

Pulse Check

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Clinical Skills Teaching 2

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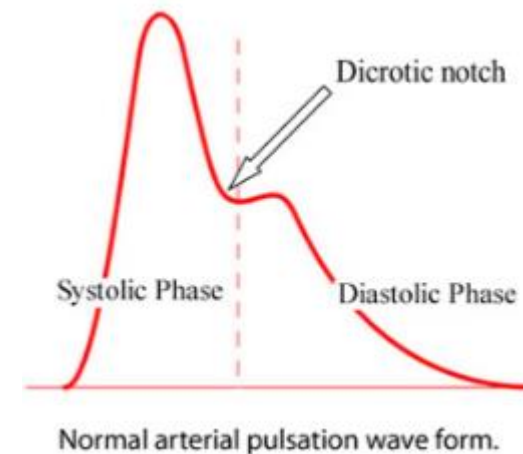
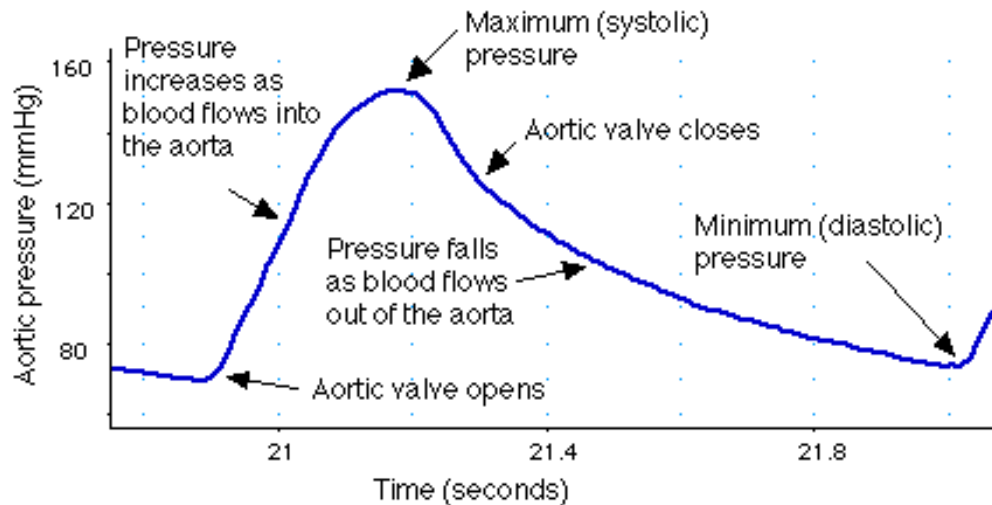


Learning Objectives

- Defining a pulse
- Assessing a pulse and location of pulses
- Specialized tests
- Assessing for peripheral vascular disease
- JVP and its assessment
- Pathological problems identified with pulse checks

What is a pulse?

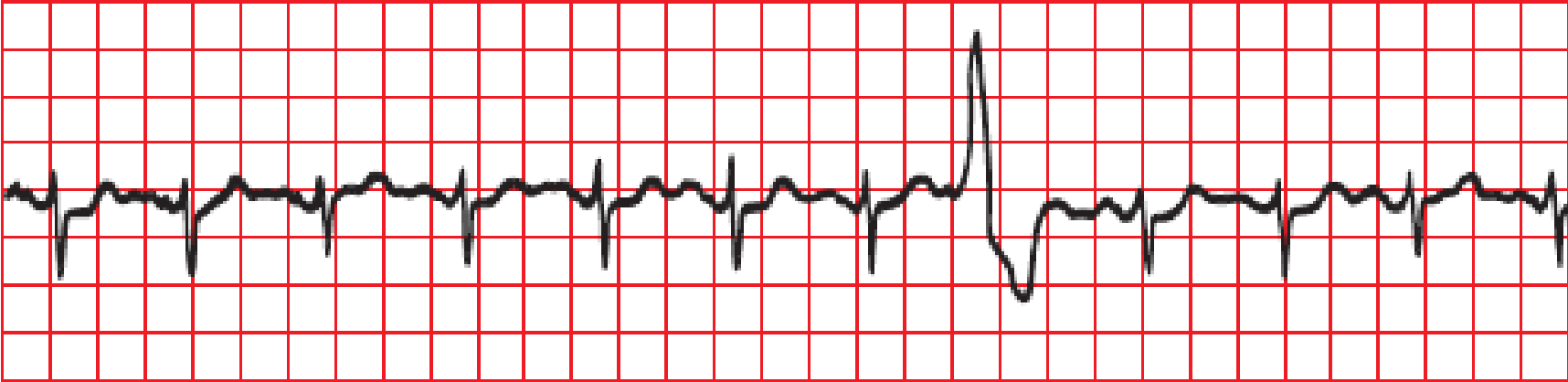
A pulse is a rhythmic beat felt in an artery. With each systolic beat of the heart, blood is ejected into the arteries. This pumping action (contraction) of the heart causes a rhythmic dilation of the arteries, which is palpable through light touch.



