

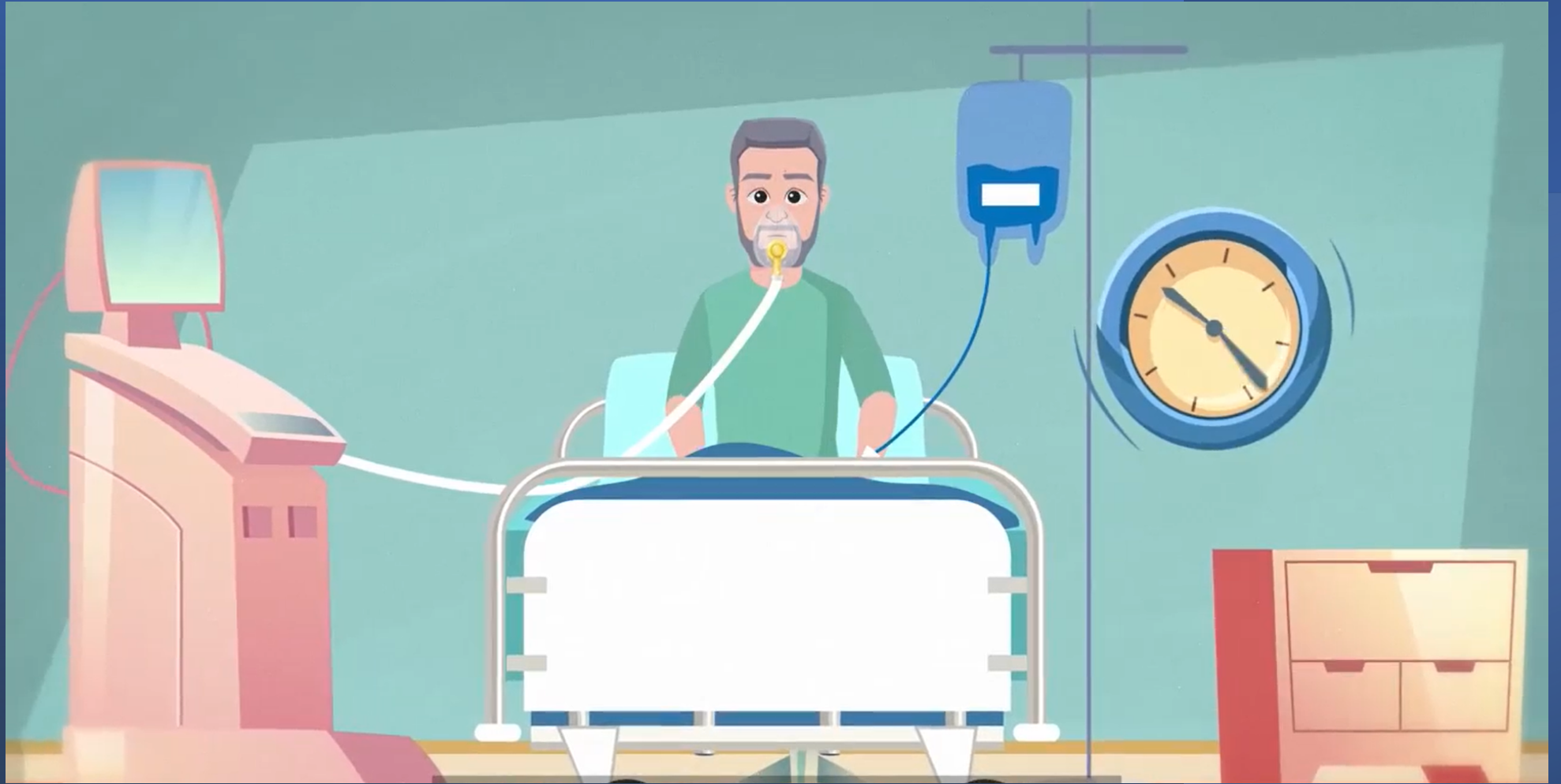


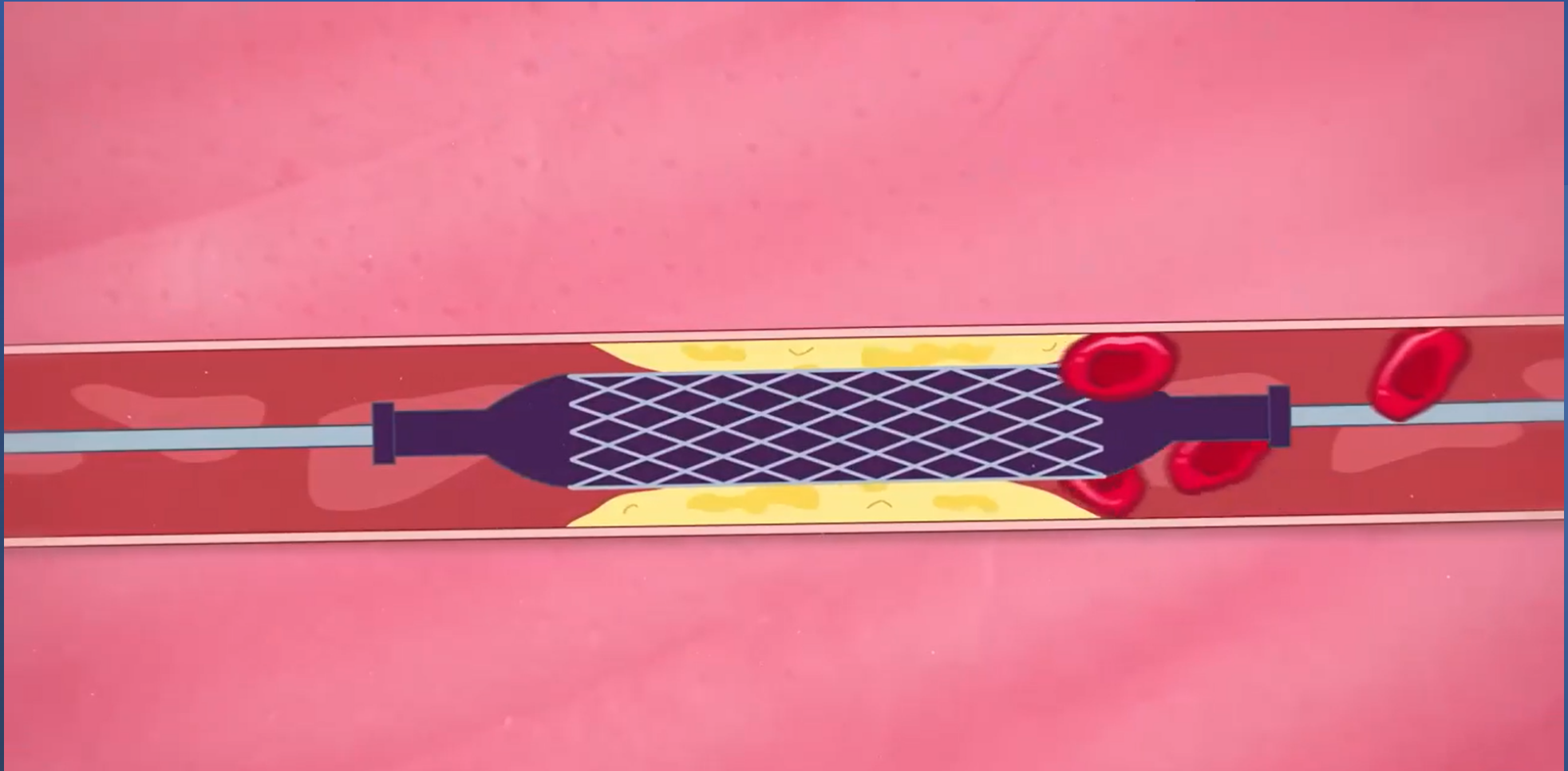
General examination

Tailor the sequence and extent of examination to the patient's condition

e.g., Emergent MI → No time for detailed PEx.









