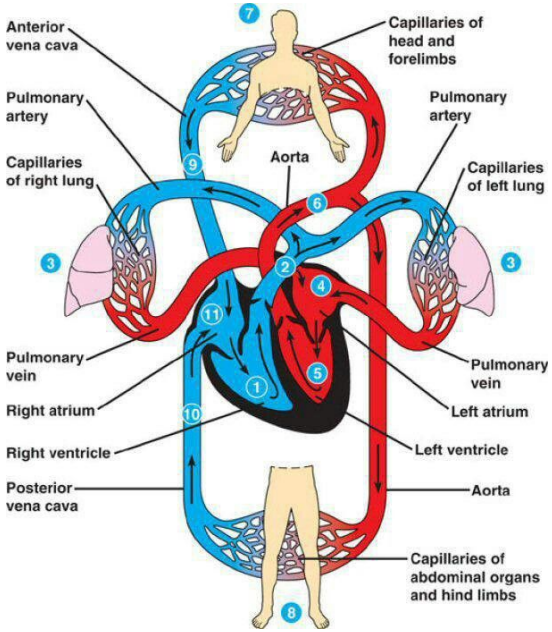
Cardiovascular system
History and physical examination

ANATOMY & PHYSIOLOGY

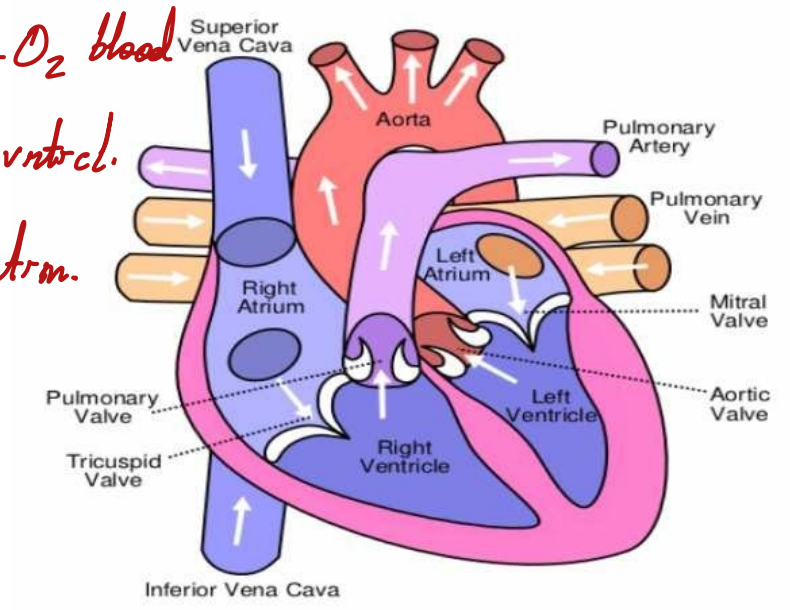


lt side → O_2 blood

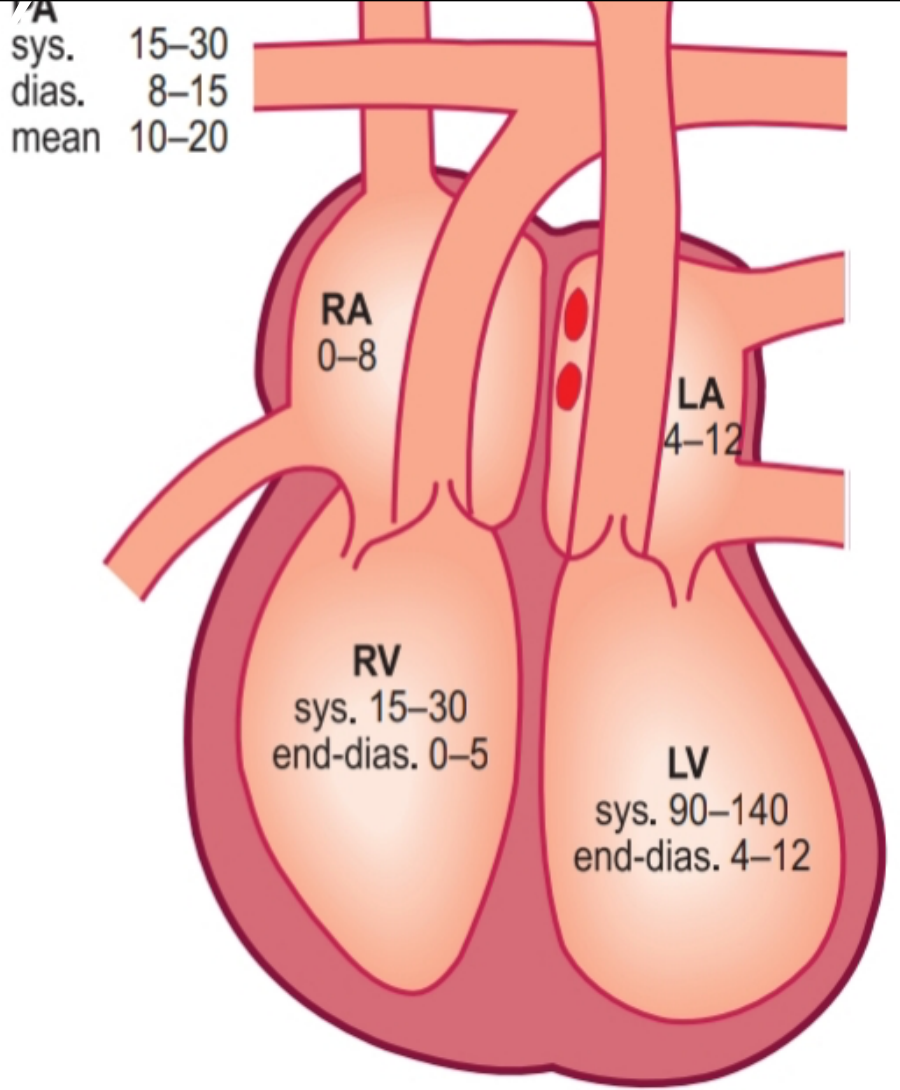
rt side → de-O_2 blood

highest p. → lt. vntrcl.

lowest p. → rt. atrm.



Normal resting pressure in the heart and great vessels



4.2 Normal resting pressures (mmHg) in the heart and great

HISTORY

Common presenting symptoms:

- Chest pain
- Dyspnoea
- Palpitation
- Syncope and presyncope
- Oedema

Intermittent Acute

1. Chest pain

Chest pain

You could reach >50% of Dx with these only.