What can you assess on a pulse check?

- Rate:Adult 60-100
Neonate 120-160
Infant (1m-12m) 80-140
Toddler 1-5yr 80-130
- Rhythm: normal or irregular / dropped beats or extra beats
- Volume: volume of pulse (difference between systolic and diastolic pressure) best assessed at **carotid pulse**
- Character: waveform of arterial pulse e.g. collapsing, slow rising or pulsus paradoxus...

What do you expect to find on pulse check after you read the following ECG?



Clinical Scenario

65 year old Mohammed Al-Sherif comes to you with new onset of palpitations. He has suffered with hypertension for the last 15 years. You find he has an irregular, irregular pulse of 120.

- a) What is your likely diagnosis?
- b) What risk factors does this man have for this condition?
- c) What other particular examinations and investigations would you make?

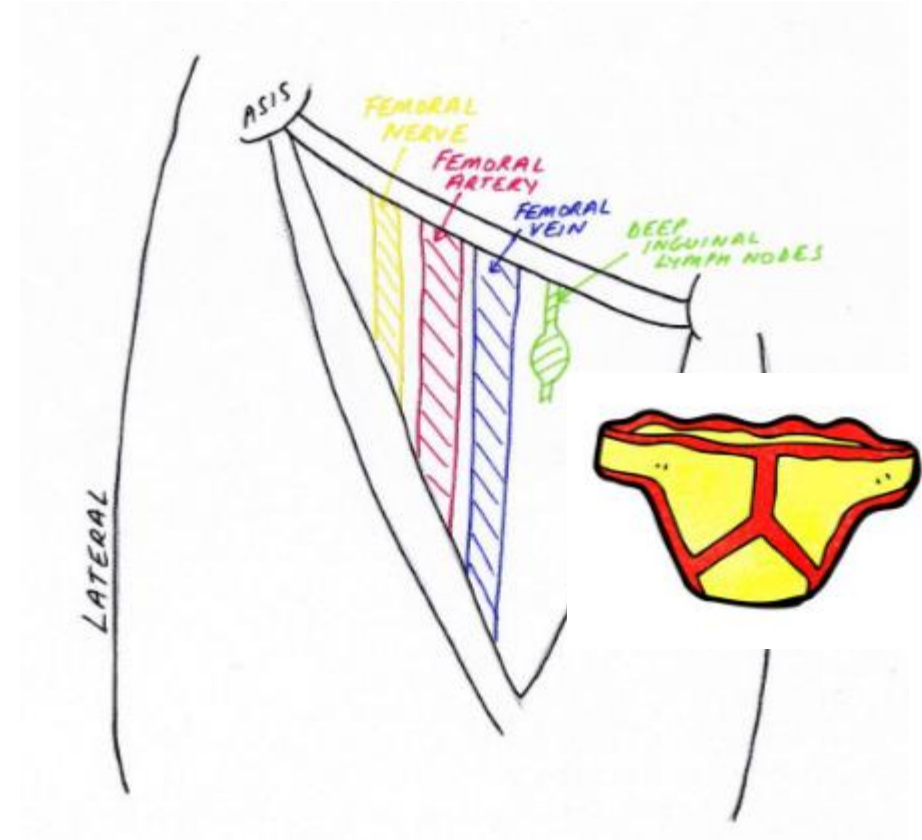
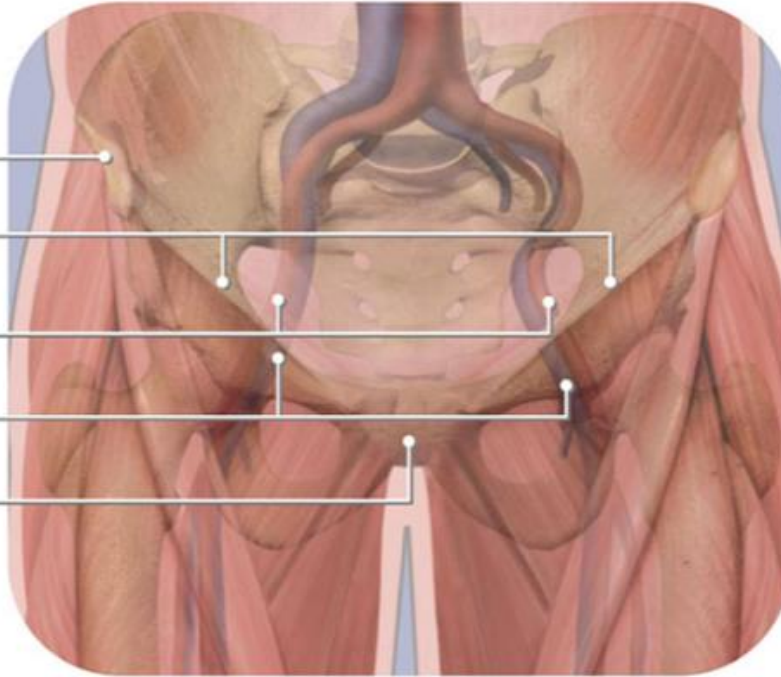
Where are your pulses?