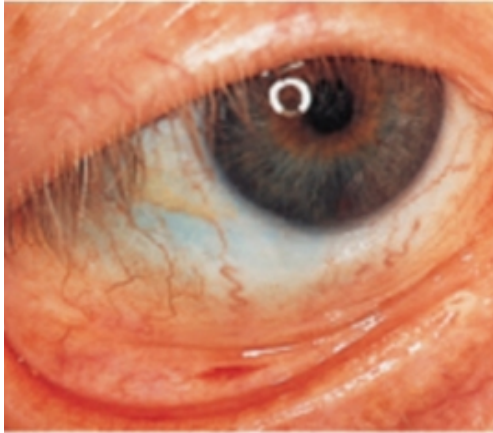
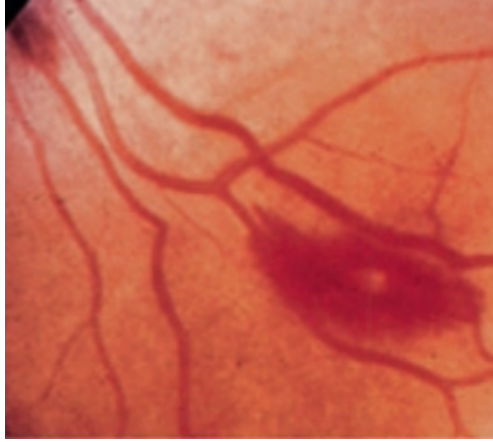
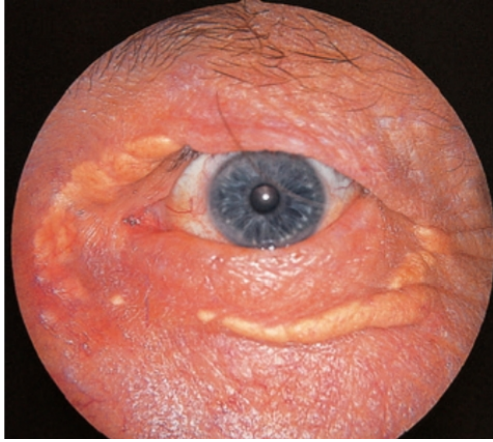
-
- Ensure privacy, good light, explain what you are going to do and take permission
 - Wash hand,
 - **Exposure**
 - **Position**



From **right**
side of the
patient

General:

- Comment on patient **position** in bed
- Level of **consciousness**
- Looks **well** or **ill**
- **Breathless**, **cyanosed**
- **Distressed**, **frightened**



Eyes

- Xanthelasmata on eyelids
- Conjunctival pallor and petechial hemorrhage
- Corneal arcus on iris
- Fundoscopy to view the fundus looking for DM or HTN changes, or Roth spots

Hyperlipidemia

Hyperlipidemia

زراق خفيف حواليتها

One of the causes is infective endocarditis

Cheeks

Malar flush

↳ Indicates mitral stenosis



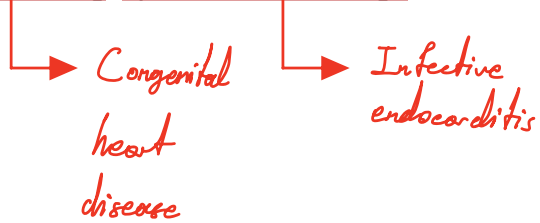
- Mouth
- Cyanosis under the tongue or on the lips
central *peripheral*

Missing slide

Hands

- Inspection**

- Nails: tobacco stain, cyanosis, clubbing, splinter hemorrhage



Splinter Haemorrhages

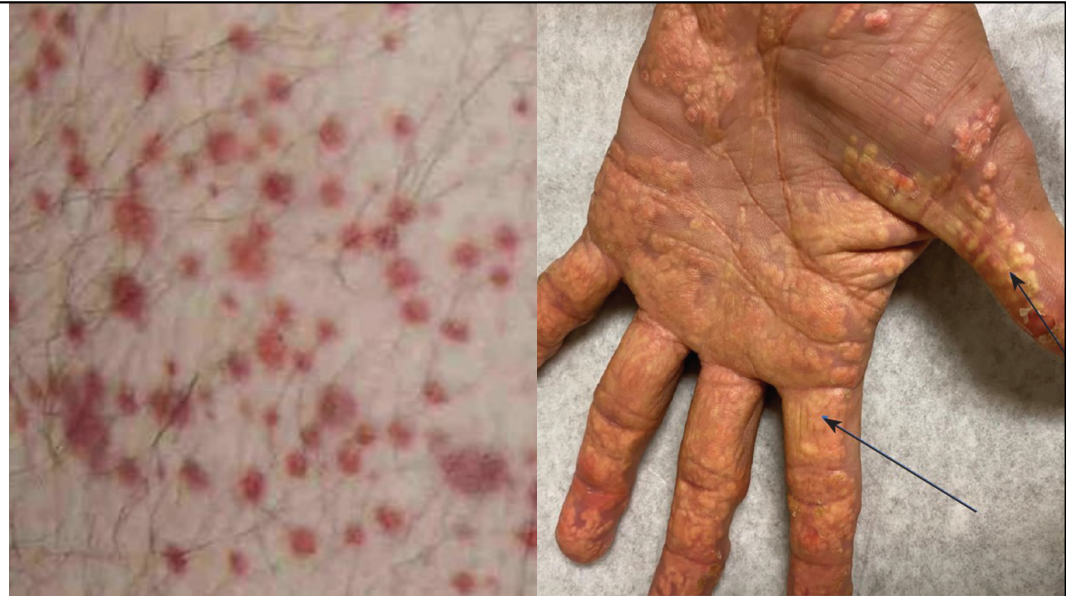


• Inspection

- dorsum: tendon xanthoma, petechial rash

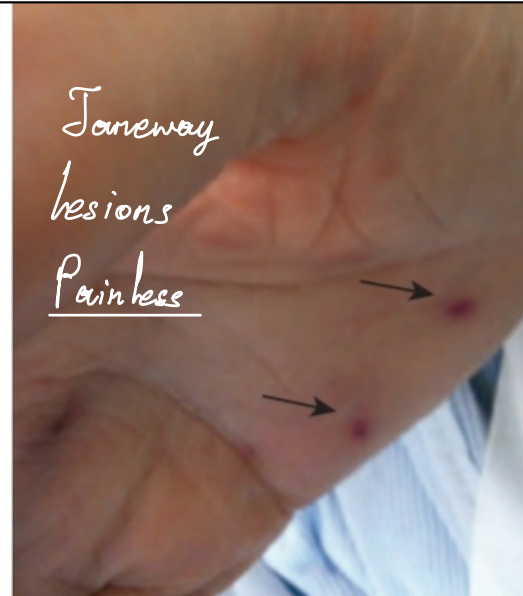
↓
Hyper-lipidemia

Vasculitis



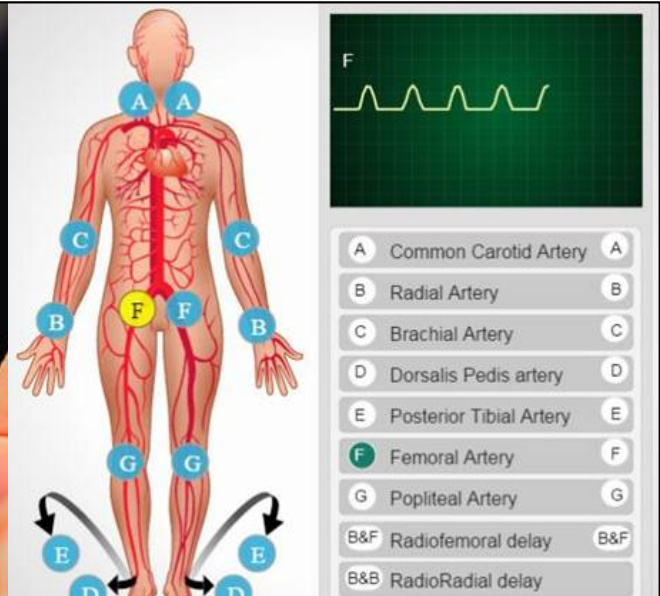
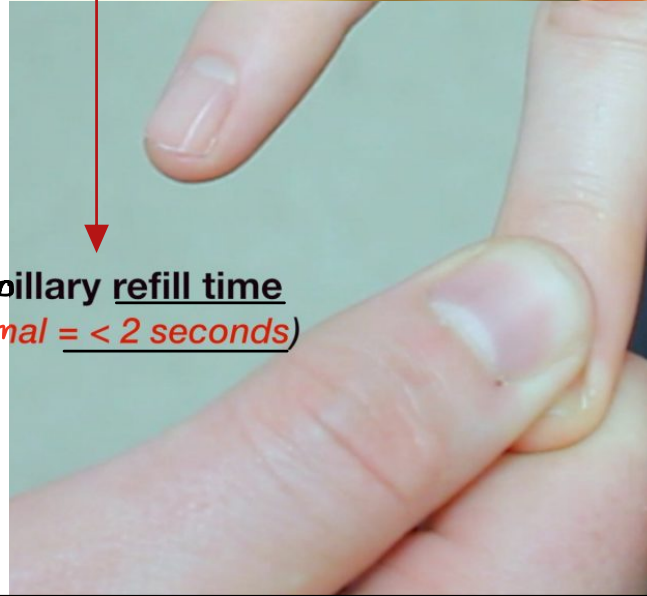
Hands

- Palmar aspect: palmar erythema, Osler nodes, Janeway lesion
 - IV drug use site
 - Tremor
- Infective endocarditis
- No aseptic protection
- ↓
- Infective endocarditis risk



Palpation

- Temperature
- Wet/dry
- Capillary refill
- Pulses



Radial pulse

Location:

- Flexor carpi radialis tendon
- Lateral to the tendon with the pads of 3 fingers to measure it.