- **SOCRATES**
- Always ask about its relation to **exertion** and degree of limitation caused by symptoms

- DDx:

1. Angina
2. Myocardial infarction
3. Aortic dissection
4. Pericarditis
5. Oesophageal Spasm
6. Pneumothorax
7. Musculoskeletal pain

Angina

- Chest pain due to inadequate oxygen supply to the heart muscle
- Causes:

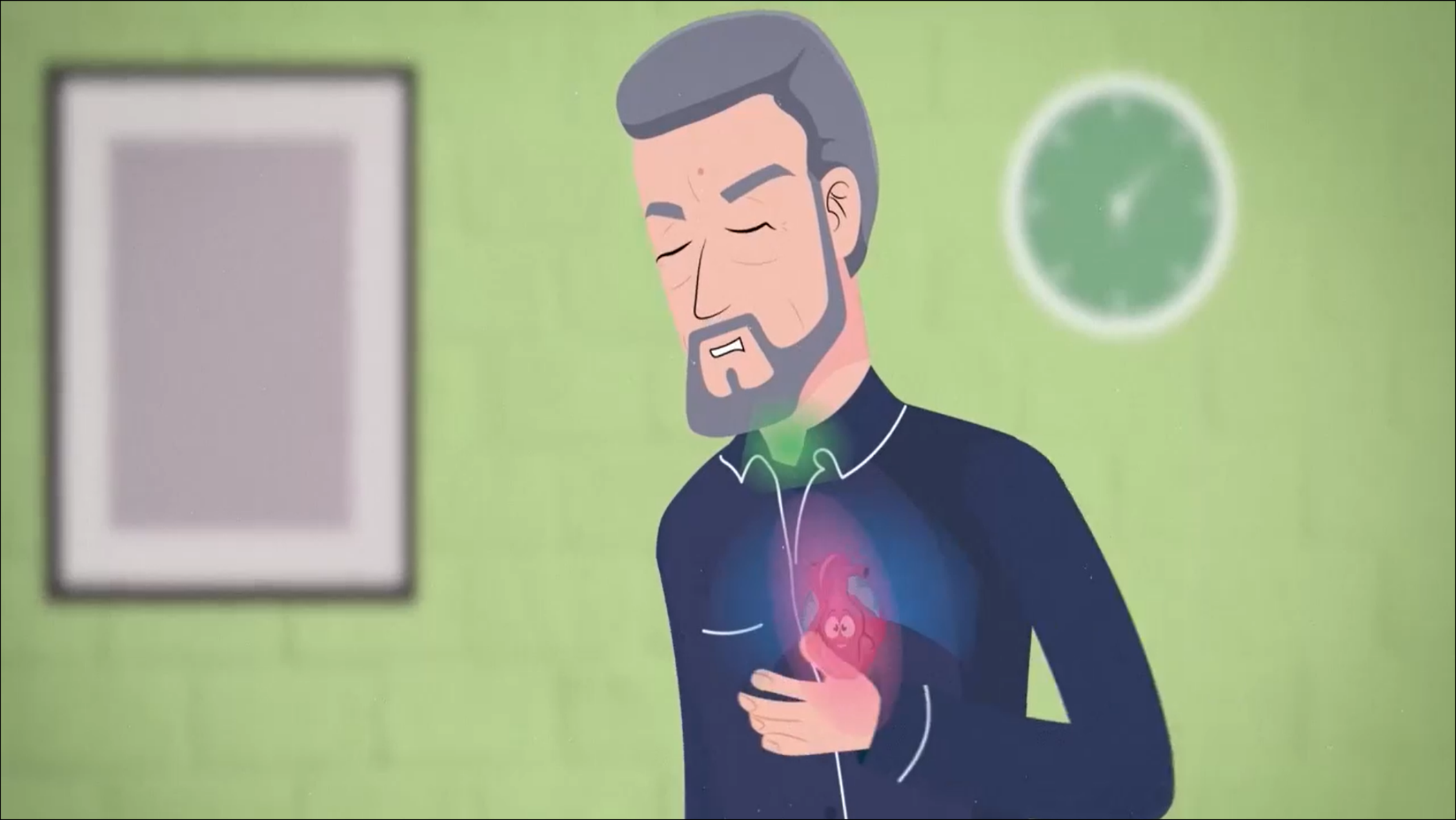
1. Coronary atherosclerosis (Chronic fixed narrowing of the coronaries)
2. Aortic stenosis
3. Hypertrophic cardiomyopathy (HOCM)

There is an important table in the book! Memorize.

Angina

CP
- Cardiac: Pt's hands are all over the chest.
- Musculoskeletal: Pt pinpoints with 1 finger

SITE	RETROSTERNAL
Onset	progressive, increase in intensity over 1-2 minutes
Character	Constricting, heavy
Radiation	Sometimes arm, neck, epigastrium
Associated features	Dyspnoea
Timing	Intermittent, with episode lasting 2-10 minutes
Exacerbating/relieving factors	Triggered by emotion, exertion, cold, large meal Relieved by rest, nitrates
Severity	Mild to moderate



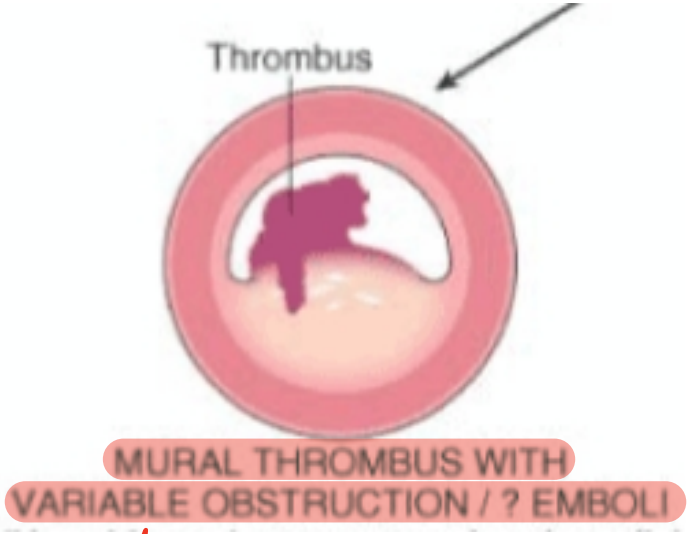
Chronic plaque

More acute (< 6 weeks)

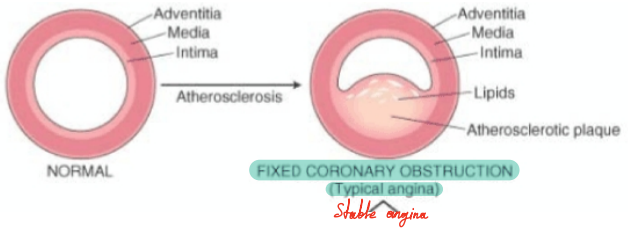
Stable vs. unstable angina

- Unstable angina: atherosclerotic plaque rupture with non-occlusive thrombus

1. New onset chest pain **< 6 weeks**, or **< 2 weeks post-MI**
2. **Worsening** in severity, frequency, less responsive to nitrates
3. Occur with minimal exertion or at **rest**