- Radial pulse (lateral to flexor carpi radialis tendon - use 3 middle fingers)
 - Brachial pulse (antecubital fossa medial to biceps tendon –use thumb)
 - Carotid pulse (angle of jaw, anterior to sternocleidomastoid muscle and larynx - use right thumb for left carotid and vice versa)
 - Abdominal aorta (abdominal midline above umbilicus–use flat of hands)
 - Femoral artery (midline between ASIS and pubic tubercle – 1-3 finger(s))
- (Remember **NAVY** for arterial blood gas or venous blood taking – Nerve, Artery, Vein and Y-fronts!)

Femoral Artery

Landmarks/Location:

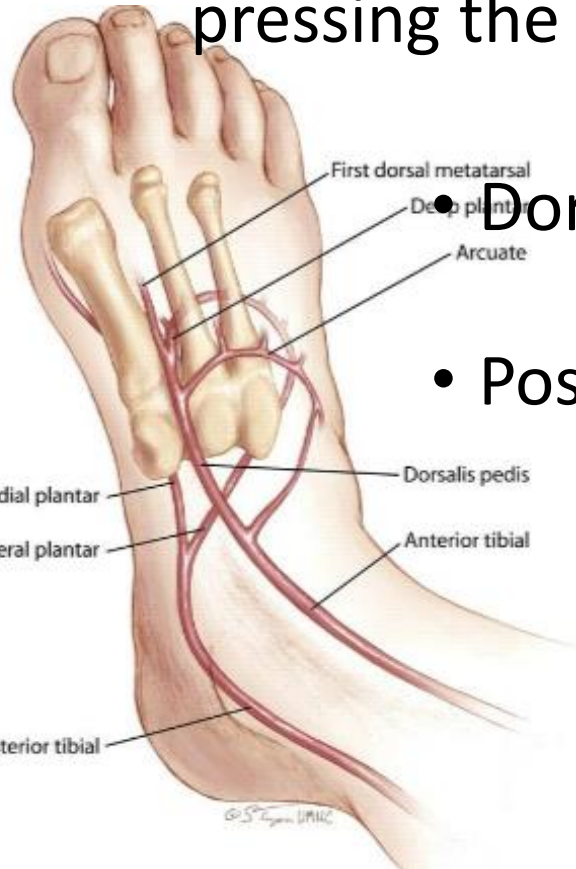
- Anterior superior Iliac spine
- Inguinal ligament
- Femoral artery
- Femoral vein
- Pubic tubercle