Use

for - 1 minute (skipped in OSCE)

- Comment of rate, rhythm, volume character and compressibility

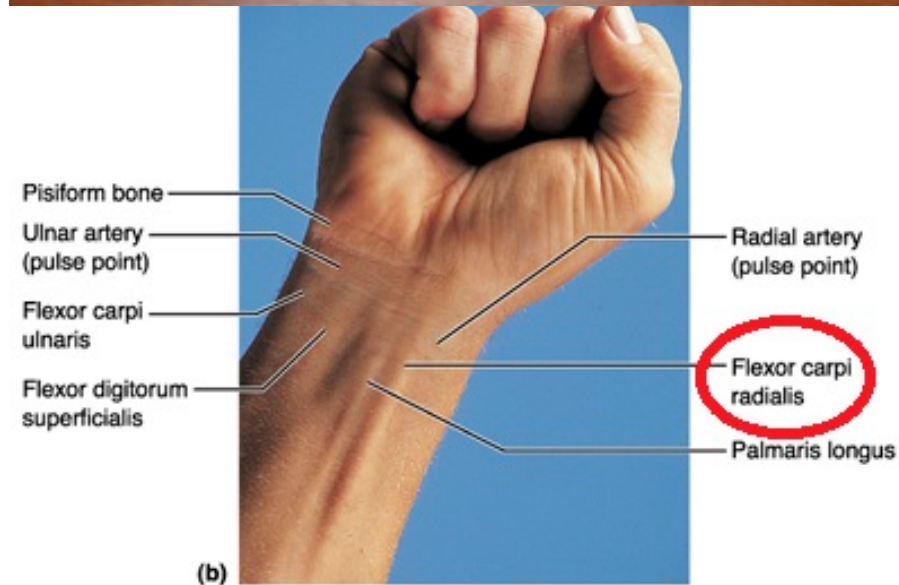
Other

manoeuvres:

Indicate aortic coarctation

- Radio-radial delay → Lt. radial A. vs Rt. radial A.
- Radio-femoral delay → Radial A. vs Femoral A.
- Collapsing pulse → May indicate aortic regurgitation.
- Pulse deficit

Stimulosecularly



Collapsing pulse

- Palpate the radial pulse
- Ask the patient if he has shoulder or arm pain
- Using base of the fingers, elevate the hand above the patient's head

Aortic regurgitation → Wide pulse pressure

(2 stages, high then sudden collapse)



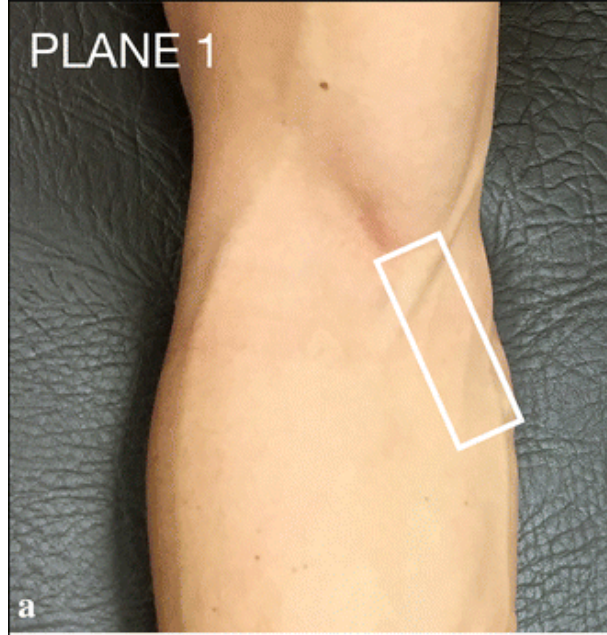


Pulse deficit

- 2 examiners
- If one examiner only; can palpate for 1 minute, auscultate for another 1 minute
- Palpate the radial artery and calculate the rate over 1 minute
- Auscultate over the heart apex and calculate the rate over 1 minute
- The deficit between HR by auscultation and pulse rate by palpation should not exceed 10 bpm

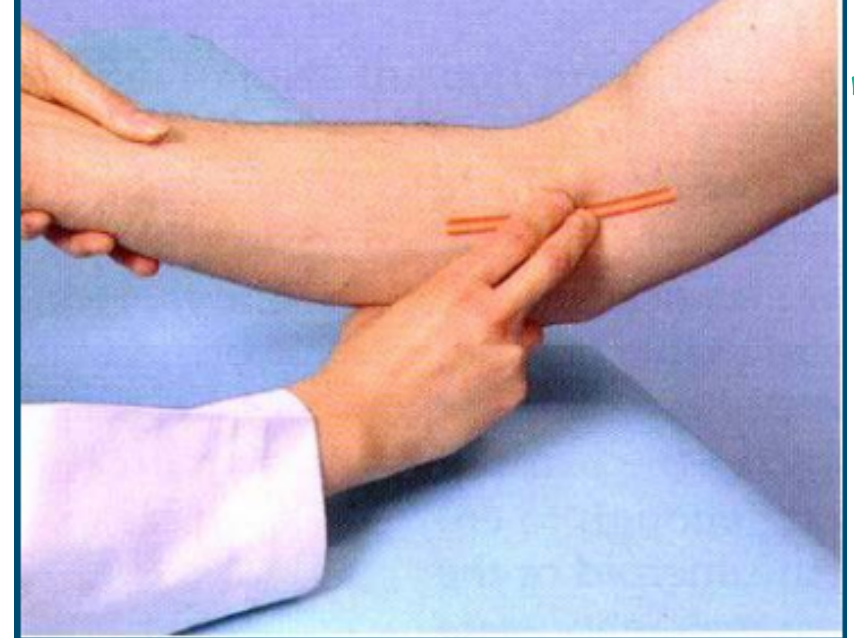
If it does exceed: Arrhythmias ←

Brachial artery



- Medial to biceps tendon in antecubital fossa by index and middle fingers → 2 fingers
- Comment of volume, character, and compressibility

Rate & rhythm already mentioned in radial A. You could still repeat them though.



in heart: murmurs
in vessels: bruits

Carotid pulse

- Explain what are you going to do.
- Feel it between the larynx and anterior border of SCM muscle
- Press gently by the thumb → 1 finger
- **DON'T FEEL BOTH SIDES SIMULTANOUSLY** → Patient may collapse
- AUSCULTATE FOR **BRUIT** ON BOTH SIDES WHILE HOLDING HIS BREATH
↳ Indicates atherosclerosis



Femoral A.
 Popliteal A.
 Posterior tibial A.
 Dorsalis pedis A.

→ Only mention in OSCE

Rate

- Normal heart rate 60-100 bpm
- Tachycardia > 100 bpm
- Bradycardia < 60 bpm

4.9 Causes of abnormal pulse rate or rhythm

Abnormality	Sinus rhythm → Benign	Arrhythmia → Pathological
Fast rate (tachycardia, > 100 bpm)	Exercise Pain Excitement/anxiety Fever Hyperthyroidism Medication: Sympathomimetics, e.g. salbutamol Vasodilators	Atrial fibrillation Atrial flutter Supraventricular tachycardia Ventricular tachycardia
Slow rate (bradycardia, < 60 bpm)	Sleep Athletic training Hypothyroidism Medication: Beta-blockers Digoxin Verapamil, diltiazem	Carotid sinus hypersensitivity Sick sinus syndrome Second-degree heart block Complete heart block
Irregular pulse	Sinus arrhythmia Atrial extrasystoles Ventricular extrasystoles	Atrial fibrillation Atrial flutter with variable response Second-degree heart block with variable response

4.10 Haemodynamic effects of respiration

	Inspiration	Expiration
Pulse/heart rate	Accelerates	Slows
Systolic blood pressure	Falls (up to 10 mmHg)	Rises
Jugular venous pressure	Falls	Rises
Second heart sound	Splits	Fuses

Rhythm

- Normally should be regular with some physiological hemodynamic changes
- Comment: regular, ~~regularly~~ irregular, irregularly irregular

طبيعي
منتظم

طبيعي لكن غير
منتظم

خبرة

4.11 Common causes of atrial fibrillation

- Hypertension
- Heart failure
- Myocardial infarction
- Thyrotoxicosis
- Alcohol-related heart disease
- Mitral valve disease
- Infection, e.g. respiratory, urinary
- Following surgery, especially cardiothoracic surgery

Volume

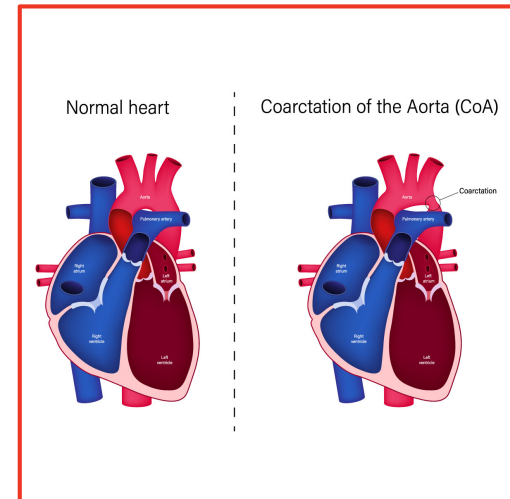
- Stroke volume
 - Since ventricles fill during diastole, longer diastolic interval associated with increase stroke volume so increase in pulse volume on examination
 - **Low pulse volume**
 - Severe heart failure
 - Condition associated with inadequate ventricular filling (hypovolemia, cardiac tamponade, mitral stenosis)
-