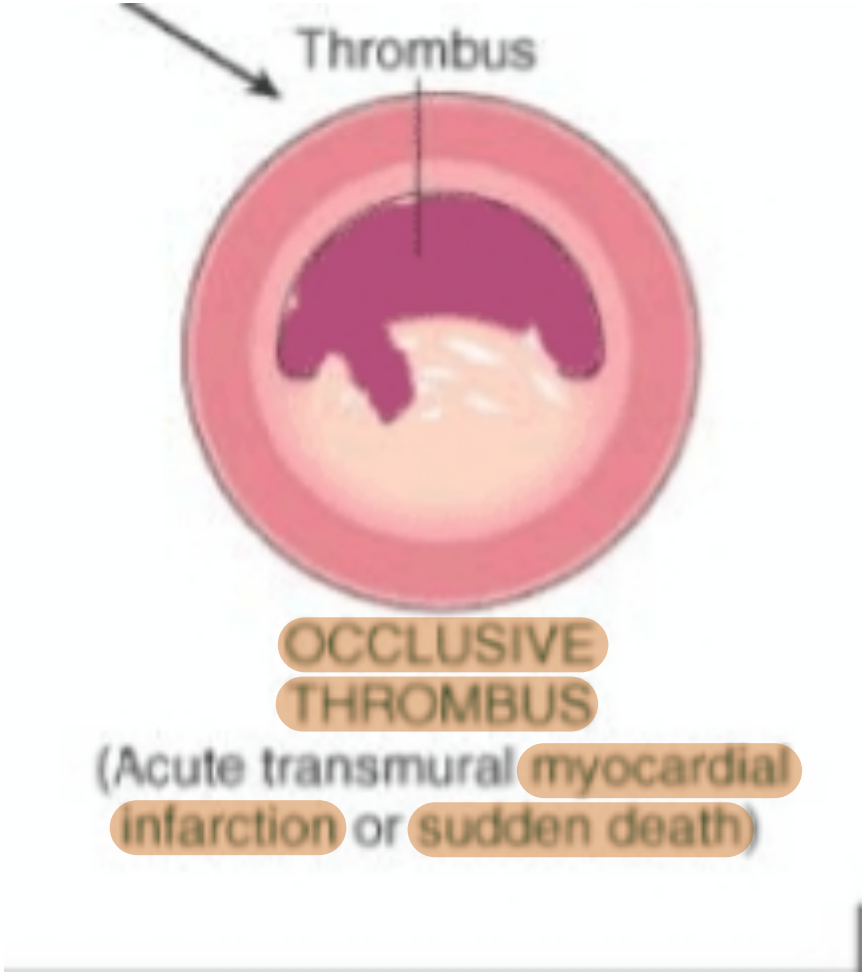
Unstable angina



Stable angina

Myocardial infarction

- Atherosclerotic plaque rupture with occlusive thrombus
- The symptoms are move severe and prolonged than angina
- +ve autonomic symptoms: nausea, vomiting, pallor, sweating
- Angor animi: feeling of impending death



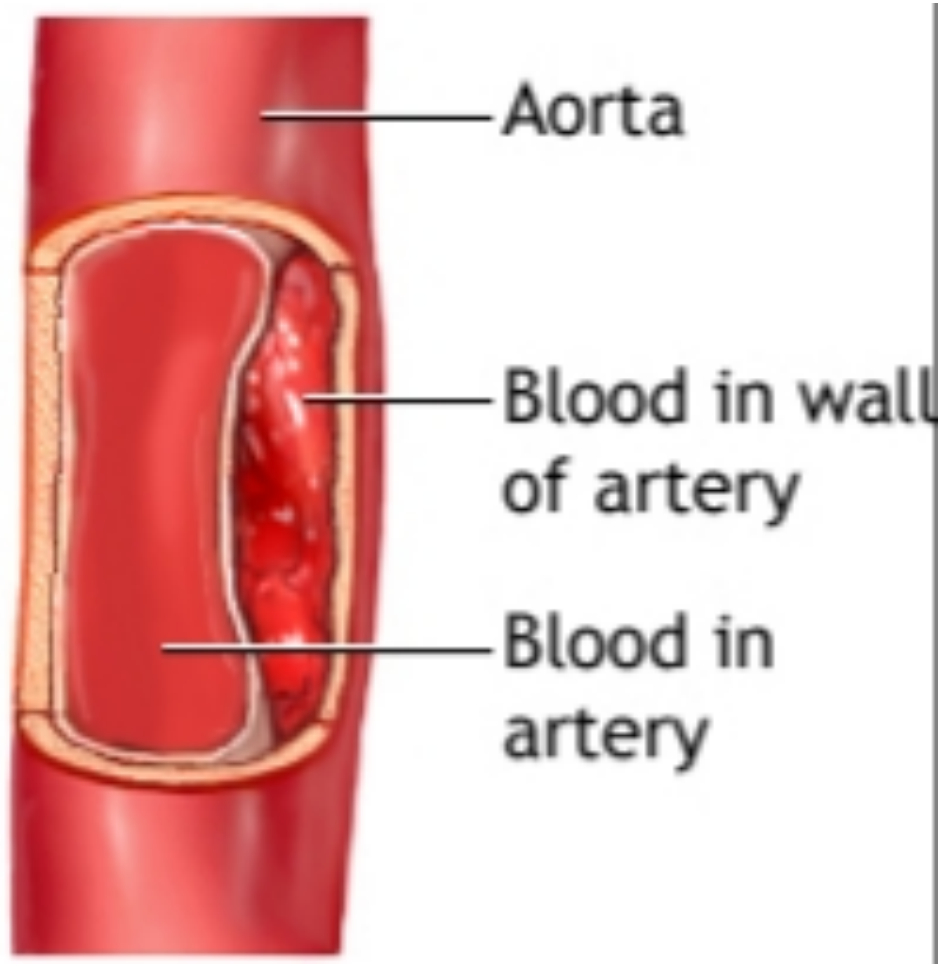
MI

Site	Retrosternal
Onset	Rapid over few minutes
Character	Constricting, heavy
Radiation	Arms, neck, jaw, epigastrium
Associated symptoms	Autonomic symptoms, angor animi, SOB
Timing	Acute presentation, prolonged duration >30 minutes vs 10 mins. max for angina
Exacerbating/relieving factors	Stress and exercise are rare triggers, usually spontaneous Not relieved by rest or nitrates
Severity	Usually severe

Aortic dissection

- Tear in the intima of aorta → Same as MI
- Associated with profound autonomic stimulation
- If the tear involves the cranial or upper limb arteries, there may be associated syncope, stroke, or upper limb pulse asymmetry → Radio-radial delay
- Predisposing factors:

1. HTN
2. CTD (Marfan syndrome) → Connective Tissue Diseases



Aortic dissection

Site	Interscapular/retrosternal
Onset	Very sudden
Character	Tearing, ripping
Radiation	Back, interscapular
Associated features	Sweating, syncope, focal neurological deficit, signs of limb ischemia, mesenteric ischemia
Timing	Acute presentation, prolonged duration
Exacerbating/relieving factors	Spontaneous, no manoeuvres relieve pain
Severity	Very severe