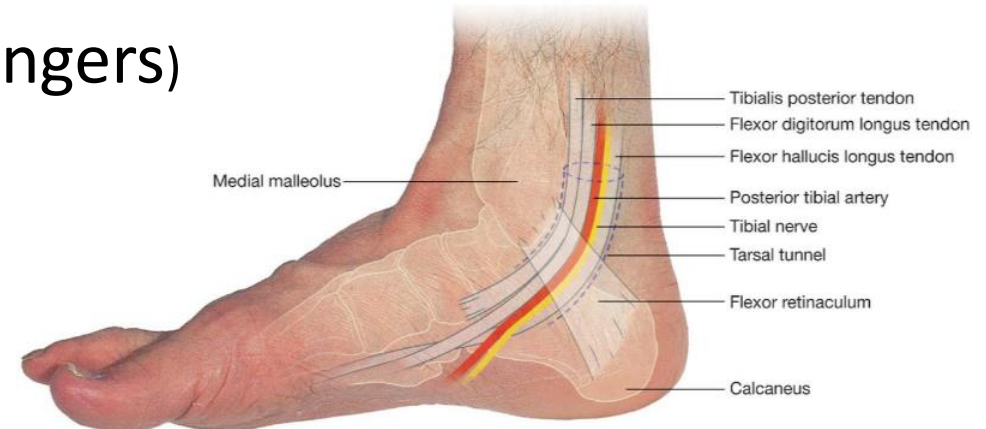
NAV-Y

Where are your pulses?

- Popliteal pulse (deep in popliteal fossa with knee flexed at 30 degree – thumbs on tibia anteriorly and press middle fingers firmly in midline pressing the artery against the back of the tibia)



- Dorsalis pedis pulse (lateral to hallucis extensor longus – 3 middle fingers)
- Posterior Tibialis pulse (posterior to medial malleolus – 3 middle fingers)



Specialized tests

- Collapsing pulse – hold radial pulse with hand and lift patients hand above their head (severe aortic regurgitation)
- Check for radial – femoral delay – palpate radial and femoral pulses (on same ipsilateral side) and check for delay (coarctation of aorta)
- Pulsus paradoxus – exaggerated normal phenomenon where increase in pulse volume on expiration and decreases in inspiration (asthma, cardiac tamponade with pericardial effusion)
- Auscultate for carotid bruits with bell of stethoscope - ?carotid stenosis if unilateral or radiating aortic systolic murmur if bilateral
- Buerger's test - *Buerger's angle*, is the angle to which the leg has to be raised before it becomes pale, whilst the patient is supine. In a limb with a normal circulation the toes and sole of the foot, stay pink, even when the limb is raised by 90 degrees. In an ischaemic leg, elevation to 15 degrees or 30 degrees for 30 to 60 seconds may cause pallor.
- Ankle Brachial Pressure Index (ABPI) – Doppler used over brachial and DP pulses and ratio calculated (used to assess arterial and venous insufficiency)

Sequencing of radial pulse assessment

- Place pads of index and middle finger over right radial artery
- Assess rate and rhythm
- Palpate both radial pulses – assess for any delay and any difference in volume
- Detect for radio-femoral delay – palpate radial and femoral pulses simultaneously (on ipsilateral side) noting for any timing and volume difference
- Detect for collapsing pulse (checking patient has no shoulder or arm pain or restriction) and feel pulse with base of fingers then lift arm vertically above head



KEEP
CALM
AND
CHECK A
PULSE

Clinical Scenario

74 year old gentleman Abdullah Abu Shemasani lifelong smoker has been developing right calf pain climbing the hill to his house. He has to stop and then his pain eases off. What clinical assessment would you make of this man?



Assessment for peripheral vascular assessment

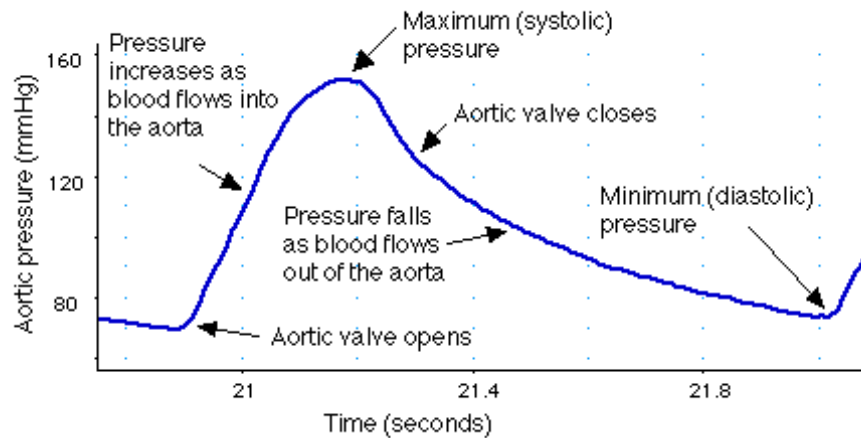
- Begin by washing hands
- Introduce yourself and check ID of patient
- Explain procedure and gain consent / chaperone if necessary
- **Inspection**

