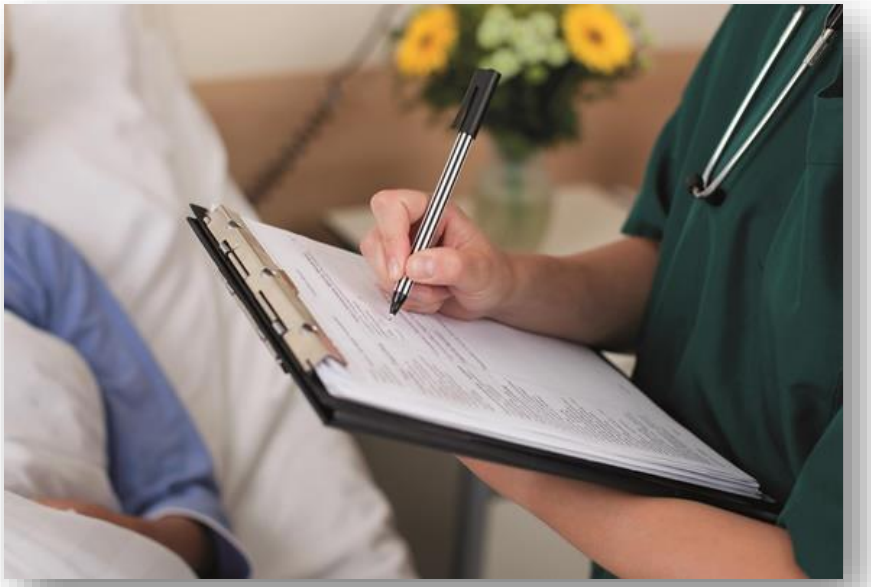
History Taking and Physical Examination of Cardiovascular System-The Essentials

History taking & Physical Examination



- Fundamental to accurate diagnosis!
- Cheap, fast, and powerful tools!!

Opening the consultation/ Warm up

- **Introduce yourself –** *name / role*
- **Confirm patient details –** *name / DOB*
- **Explain the need to take a history & PE**
- **Informed consent**
- **Ensure the patient is comfortable**

The history/Anamnesis taking process..

- History of presenting complaint
- Past medical history
- Drug history
- Family history
- Social history
- Systemic enquiry
- Summarizing
- Provisional diagnosis based on history

Presenting complaint

- **It's important to use open questioning to elicit the patient's presenting complaint**
  - *"What's your complaint?"* or *"Tell me about your symptoms"*
- **Allow the patient time to answer, trying not to interrupt or direct the conversation.**
- **Facilitate the patient to expand on their presenting complaint if required.**
  - *"Ok, so tell me more about that"* or *"Can you explain what that pain was like?"*

- **A patient with a cardiological problem is likely to have one or more of six main symptoms:**
  - chest pain/discomfort
  - shortness of breath/dyspnea
  - fatigue
  - palpitations
  - syncope
  - edema

Other symptoms..

- Cough
- Hemoptysis
- Cyanosis
- Claudication
- Limb pain
- Skin discoloration

} can indicate a vascular disorder !!

History of presenting complaint

- **Onset** – *When did the symptom start? / Was the onset acute or gradual?*
- **Duration –** *minutes / hours / days / weeks / months / years*
- **Severity –** *e.g. if symptom is chest pain, how bad is it on a scale of 1 to 10?*
- **Course** – *is the symptom worsening, improving, or continuing to fluctuate?*
- **Intermittent or continuous –** *is the symptom always present or does it come and go?*
- **Precipitating factors –** *are there any obvious triggers for the symptom?*
- **Relieving factors –** *does anything appear to improve the symptoms e.g. GTN spray*
- **Associated features –***are there other symptoms that appear associated e.g. fever / malaise*
- **Previous episodes –** *has the patient experienced this symptom previously?*

If the chest pain is a major symptom..

- **Pain** – *if the pain is a symptom, clarify the details of the pain using **SOCRATES** acronym.*

- **S**ite – *where is the pain?*
- **O**nset – *when did it start? / sudden vs gradual?*
- **C**haracter – *sharp / dull ache / burning*
- **R**adiation – *does the pain move anywhere else?*
- **A**ssociations – *other symptoms associated with the pain?*
- **T**ime course – *worsening / improving / fluctuating / time of day dependent*
- **E**xacerbating / Relieving factors – *anything make the pain worse or better?*
- **S**everity – *on a scale of 0-10, how severe is the pain?*

The history taking process..