- **Large pulse volume**

Physiological	
<ul style="list-style-type: none">• Exercise• Pregnancy• Advanced age	<ul style="list-style-type: none">• Increased environmental temperature
Pathological	
<ul style="list-style-type: none">• Hypertension• Fever• Thyrotoxicosis• Anaemia	<ul style="list-style-type: none">• Aortic regurgitation• Paget's disease of bone• Peripheral atrioventricular shunt

- **Asymmetrical pulse volume**
- Peripheral artery disease
- Aortic dissection
- Coarctation of aorta

Extra:



Character

- Slow rising pulse
- Collapsing pulse
- Pulsus bisferiens
- Pulsus alternans (volume rather than character)
- Pulsus paradoxus

Slow rising pulse

- Gradual upstroke with a reduced peak occurring late in systole
- Severe aortic stenosis

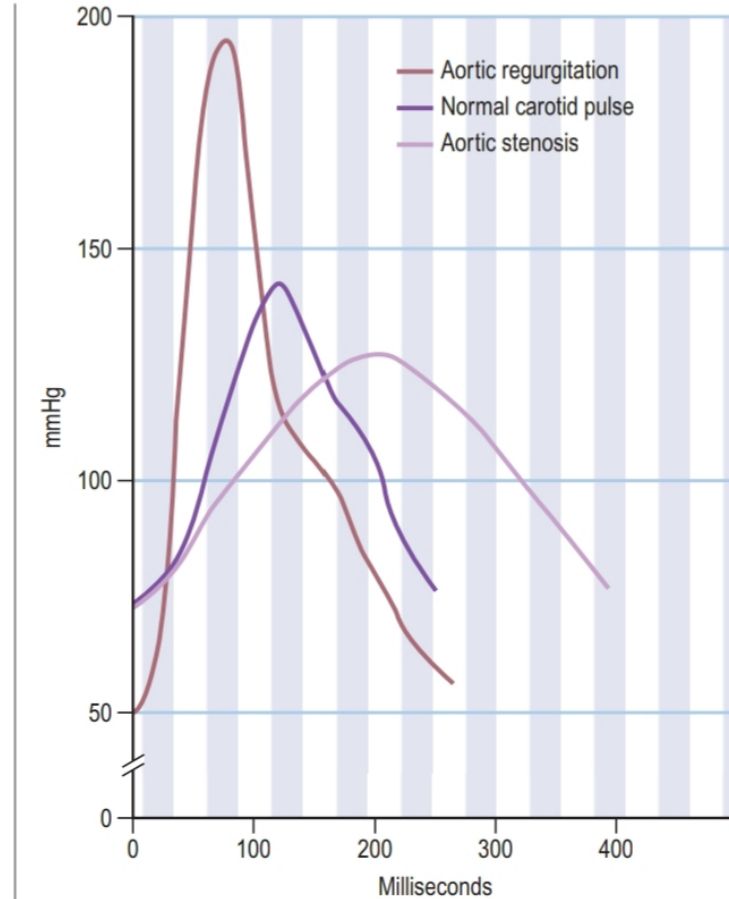


Fig. 4.10 Pulse waveforms.

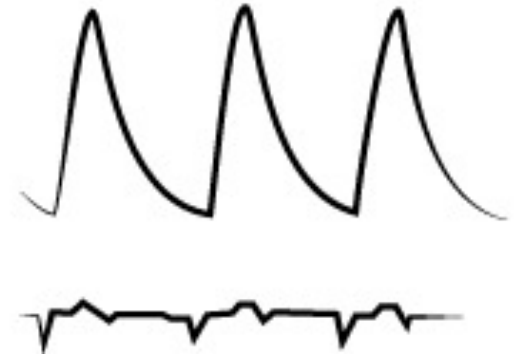
Collapsing pulse

- The peak of the pulse wave arrives early and is followed by rapid fall in pressure as blood flows back into LV, resulting in wide pulse pressure
- Pulse pressure (systolic Bp- diastolic Bp > 80 mmHg)
- Severe aortic regurgitation

Normal



Water Hammer Pulse

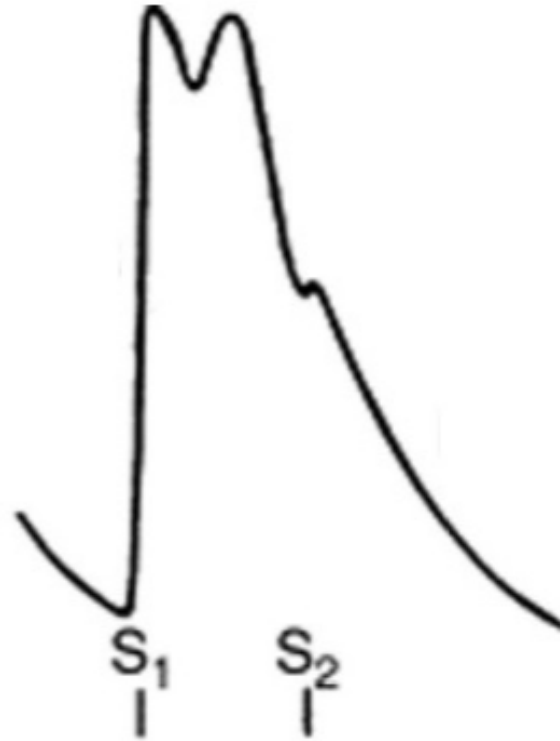


Pulsus bisferiens

2

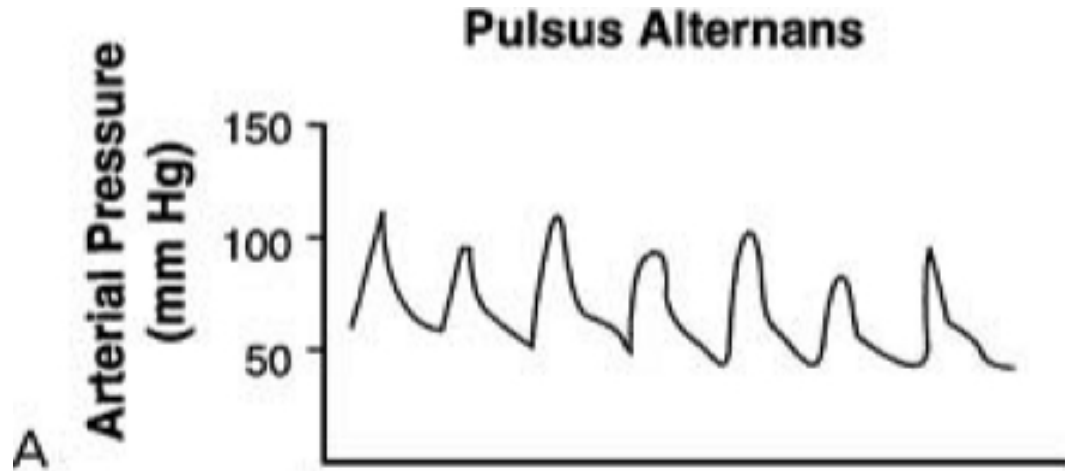
- Increased pulse with a double systolic peak separated by distinct mid-systolic dip
- Concomitant aortic stenosis and aortic regurgitation
- HCOM *Hypertrophic Obstructive Cardiomyopathy*

Pulsus Bisferiens



Pulsus alternans

- Beat-to-beat variation in pulse volume with normal rhythm
- Advanced heart failure