General: nicotine staining, scars (CABG / AAA repair...)

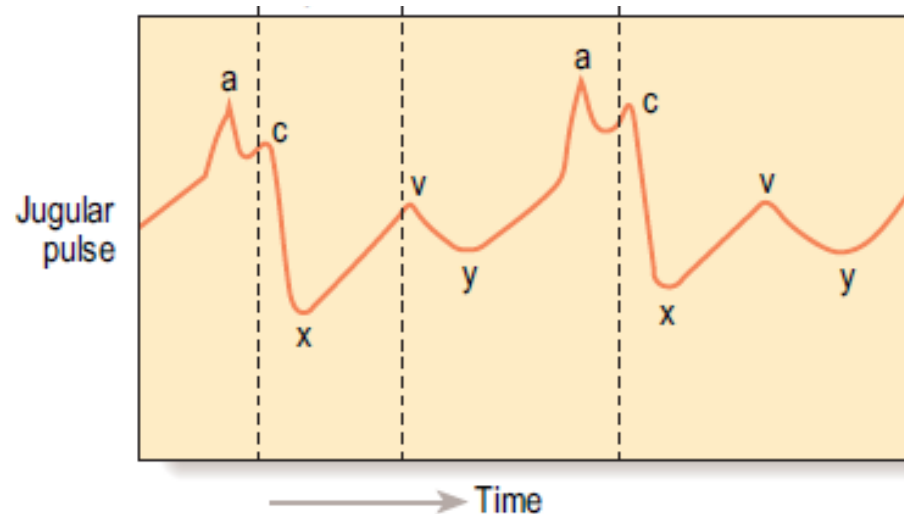
Specific : gangrene, arterial / venous ulcers, varicose veins, check between toes and underneath legs, colour changes – black / brown (hemosiderin deposits) / pallor, shiny skin, loss of hair

- **Palpation** – test for temperature with back of hands – start distally and more proximally
- Check for capillary return (squeezing toe) and if more than 2secs go on to perform Buerger's test
- Check for AAA, femoral, popliteal pulses, dorsalis pedis, posterior tibial – checking both sides to compare for presence and strength
- Check for radio-femoral delay on same side of body
- Check for sensation of light touch – cotton wool – testing with patient's eyes closed and asking which foot / leg is being touched?
- Auscultate for abdominal aortic, femoral and popliteal bruits

Jugular Venous Pressure



and internal jugular vein therefore the pressure in the internal jugular vein is dictated by the right atrial pressure. This provides information about the cardiac function.



a = atrial systole

c = transmitted pulsation of carotid artery at onset of ventricular systole

x = descent, due to atrial relaxation

v-y = descent at commencement of ventricular filling

How to examine for JVP

- Position patient at supine at 45 degrees
- Ensure neck muscles are relaxed by resting back of head on pillow and turn head away slightly
- Look across neck from right side of patient
- Identify internal jugular pulsation (use abdominojugular reflux if necessary)
- Estimate vertical height in cm between top of venous pulsation and sternal angle to give venous pressure
- Identify timing and form of pulsation and note any abnormality