Important

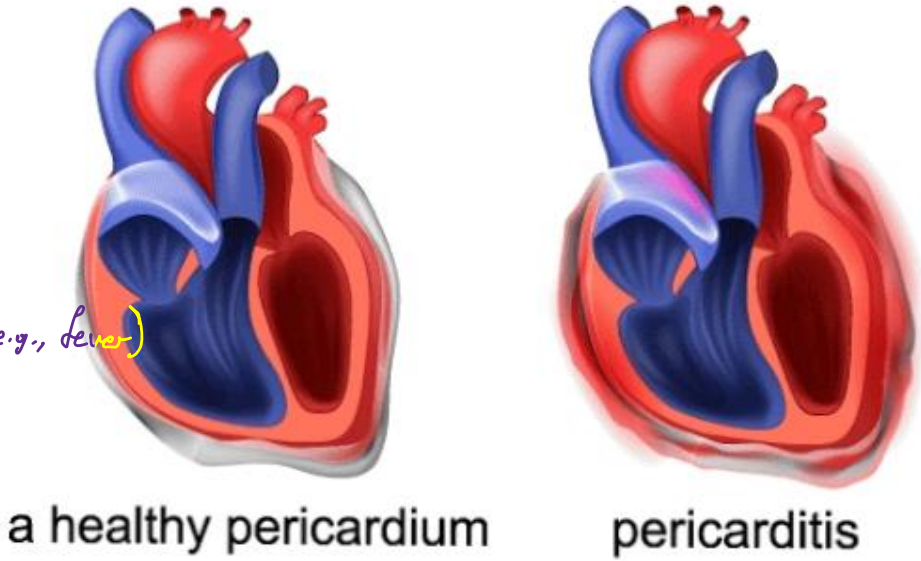
بحس بألم بمزع فيه

"Tearing" pain

Pericarditis

- Inflammation of the pericardium
- Causes:

1. Viral infection → Infection symptoms precede it (e.g., fever)
2. CTD → Mostly known (e.g., Marfan's)
3. MI
4. After surgery, catheter ablation or radiotherapy → Dressler syndrome !



a healthy pericardium pericarditis

Extra :

Dressler syndrome is inflammation of the sac surrounding the heart (pericarditis). It's believed to occur as the result of the immune system responding to damage to heart tissue or damage to the sac around the heart (pericardium). The damage can result from a heart attack, surgery or traumatic injury.

Pericarditis

Site	**Retrosternal or left sided**
Onset	Gradual, postural changes may suddenly aggravate
Character	Sharp, stabbing
Radiation	Left shoulder or back
Associated symptoms	Flu-like prodrome, SOB, fever
Timing	Acute presentation, variable duration
Exacerbating/relieving factors	Exacerbated by lying down Inspiration worsen pain Relieved by NSAID, leaning forward pressure by muscles, etc. is relieved.
Severity	Can be severe
Causes	MI Viral infection After surgery, catheter ablation, angioplasty or radiotherapy

Blood tests:

Cardiac enzymes –ve

Oesophageal spasm

Young pts. e.g., 18 yo
& could be due to emotional stress

Site	**Retrosternal or epigastric**
Onset	Over 1-2 minutes, can be sudden (spasm)
Character	Gripping, tight or burning
Radiation	Often to back, sometimes to arms
Associated symptoms	Heartburn, acid reflux
Timing	Intermittent, often at night-time, variable duration
Exacerbating/relieving factors	Triggered by lying flat and some food Not relieved by rest Nitrates sometimes relieve
Severity	Usually mild but oesophageal spasm can mimic MI

2. Dyspnea

Dyspnoea (breathlessness)

- Unpleasant awareness of breathing
- Acute vs. Chronic
- Causes of acute SOB:

1. Heart failure-most common cause (Acute or chronic)
2. Pulmonary embolism
3. Arrhythmias

Mechanisms of heart failure

4.4 Some mechanisms and causes of heart failure

Mechanism	Cause
Reduced ventricular contractility (systolic dysfunction)	Myocardial infarction Dilated cardiomyopathy, e.g. genetic, idiopathic, alcohol excess, cytotoxic drugs, peripartum cardiomyopathy Myocarditis
Impaired ventricular filling (diastolic dysfunction)	Left ventricular hypertrophy Constrictive pericarditis Hypertrophic or restrictive cardiomyopathy
Increased metabolic and cardiac demand (rare)	Thyrotoxicosis Arteriovenous fistulae Paget's disease
Valvular or congenital lesions	Mitral and/or aortic valve disease → Lt. heart Tricuspid and/or pulmonary valve disease (rare) → Rt. heart Ventricular septal defect Patent ductus arteriosus

القلب يعبي بس مش قادر يفضي

القلب مش قادر يعبي

Angina equivalent

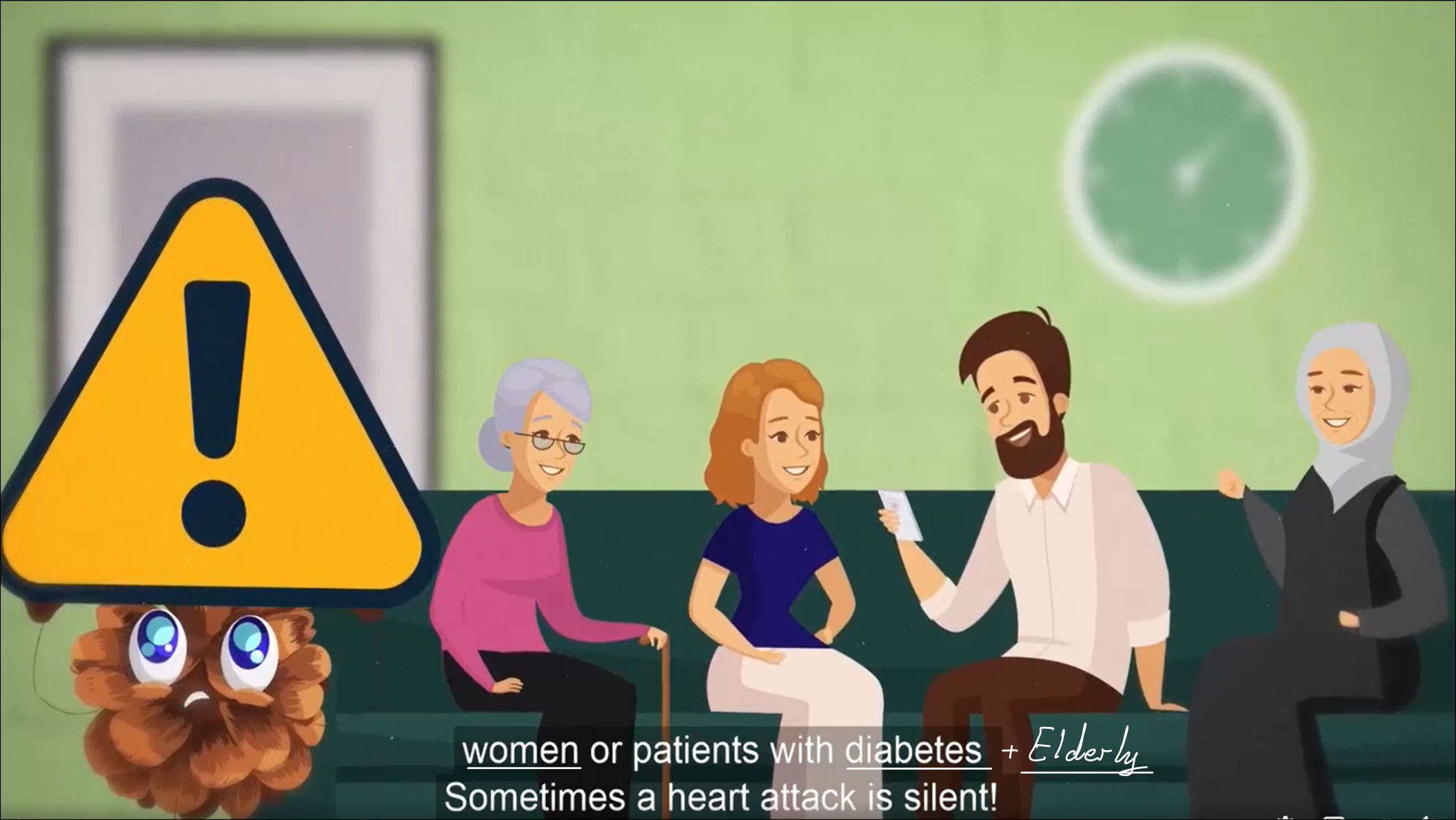
- SOB caused by MI
- May be accompanied with chest pain
- Elderly, DM, females → 3 populations with MI with unclear presentation
- Identical precipitant to angina and relived with nitrate