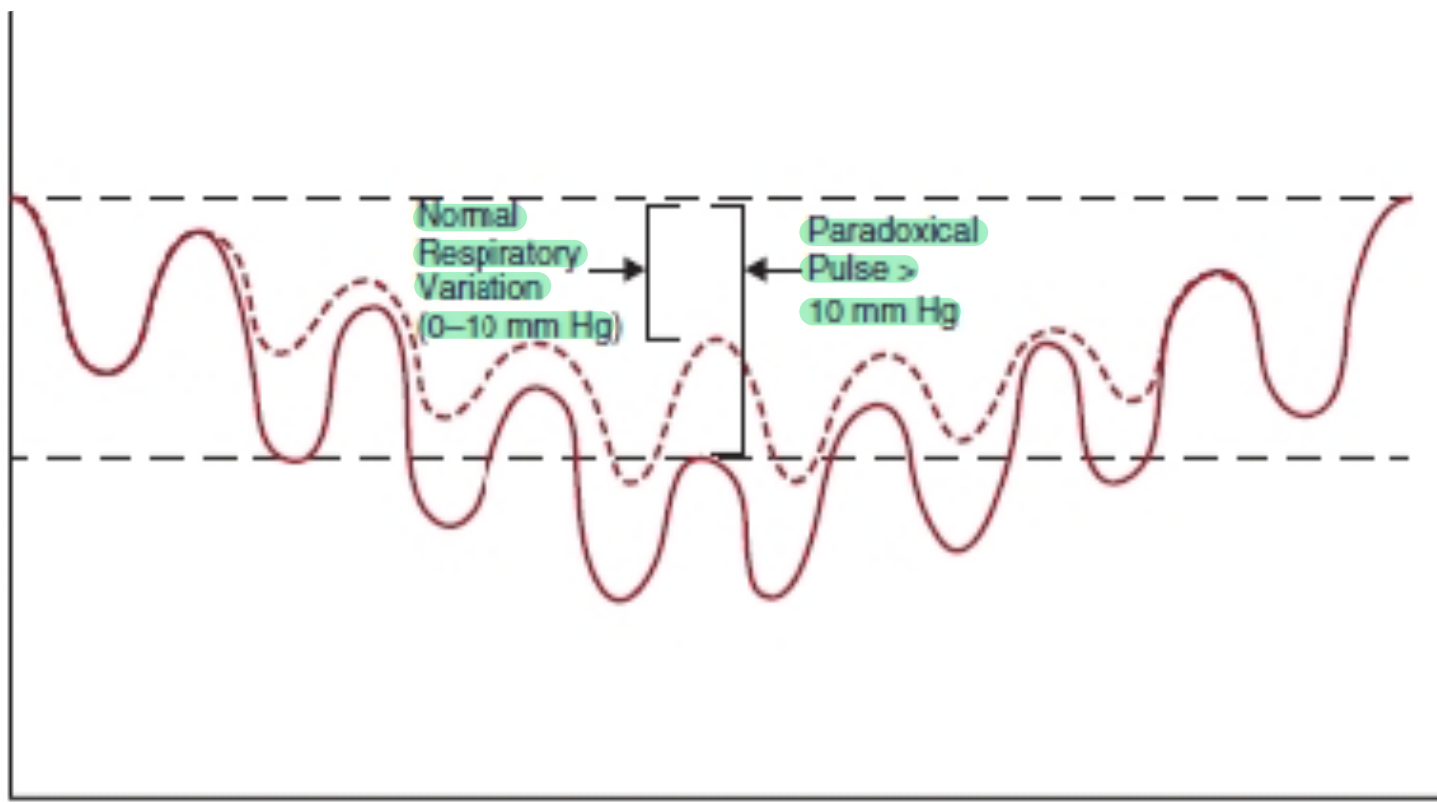


Volume rather than character

Pulsus paradoxus

- Exaggeration of the normal variability of pulse volume with breathing
- Pulse volume normally increase with expiration decreases during inspiration due to intrathoracic pressure changes affecting venous return to the heart
- This variability is exaggerated when ventricular diastolic filling is impeded by elevated intrapericardial pressure
- cardiac tamponade, pericardial constriction, acute severe asthma

Blood Pressure



Normal
Respiratory
Variation
(0-10 mm Hg)

Paradoxical
Pulse >
10 mm Hg

Key

- Normal
- Pulsus Paradoxus

Inspiration

Expiration

Respiratory Cycle

Blood pressure



-
- Blood pressure is the measure of the pressure that the circulating blood exerts against arterial wall
 - Systolic pressure
 - Diastolic pressure
 - Is measured by sphygmomanometer or invasively by intra-arterial catheter in ICU setting
 - Record the reading as systolic pressure/diastolic pressure with mmHg as the measurement unit, note of where and how it was recorded
- e.g. 120/85 mmHg, left arm, sitting

Hypertension

- Abnormal elevation of blood pressure from normal range
 - Many guidelines
 - SILENT KILLER
1. Essential hypertension: most cases, without identifiable cause
 2. Secondary hypertension: rare
 3. White coat Hypertension: elevated BP in healthcare setting, while normal away, use ambulatory measurement to diagnose it

Approach to hypertension

- Assess symptoms
- Assess for potential cause
- Assess for end-organ damage
 1. Cardiac
 2. Renal
 3. Eye

4.14 Clinical clues to secondary hypertension

Clinical feature	Cause
Widespread vascular disease Renal bruit	Renovascular disease, including renal artery stenosis
Episodes of sweating, headache and palpitation	Phaeochromocytoma
Hypokalaemia	Primary aldosteronism
Cushingoid facies, central obesity, abdominal striae, proximal muscle weakness Chronic glucocorticoid use	Cushing's syndrome
Low-volume femoral pulses with radiofemoral delay	Coarctation of the aorta
Bilateral palpable kidneys	Adult polycystic kidney disease (p. 243)

Korotkoff sounds

- Snapping sound that is produced when the cuff pressure is between systolic and diastolic because the artery collapses completely and reopen with each heartbeat
- First sound appearance (phase 1) indicate systole
- When the sounds muffle and then disappear (phase 5) indicate diastole

Phase	Korotkoff sounds
1	A thud 120 mmHg systolic
2	A blowing noise 110 mmHg
3	A softer thud 100 mmHg
4	A disappearing blowing noise 90 mmHg diastolic (1st)
5	Nothing 80 mmHg diastolic (2nd)



FIRST SOUND TO HEAR IS SYSTOLIC PRESSURE



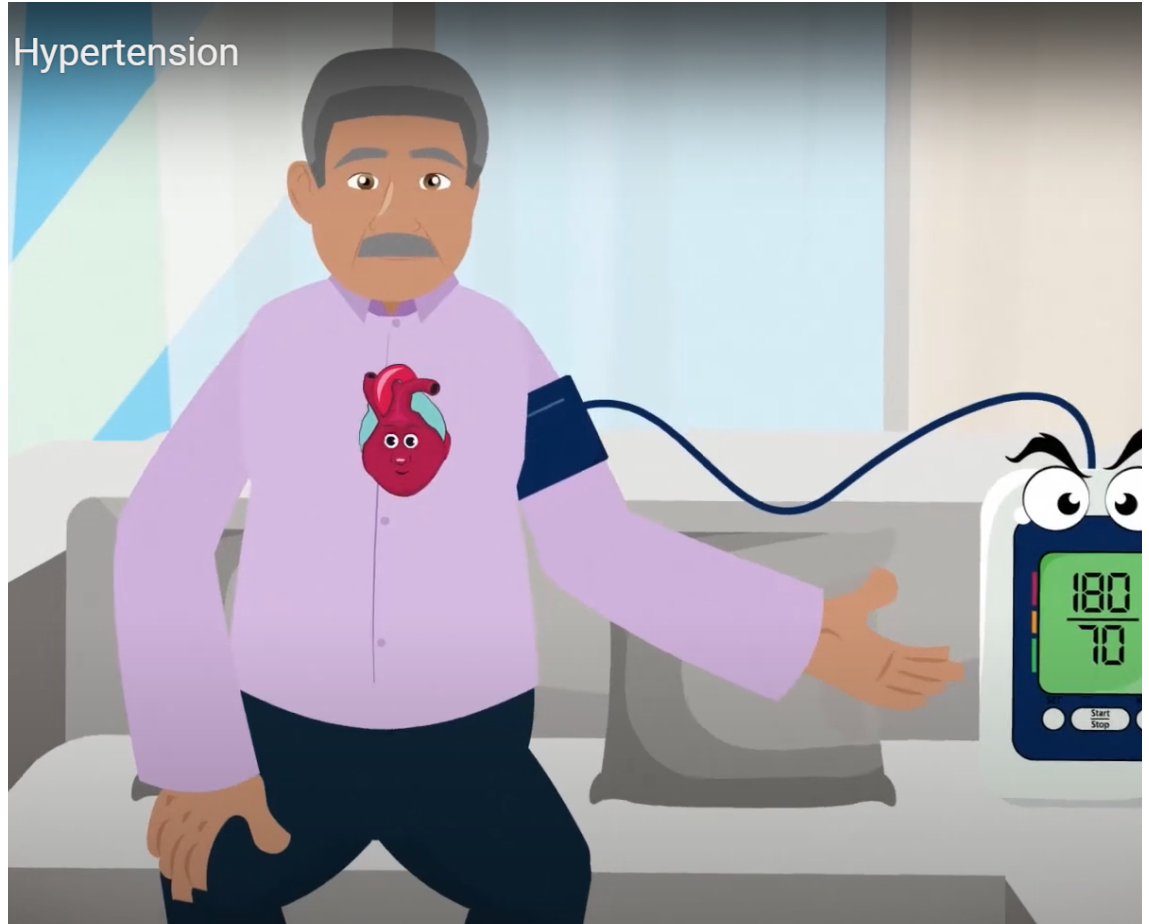
WHEN THE SOUNDS COMPLETELY DISAPPEAR
THIS IS DIASTOLIC PRESSURE



IF THE MUFFLED SOUNDS PERSIST (PHASE 4)
AND DO NOT DISAPPEAR, USE THE POINT OF
MUFFLING AS DIASTOLIC PRESSURE

How to measure blood pressure?