Jugular Venous Pressure

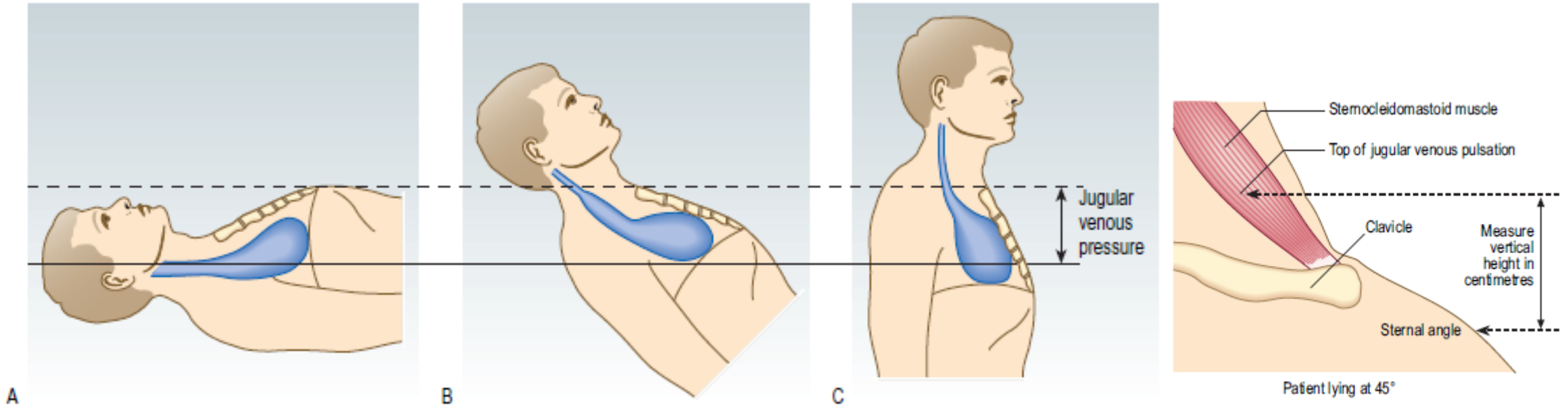
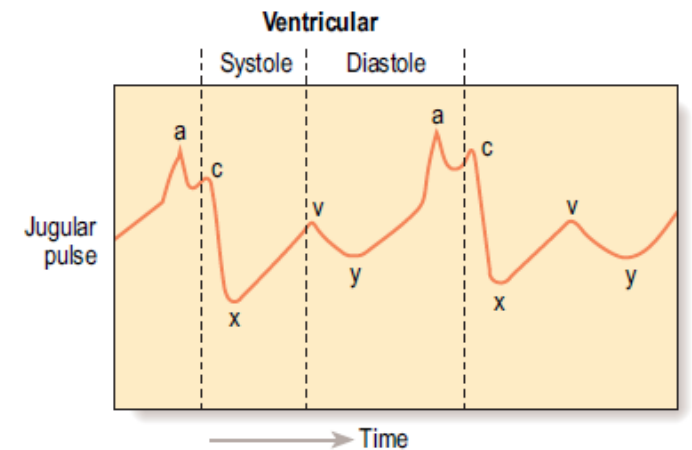


Fig. 6.18 Jugular venous pressure in a healthy subject. (A) Supine: jugular vein distended, pulsation not visible. (B) Reclining at 45°: point of transition between distended and collapsed vein can usually be seen to pulsate just above the clavicle. (C) Upright: upper part of vein collapsed and transition point obscured.

Normal JVP up to
4cm above
sternal angle

Abnormal JVP



- Elevated JVP most commonly heart failure
 - Other causes: pulmonary embolism, pericardial effusion, pericardial constriction, superior vena caval obstruction (loss of pulsation too)
- Absent `a` waves (no atrial systole) – atrial fibrillation
- Giant `a` waves (due to restriction of blood flow from atrial to right ventricle) – pulmonary hypertension, rarely tricuspid regurgitation
- Giant `v` waves – severe tricuspid regurgitation
- Cannon waves (giant `a` waves when right atrium contracts against closed tricuspid valve) – complete heart block, some VT and SVT
- Kussmaul's sign – paradoxical rise of JVP on inspiration – pericardial constriction and tamponade, severe right ventricular failure and restrictive cardiomyopathy

Abnormalities in pulses

Bradycardia (>60 bpm)	Tachycardia (<100 bpm)
Athletic training	Exercise
Hypothyroidism	Fever
Medication e.g. beta-blockers, digoxin, verapamil	Pain / Excitement / Anxiety
	Hyperthyroidism
	Medication e.g. Ventolin inhaler, vasodilators
	Arrhythmia e.g. AF, SVT, VT

Resources

- Macleod's Clinical Examination – Graham Douglas, Fiona Nicol, Colin Robertson.
- www.patient.info/doctor/pulse-examination