⚠ Assume MI unless excluded!

Extra:

While the classic symptom of angina is chest pain or discomfort, some people, particularly women, may not experience chest pain but instead have symptoms that are considered equivalents of angina. These equivalents can include shortness of breath, fatigue, nausea, lightheadedness, or pain in the neck, jaw, back, or arm. These symptoms can still indicate a serious heart condition and should be evaluated by a medical professional.

e.g., MI


women or patients with diabetes + Elderly
Sometimes a heart attack is silent!

Exertional dyspnea, orthopnea, paroxysmal nocturnal dyspnea

- **Exertional dyspnea**: the symptomatic hallmark of heart failure
- NYHA grading system to assess the degree of symptomatic limitation caused by exertional SOB of heart failure

Remember from RS:

5.2 Medical Research Council (MRC) breathlessness scale

Grade	Degree of breathlessness related to activities
1	Not troubled by breathlessness except on strenuous exercise
2	Short of breath when hurrying on the level or walking up a slight hill
3	Walks slower than most people on the level, stops after a mile or so, or stops after 15 minutes walking at own pace
4	Stops for breath after walking about 100 yds or after a few minutes on level ground
5	Too breathless to leave the house, or breathless when undressing

Used with the permission of the Medical Research Council.

4.5 New York Heart Association classification of heart failure symptom severity

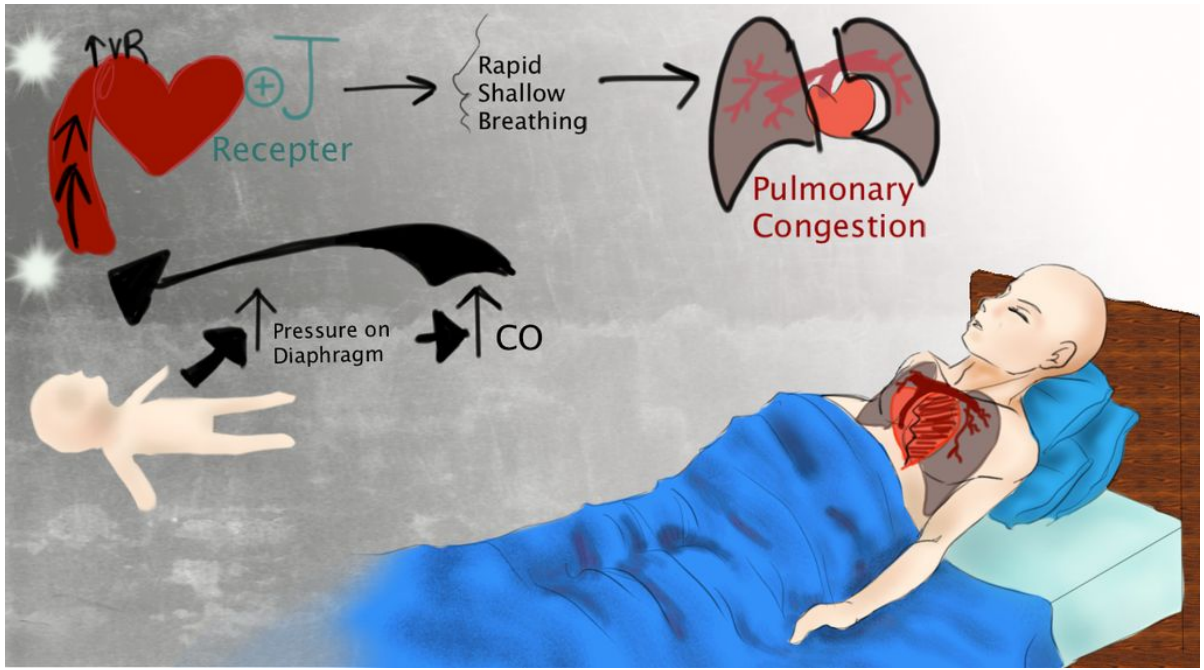
Class	Description
I	No limitations. Ordinary physical activity does not cause undue fatigue, dyspnoea or palpitation (asymptomatic left ventricular dysfunction)
II	Slight limitation of physical activity. Such patients are comfortable at rest. Ordinary physical activity results in fatigue, palpitation, dyspnoea or angina pectoris (symptomatically 'mild' heart failure)
III	Marked limitation of physical activity. Less than ordinary physical activity will lead to symptoms (symptomatically 'moderate' heart failure)
IV	Symptoms of congestive heart failure are present, even at rest. With any physical activity, increased discomfort is experienced (symptomatically 'severe' heart failure)

Orthopnea

Occurs as soon as you lie down

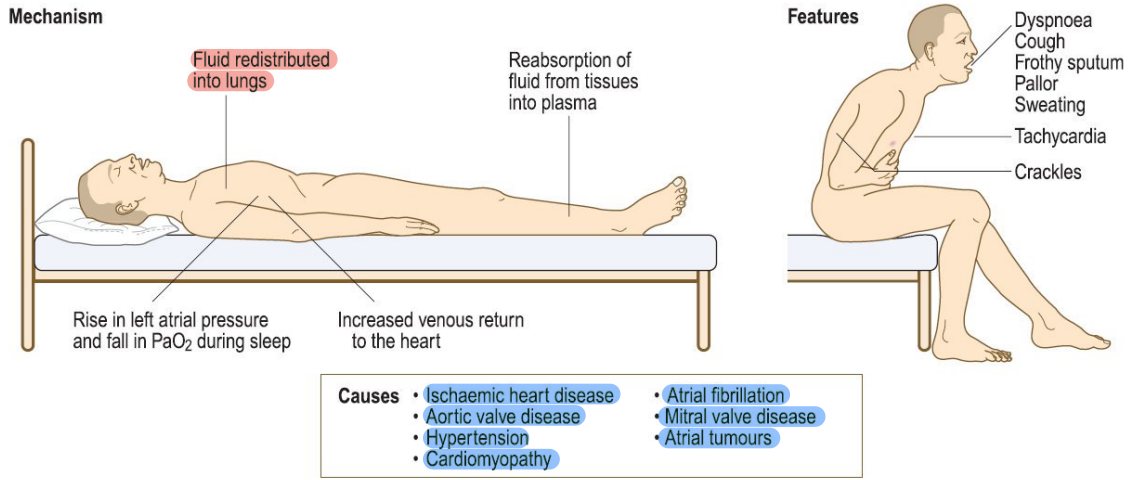
vs.