- Rest for 5 minutes
- No tight clothing
- Support the arm at the heart level
- Proper cuff size
- Apply the cuff to the upper arm, with the center of bladder over brachial artery
- Palpate brachial artery
- Inflate cuff until the pulse is impalpable around 30 mmHg above, put the diaphragm of stethoscope on brachial artery and deflate slowly
- Measure in both arms



4.13 British Hypertension Society classification of blood pressure (BP) levels

BP	Systolic BP (mmHg)	Diastolic BP (mmHg)
Optimal	<120	<80
Normal	<130	<85
High normal	130–139	85–89
Hypertension		
Grade 1 (mild)	140–159	90–99
Grade 2 (moderate)	160–179	100–109
Grade 3 (severe)	>180	>110
Isolated systolic hypertension		
Grade 1	140–159	<90
Grade 2	>160	<90

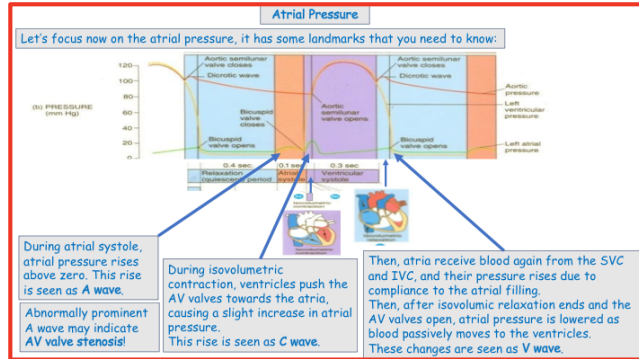
Reproduced by kind permission of the British and Irish Hypertension Society

Common BP measurement problems

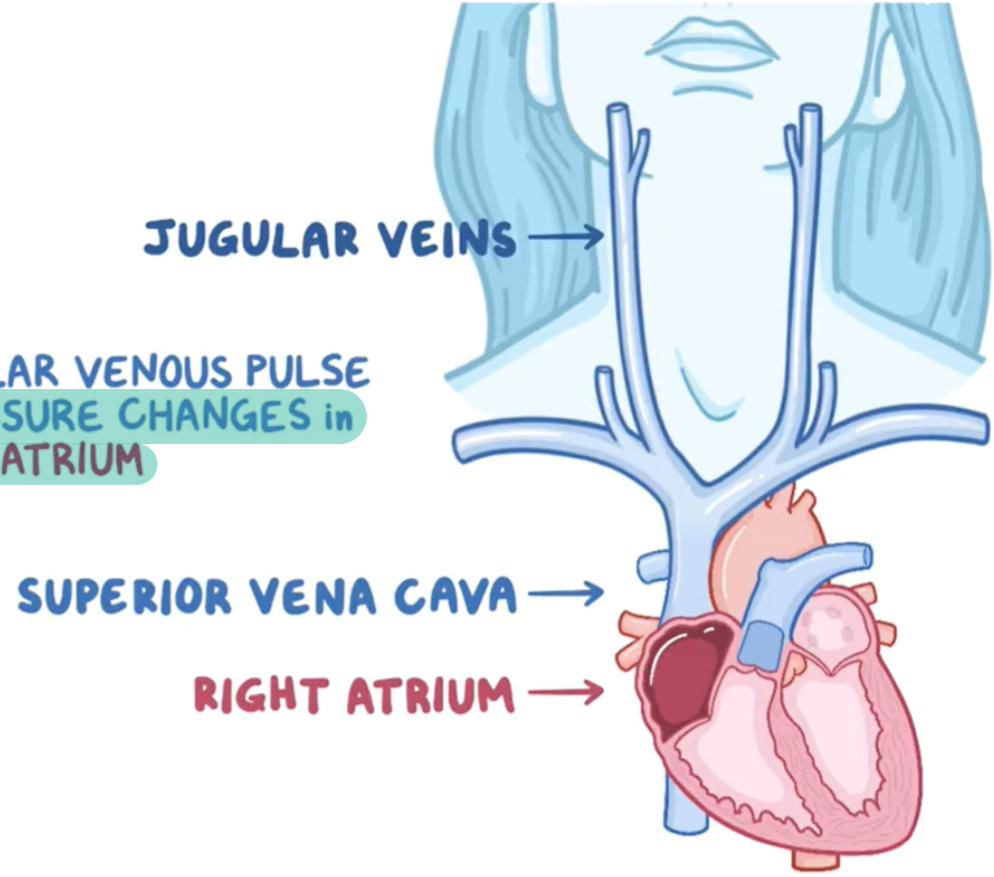
- **Difference** > 10 mmHg in each arm (suggest aortic or subclavian artery disease)
- **Wrong cuff size:** the bladder should be 80% of the length and 40% of the width of upper arm
- **Auscultatory gap:** 20% of elderly hypertensive patients, when Korotkoff sounds appear at systolic BP and disappear for an interval between systolic and diastolic pr. Avoid by palpating the systolic BP
- Pt's arm at **the wrong level:** elbow should be at the level of the heart
- **Postural change:** check for postural hypotension
- **Atrial fibrillation:** take average value

Jugular venous pressure

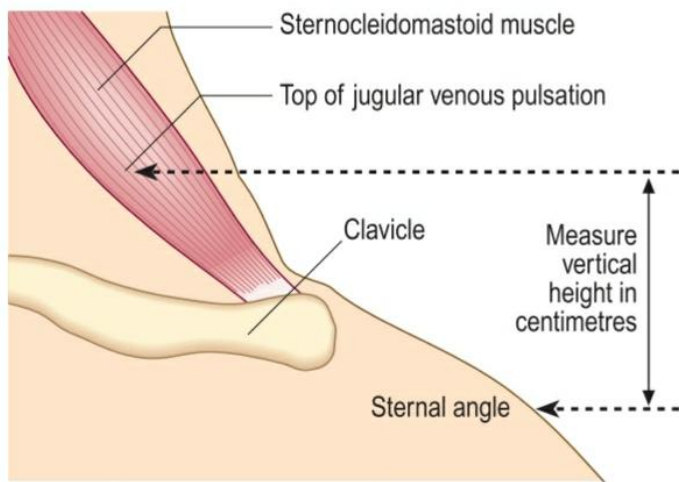
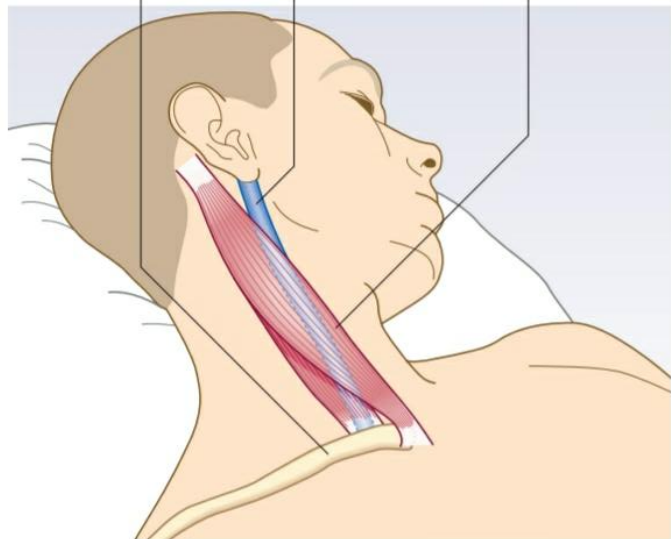
Recap:
CVS basic
Physiology



* **JUGULAR VENOUS PULSE**
= **PRESSURE CHANGES** in
RIGHT ATRIUM



Jugular venous pressure and waveform

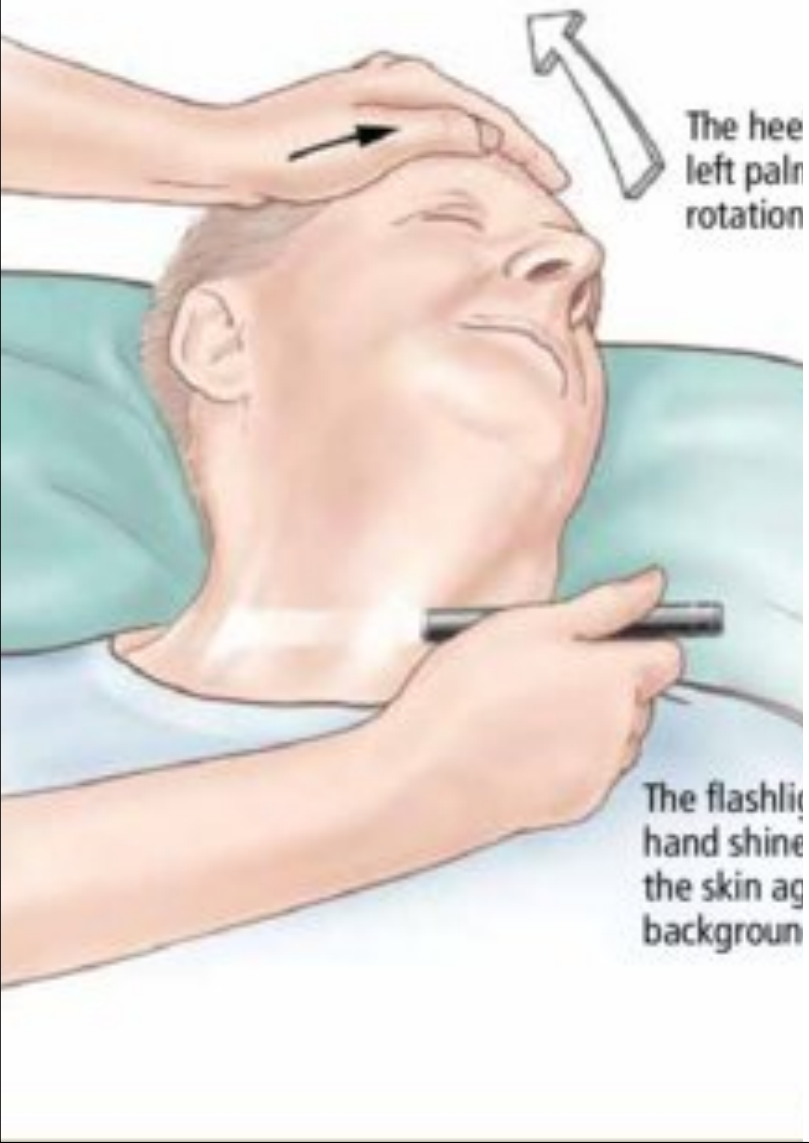


Patient lying at 45 degrees

- What does the JVP reflect? *Rt. atrial pressure*
- Normally measures $< 7 \text{ mmHg} / 9 \text{ cmH}_2\text{O}$ when the patient lies at 45 degrees *SI unit*
- Internal jugular vein vs. External jugular vein?
- How to differentiate between jugular and ~~venous~~ *arterial* pulsation? *Slide 44* →

- *External jugular vein could be kinked & obstructed because it is more superficial & prominent.*
- *We use internal jugular vein instead.*

relaxing the sternocleidomastoid.

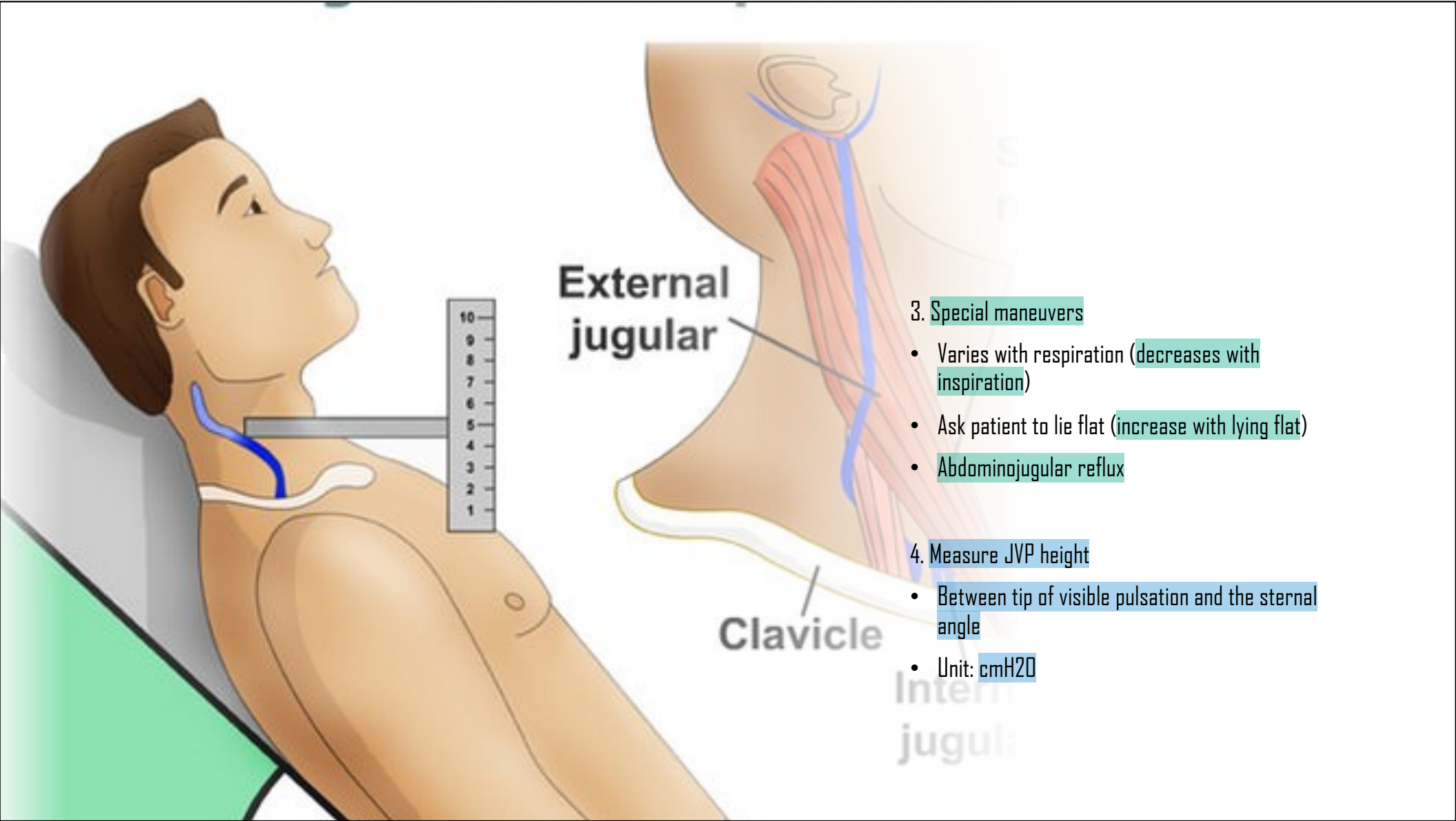


Jugular venous pressure examination

- Be on the right side of the patient
- Position the patient supine, reclined on 45 degrees, with pillow below the head and slightly turned to the left with adequate exposure
- Use the light
- Identify Jugular venous pulsation

4.15 Differences between carotid artery and jugular venous pulsation

Carotid	Jugular
Rapid outward movement	Rapid inward movement
One peak per heart beat	Two peaks per heart beat (in sinus rhythm)
Palpable	Impalpable
Pulsation unaffected by pressure at the root of the neck	Pulsation diminished by pressure at the root of the neck
Independent of respiration	Height of pulsation varies with respiration
Independent of the position of the patient	Varies with the position of the patient
Independent of abdominal pressure	Rises with abdominal pressure



External jugular

3. Special maneuvers

- Varies with respiration (decreases with inspiration)
- Ask patient to lie flat (increase with lying flat)
- Abdominojugular reflux