PND: Occurs 2-3hrs later



- Dyspnea on lying flat — leads to → ② Increas mec ical pressure on the rt. atrium
- Mechanism: ① increase venous return → Lower limb edema redistributed to the lungs. → Pulmonary congestion → Orthopnea
- Severity is assessed by the number of pillows used at night
  e.g., 2-pillow orthopnea
- The most severe form on dyspnea

Paroxysmal nocturnal dyspnea (PND)



Paroxysmal nocturnal dyspnoea.

Source : Macleods Clinical Examination 13th Ed (2013)

- SOB awaken patient from sleep (hours later)
- Same mechanism and orthopnea
- Pt describes episode of choking or gasping for air, relieved by sitting
- VS. Asthma attack

Acute dyspnoea

Ask about:

- duration of onset
- Background symptoms of **exertional** dyspnoea and usual exercise tolerance
- Associated symptoms: chest pain, syncope, palpitation or respiratory symptoms (cough, sputum, wheezes, haemoptysis)

Chronic dyspnoea

- Ask about:
- Relationship between symptoms and **exertion**
- degree of limitation caused by symptoms and their impact on everyday activities
- effect of posture on symptoms and/or episodes of nocturnal breathlessness
- associated symptoms: ankle swelling, cough, wheeze or sputum.

3. Palpitation

Palpitation

- Unexpected or unpleasant awareness of the heart beating in the chest
- Ask about:

1. Nature of palpitation (Heart beats rapid, forceful, irregular)
2. Timing of symptoms: speed on onset and offset, frequency and duration of episodes
3. Precipitants for symptoms (e.g., exertion, smoking, etc.) or relieving factors
4. Associated symptoms: presyncope, syncope, chest pain
5. History of cardiac disease

In healthy people

(Physiological palpitations)

- More common in bed at night in slim people while lying on their left side
- After exercise or in stressful situation will be aware of their heart beating with normal sinus rhythm

4.6 Descriptions of arrhythmias

Somehow benign

Hx of angina usually

	Extrasystoles (Benign)	Sinus tachycardia	Supraventricular tachycardia	Atrial fibrillation	Ventricular tachycardia
Site	–	–	–	–	–
Onset	Sudden	Gradual	Sudden, with 'jump'	Sudden	Sudden
Character	'Jump', missed beat or flutter	Regular, fast, 'pounding'	Regular, fast	Irregular, usually fast; slower in elderly	Regular, fast
Radiation	–	–	–	–	–
Associated features	Nil	Anxiety	Polyuria, lightheadedness, chest tightness	Polyuria, breathlessness Syncope uncommon	Presyncope, syncope, chest tightness
Timing	Brief	A few minutes	Minutes to hours	Variable	Variable
Exacerbating/ relieving factors	Fatigue, caffeine, alcohol may trigger Often relieved by walking (increases sinus rate)	Exercise or anxiety may trigger	Usually at rest, trivial movements, e.g. bending, may trigger Vagal manœuvres may relieve	Exercise or alcohol may trigger; often spontaneous	Exercise may trigger; often spontaneous
Severity	Mild (usually)	Mild to moderate	Moderate to severe	Very variable, may be asymptomatic	Often severe

Benign, At rest
Abolished by exercise
underfilling alternating with overfilling of left ventricle

Affects young
Regular, sudden paroxysms

Valsalva maneuver
Carotid sinus massage
Cold water face immersion

Affects pts with underlying cradiomyopathy, or previous MI

High risk features for life-threatening arrhythmia

1. Previous MI or cardiac surgery → Red flag
2. Associated syncope or severe chest pain
3. Family hx of sudden death YOUNG: at < 55yrs (males) or < 65 yrs (females)
4. Wolff-Parkinson-white syndrome
5. Significant structural heart disease (HCM, AS)
   - AS → aortic stenosis

4. Syncope/presyncope

Syncope and presyncope

- Syncope: Transient loss of consciousness due to transient cerebral hypoperfusion
- Presyncope: sensation of lightheadedness and impending loss of consciousness without progressing to acute LOC

For **SYNCOPE** ask about:

- Ask about witness
- قبل Circumstances of the event and any preceding symptoms (palpitation, chest pain, lightheadedness, nausea, tinnitus, sweating and visual disturbance)
- أثناء Duration of LOC, appearance of the patient while unconscious and any injuries sustained.
- بعد Time to recovery to full consciousness and normal cognition
- Current driving status, including occupational driving

e.g., Truck drivers: Fatal consequences if they kept driving untreated!

For **PRESYNCOPE** ask about:

- Exact nature of symptoms and associated features as palpitation
- Precipitants for symptoms such as postural changes, prolonged standing, intense emotion or exertion
- Frequency of episodes and impact on lifestyle
- Possible contributing medications as antihypertensive meds

Causes of syncope/presyncope

- Postural hypotension → Tachycardia
- Neurocardiogenic syncope (vasovagal attacks) → Bradycardia
- Hypersensitive carotid sinus syndrome (pressure over carotid sinus may lead to reflex bradycardia and syncope)
- Arrhythmia
- Mechanical obstruction of cardiac output

Postural hypotension as a cause of syncope

- A fall > 20 mmHg in systolic BP, > 10 mmHg in diastolic BP on standing with reflex tachycardia of 15-20 bpm increase in heart rate

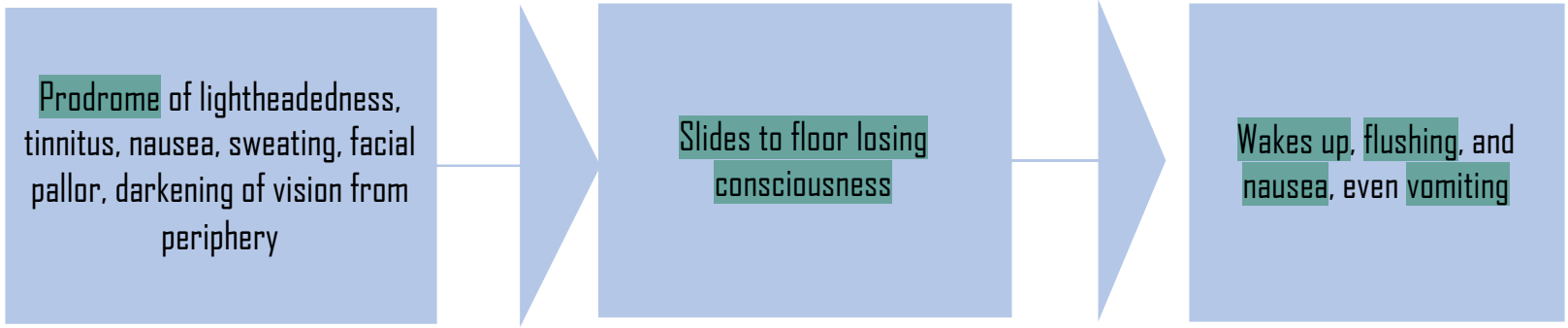
- Causes:

1. Hypovolemia
2. Drugs
3. Autonomic neuropathy

- Common in elderly, esp. above 65 years

Vasovagal syncope

- Mechanism: abnormal autonomic reflexes produce a sudden bradycardia and/or vasodilatation
- In healthy people forced to stand for a long time in warm environment or subject to painful or emotional stimuli such as sight of blood ⟵ ∴ لما تروح للجراحة وتشوف الدم يا طالب الطب
- VS. seizure



DON'T HOLD THE PATIENT UPRIGHT

This will worsen cerebral hypoperfusion, leading to delays recovery and possible progression into seizure

Arrhythmia as a cause of syncope

- Most common cause is bradyarrhythmia

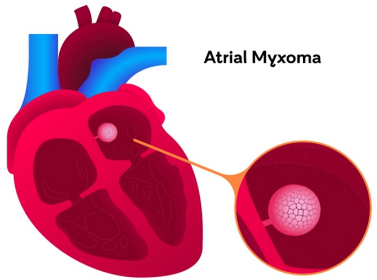
1. Stoke-Adams attacks: episodic LOC secondary to sinoatrial disease or AV block
2. Drugs (Digoxin, beta-blockers)
3. Ventricular tachycardia causes syncope more often than supraventricular tachycardia esp. in patient with impaired LV function

Mechanical obstruction to ventricle outflow as a cause of syncope

1. Left ventricular outflow obstruction (related to exertion)
- Severe aortic stenosis
- Hypertrophic cardiomyopathy (HOCM) → Familial
  → Lt. ventricle is thickened! → Heart pumps against strong pressure
2. Right ventricular outflow obstruction
- Pulmonary embolism

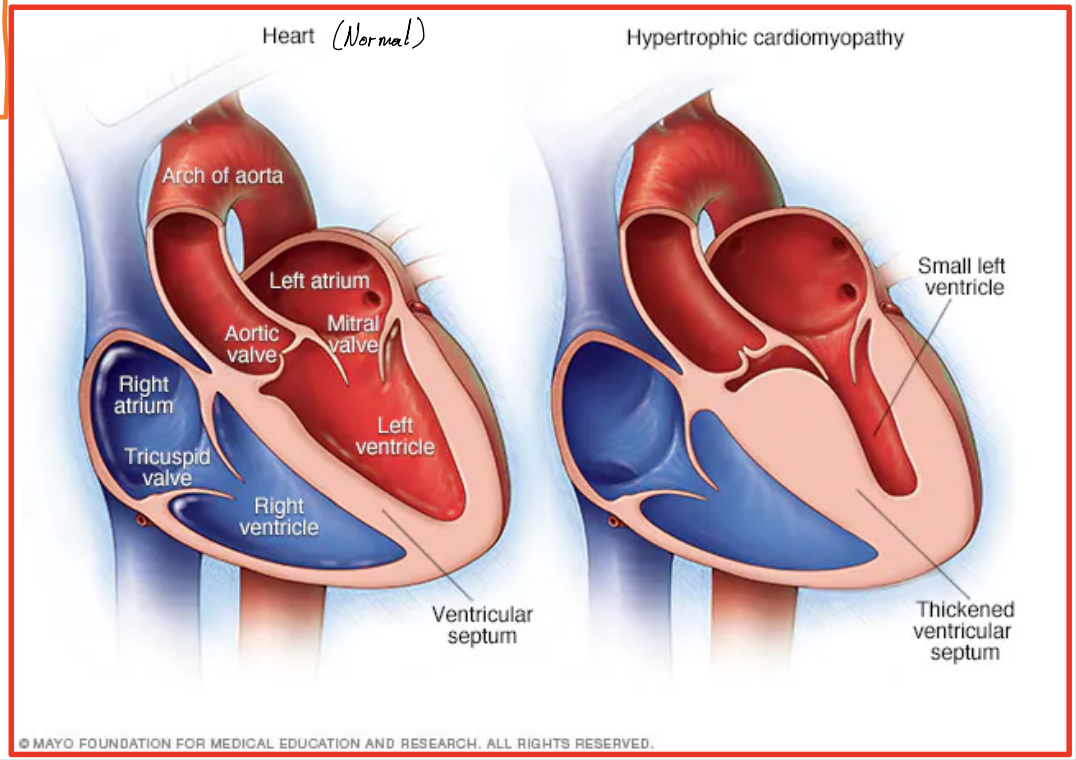
3. Atrial myxoma, thrombosis of prosthetic heart valves

Extra pic:



Extra pic;

HOCM:

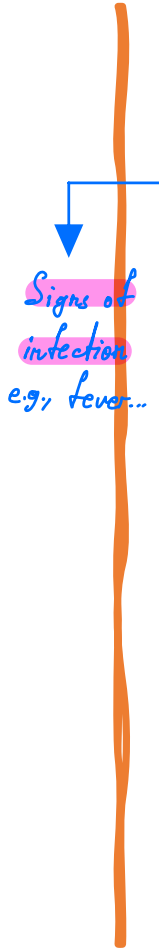


5. Edema

Edema

- Excess fluid in the interstitial space
- Usually gravity dependent
- Where to look for? Lower limbs
- Unilateral vs bilateral → Could indicate cardiac etiology
  - No cardiac etiology
- If suggestive of cardiac cause of edema> check for JVP → Indicates venous return issues.
- Check for other symptoms of volume overload

Other symptoms of cardiac disease



Non-specific symptoms; weight loss, generalized weakness, fever, night sweats (infective endocarditis)

- A cause is Strep. viridans infection in dental procedures.
- Another cause: Rheumatic fever (Strep. pyogenes)

Symptoms of stroke, acute mesenteric ischemia, acute limb ischemia (patients with atria myxoma or infective vegetations)

Abdominal distension due to ascites, muscle wasting due to cardiac cachexia (advanced heart failure)

Past medical history

Ask about:

Detailed record for any previous cardiac disease, investigations, and interventions

Conditions associated with increased risk of vascular diseases → e.g., HTN, DM, Hyperlipidemia

Rheumatic fever or heart murmur during childhood

Potential causes of bacteremia in patients with suspected infective endocarditis
e.g., Skin infection, Dental procedures, IV drug use

Systemic disorders with cardiac manifestations
→ Examples:
- Raynaud's phenomenon → Pericarditis
- Marfan's syndrome → Aortic dissection
- Myotonic dystrophy → Atrioventricular block