4. Measure JVP height

- Between tip of visible pulsation and the sternal angle
- Unit: cmH₂O

Clavicle

Internal jugular

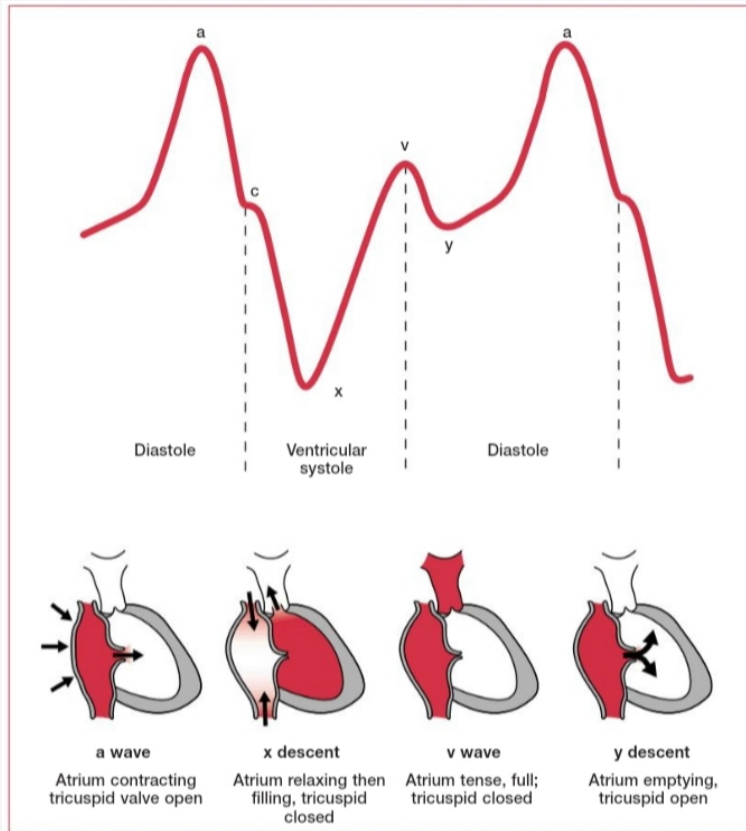


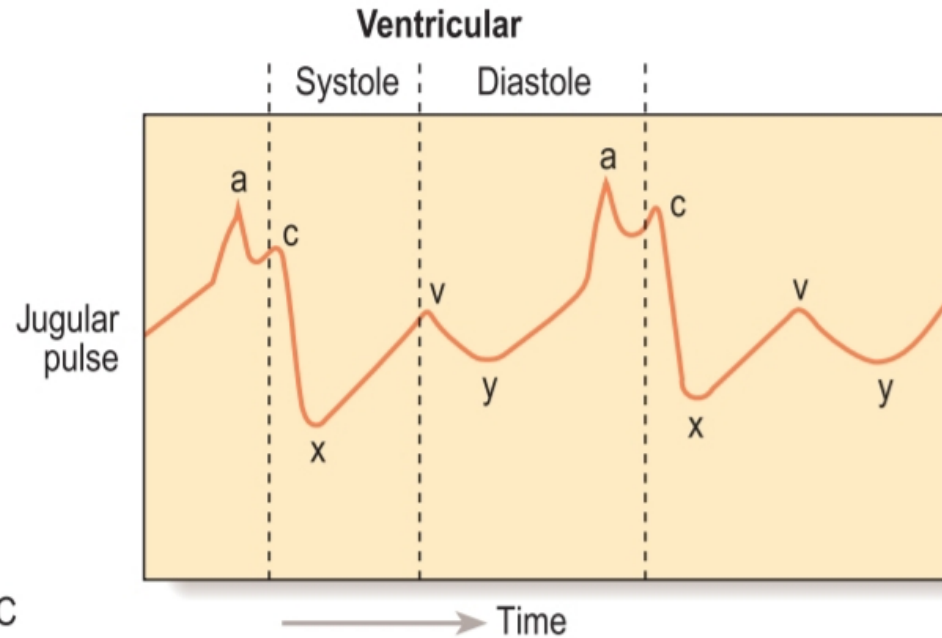
Figure 1. Waveforms of the jugular venous pressure (including a brief explanation for each wave). The “c” wave represents right ventricular contraction “pushing” the tricuspid valve back into the right atrium. Reproduced with permission from Oxford University Press (Longmore JM et al. *The Oxford Handbook of Clinical Medicine*, 5th Edn, p. 79).

1. Inspection

- Diffuse inward movement
- Two waves per pulse

2. Palpation

- Impalpable
- Compress at the root of the neck it will disappear with pressure



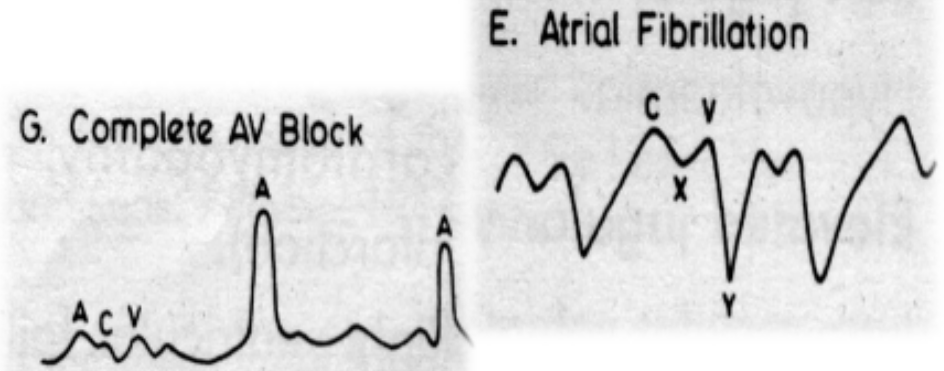
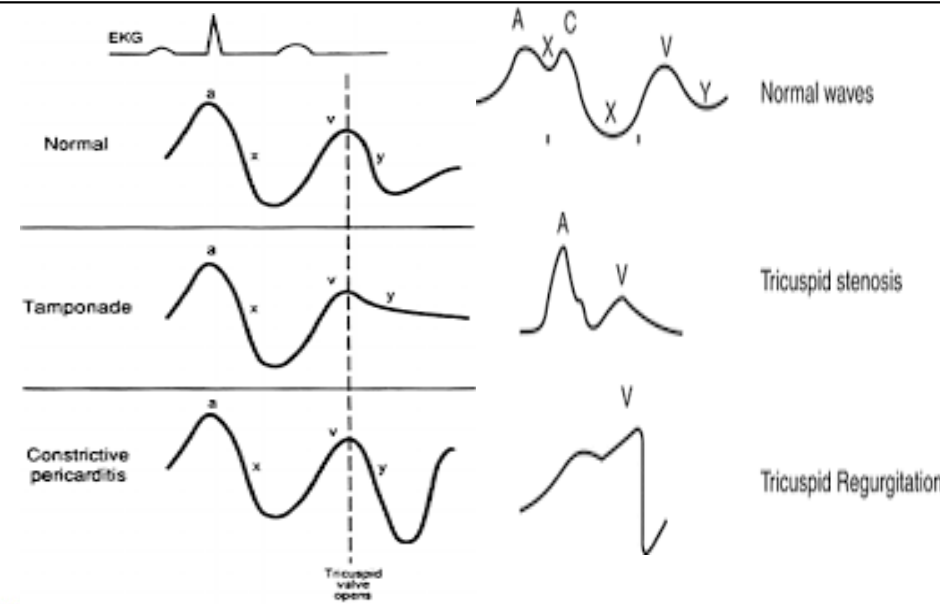
C

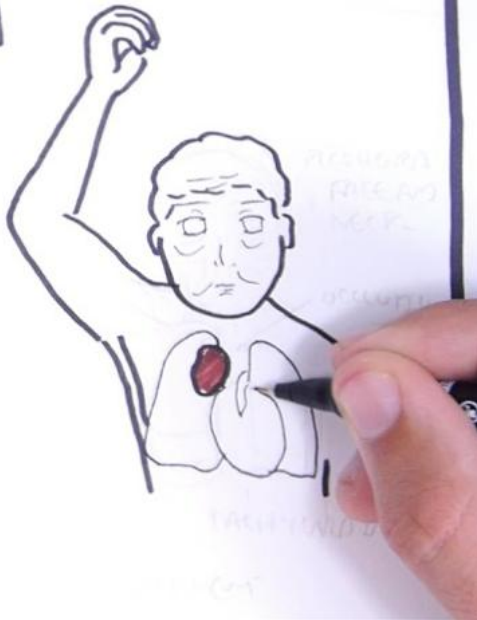
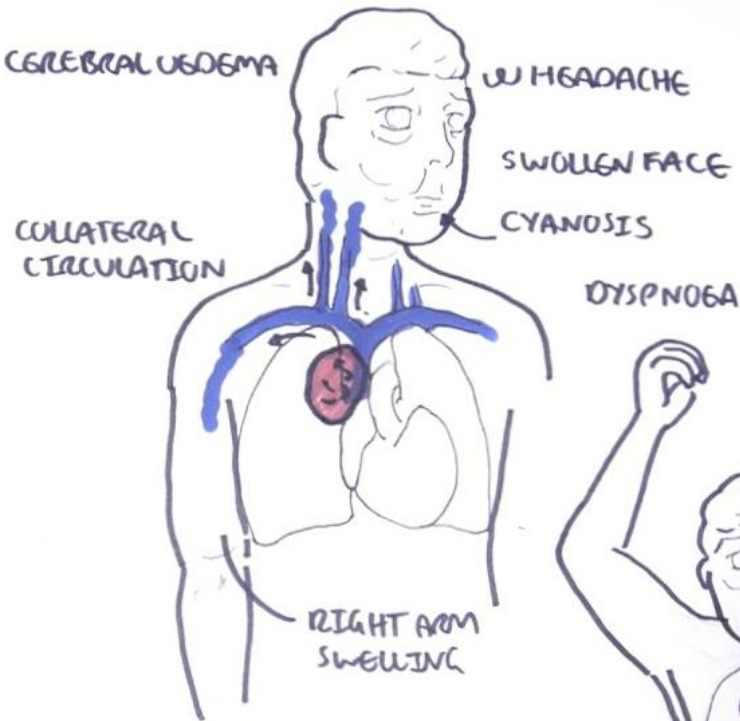
Fig. 4.15 Jugular venous pressure. **A** Inspecting the jugular venous pressure from the side (the internal jugular vein lies deep to the sternocleidomastoid muscle). **B** Measuring the height of the jugular venous pressure. **C** Form of the venous pulse wave tracing from the internal jugular vein: **a**, atrial systole; **c**, closure of the tricuspid valve; **v**, peak pressure in the right atrium immediately prior to opening of the tricuspid ring during systole; **a-x**, descent, due to downward displacement of the tricuspid ring during systole; **v-y**, descent at the commencement of ventricular filling.

Recap in Slide 41

4.16 Abnormalities of the jugular venous pulse

Condition	Abnormalities
Heart failure	Elevation, sustained abdominojugular reflux > 10 seconds
Pulmonary embolism, tamponade	Elevation
Pericardial effusion	Elevation, flattened prominent 'y' descent
Pericardial constriction	Elevation, Kussmaul's sign, prominent 'y' descent, 'x' descent
Superior vena cava obstruction	Elevation, loss of pulsation
Atrial fibrillation	Absent 'a' waves
Tricuspid stenosis	Giant 'a' waves, large, prominent
Tricuspid regurgitation	Giant 'v' or 'cv' waves
Complete heart block	'Cannon' waves





Superior vena cava obstruction

- Non-pulsatile JVP elevation
- Negative abdominojugular reflux
- DOESN'T reflect right atrial pressure

Positive Pemberton's sign

Inspected; Video

Kussmaul's sign

- Paradoxical elevation of JVP with inspiration
- Differential diagnosis:
 1. Pericardial constriction
 2. Severe right ventricular failure
 3. Restrictive cardiomyopathy