4.8 Key elements of the past cardiac history

	Ischaemic heart disease	Heart failure	Valvular disease
Baseline symptoms	Exertional angina? If so, ascertain functional limitation (see Box 4.2)/response to GTN spray	Dyspnoea, fatigue, ankle swelling Record usual functional status (see Box 4.5)	Often asymptomatic Exertional dyspnoea (common), chest pain or syncope
Major events	Previous myocardial infarction/unstable angina	Hospitalisation for decompensated heart failure Ventricular arrhythmias	Infective endocarditis Previous rheumatic fever
Investigations	Coronary angiography (invasive or computed tomography): presence, extent and severity of coronary artery disease Exercise electrocardiogram (or other stress test): evidence of inducible ischaemia? Exercise capacity and symptoms	Echocardiogram (± cardiac magnetic resonance imaging): left ventricular size, wall thickness and systolic function; valvular disease; right ventricular function	Echocardiogram (transthoracic ± transoesophageal): nature and severity of valve lesion; ventricular size and function
Procedures	Percutaneous coronary intervention (angioplasty and stenting) Coronary artery bypass graft surgery	Implantable cardioverter–defibrillator Cardiac resynchronisation therapy	Surgical valve repair or replacement (note whether mechanical or bioprosthetic) Transcatheter valve procedures

GTN, *glyceryl trinitrate*.

Family Hx:

Premature CAD

- In the patient

CAD < 55 years in female, < 45 years in male

+10

+10

- In the family

First degree relative

CAD < 65 years in female, < 55 years in male

+10

1st

مش ابن عمه ولا ابن خالته..

Why do females have a higher age?

Because estrogen is protective for them!

Relieving factors:
- Angina: GTN
- MI: NSAIDs

Drug history

Pt. started with β-blockers
- Ddx → Asthma exacerbation → However, asthma pts. may use cardioselective β-blockers
- Ddx → DHF

i.e., β-blockers can cause these 2 diseases

4.7 Symptoms related to medication

Symptom	Medication
Angina	Aggravated by thyroxine or drug-induced anaemia, e.g. aspirin or NSAIDs
Dyspnoea	Beta-blockers in patients with asthma Exacerbation of heart failure by beta-blockers, some calcium channel antagonists (verapamil, diltiazem), NSAIDs
Palpitation	Tachycardia and/or arrhythmia from thyroxine, β_2 stimulants, e.g. salbutamol, digoxin toxicity, hypokalaemia from diuretics, tricyclic antidepressants
Syncope/ presyncope	Vasodilators, e.g. nitrates, alpha-blockers, ACE inhibitors and angiotensin II receptor antagonists Bradycardia from rate-limiting agents, e.g. beta-blockers, some calcium channel antagonists (verapamil, diltiazem), digoxin, amiodarone
Oedema	Glucocorticoids, NSAIDs, some calcium channel antagonists, e.g. nifedipine, amlodipine

ACE, *angiotensin-converting enzyme;* NSAIDs, *non-steroidal anti-inflammatory drugs.*

Family history

- Family history of premature coronary artery diseases (angina, interventions/surgery, sudden cardiac death)

First degree relative (< 65 years in female, < 55 years in male)

- Cardiac diseases with genetic components such as cardiomyopathies
- Venous thrombosis due to inherited thrombophilia's
- Familial hypercholesterolemia

Social history

- Smoking → Important
- Alcohol → Associated with palpitations and afib.
- Recreational drugs
- Daily life activity and change of limitations
- Eligibility for certain occupations
  - → Remember the truck driver we mentioned...

Cases with Dr. Mariam

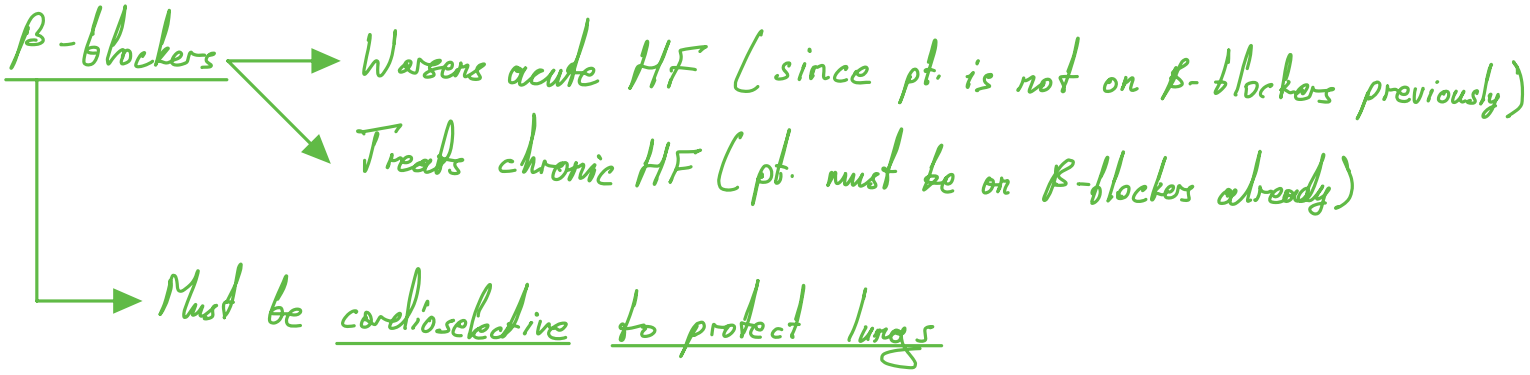
27-year-old patient, chief complaint is chest pain. Onset was before 2 days and it is gradual, increasing in severity. There was no improvement for the past 2 hours. Pain is retrosternal, and patient describes it as heaviness. It is associated with breathlessness, and relieved by rest. Patient is a non-smoker, and is not under any psychological stress. He has a history of runny nose for the past 2 weeks. No chronic diseases, and no drug history mentioned. All GI symptoms were negative, and no family history of any cardiovascular disease. ECG showed significant changes, and cardiac enzymes (e.g., troponin) were elevated in the blood.

A 60-year-old patient has a chief complaint of chest pain of 1 week duration. It is described as left-sided heaviness, episodic, exacerbated by exertion and emotional stress. Patient reported its severity to be 10/10. It is associated with breathlessness. No postural changes of symptoms were noticed, and no edema was found. Patient has palpitations. Family history of cardiovascular disease was significant. Patient is non-smoker, non-alcoholic. Cardiac enzymes test was negative.

① Dx → Pericarditis vs. Myocarditis

② Dx → Unstable angina

Dr. Qais' Notes on β-blockers



Rules for Dx. with Dr. Qais

1. The history has to make sense. It must make a story, all features shall lead you to one Dx.
2. Try to go for a universal Dx, a big category that encompasses all possible and relevant Ddx under it, then you can complete your Ddx.
3. Common is common. Keep it in mind. Always keep in mind the most common cases when dealing with patients.
4. An exception to this rule is the fatal yet uncommon cases. Examples include tension pneumothorax and aortic dissection. Be careful, these are fatal!
5. However, you should be aware of abnormal presentations. Patients might present with unusual symptoms for a specific case.