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Past medical history (Disease or risk factor)

- **Cardiovascular disease:**
  - ✓ Angina
  - ✓ Myocardial infarction – *bypass grafts / stents*
  - ✓ Atrial fibrillation
  - ✓ Stroke
  - ✓ Peripheral vascular disease
  - ✓ Hypertension
  - ✓ Hyperlipidemia
  - ✓ Rheumatic fever

- **Habits-** *smoking, alcohol, drugs*
- **Other medical conditions –** *e.g. hyperthyroidism*
- **Surgical history –** *bypass graft / stents / valve replacements*
- **Acute hospital admissions?** – *when and why?*

Drug history

- **Cardiovascular medications:**
  - ✓ Beta blockers
  - ✓ Calcium channel blockers
  - ✓ ACE inhibitors
  - ✓ Diuretics
  - ✓ Statins
  - ✓ Antiplatelets
  - ✓ Anticoagulants
  - ✓ Glyceryl trinitrate spray (GTN spray)
- **Other regular medications**
- **Contraceptive pill –** *increased risk of thromboembolic disease*
- **Over the counter drugs –** *NSAIDS / Aspirin*
- **Herbal remedies –** e.g. St John's Wort – *enzyme inducer (can affect Warfarin levels)*
- **ALLERGIES –** *ensure to document these clearly*

Family history

- **Cardiovascular disease at a young age**

(for men <55 years old, for women <65 years old in first degree relatives)– *myocardial infarction*

- **Are the parents still in good health? –**
  if deceased sensitively determine age and cause of death

- **Any unexplained deaths in young relatives? –**
  e.g. long QT syndrome / channelopathies

Social history

- **Smoking** – How many cigarettes a day? How many years have they smoked for?
- **Alcohol** – How many units a week? – *type / volume / strength of alcohol*
- **Recreational drug use** – *e.g. Cocaine – coronary artery vasospasm*
- **Diet –** Overweight? Fatty foods? Salt intake? – *cardiovascular risk factors*
- **Exercise –** baseline level of patient's day to day activity
- **Living situation:**

  House/bungalow? – *adaptations / stairs*
  Who lives with the patient? – *is the patient supported at home?*
  Any carer input? – *what level of care do they receive?*

- **Activities of daily living:**

  Is the patient independent and able to fully care for themselves?
  Can they manage self hygiene / housework / food shopping?

- **Occupation–** sedentary jobs – ↑ cardiovascular risk – *e.g. lorry driver*

Systemic enquiry

- **Systemic enquiry** involves performing a brief screen for symptoms in other body systems.

- This may pick up on symptoms the patient failed to mention in the presenting complaint.

- Some of these symptoms may be relevant to the diagnosis (e.g. reduced urine output in dehydration).

Systemic enquiry

- **Cardiovascular** – *Chest pain / Palpitations / Dyspnea / Syncope / Orthopnea / Peripheral oedema*
- **Respiratory** – *Dyspnea / Cough / Sputum / Wheeze / Haemoptysis / Chest pain*
- **GI** – *Appetite / Nausea / Vomiting / Indigestion / Dysphagia / Weight loss / Abdominal pain / Bowel habit*
- **Urinary** – *Volume of urine passed / Frequency / Dysuria / Urgency / Incontinence*
- **CNS** – *Vision / Headache / Motor or sensory disturbance/ Loss of consciousness / Confusion*
- **Musculoskeletal** – *Bone and joint pain / Muscular pain*
- **Dermatology** – *Rashes / Skin breaks / Ulcers / Lesions*

Closing the consultation

- **Thank the patient!**
- **Summarise the history!**

An example: Mitral stenosis

PARTICULARS	INFORMATION
Presenting complaint	SOB/PALPITATION
History of presenting complaint	Worsening SOB/PALPITATION for 5yrs
Past medical history	BMV
Drug history	PENCILLIN PROPHYLAXIS
Family history	--
Social history	PROVERTY AND 5 SIBLINGS
Systemic enquiry	PND --------MITRAL STENOSIS
Summarizing	Worsening SOB/PALPITATION for 5yrs WITH PND and PENCILLIN PROPHYLAXIS
Provisional Diagnosis	LEFT HEART FAILURE

PHYSİCAL EXAMINATION OF CARDIOVASCULAR SYSTEM

Physical Examination of Cardiovascular system

- General appearance/Inspection of the patient
- Measurement of the blood pressure
- Examination of the arterial pulse
- The examination of jugular vein
- The examination of the precordium
- The examination of edema

General Appearance

- The physical examination, including the general appearance of the patient, is an extremely **important component** of cardiology examinations!!

- It begins **as soon as** the physician **sees the patient.**

- **Breathlessness, signs of anxiety or discomfort, cyanosis, jaundice, and anaemia** are very important.

- **Important clues to a cardiac diagnosis** can be obtained from inspection of the patient.

- ***The examination begins with an evaluation of the general appearance of the patient, including;***
  - His/her age
  - Height, weight
  - Posture *(sitting or lying)*
  - Demeanor/behavior
  - Respiratory pattern

- Chest shape *(pectus excavatum, pectus carinatum)*
- Skin color *(pallor: anemia, cyanosis: peripheral or central, jaundice)*
- Extremities *(edema, clubbing, splinter haemorrhages, peripheral cyanosis)*
- Face *(xanthelasma, telangiectasia, high facial colouring, central cyanosis and corneal arcus (abnormal below the age of 50)).*
- Conjunctivae *(anaemia, jaundice and conjunctival haemorrhages, and the tongue examined for cyanosis)*

Pallor of conjunctiva: anemia

Xanthelesma: HL

Jaundice

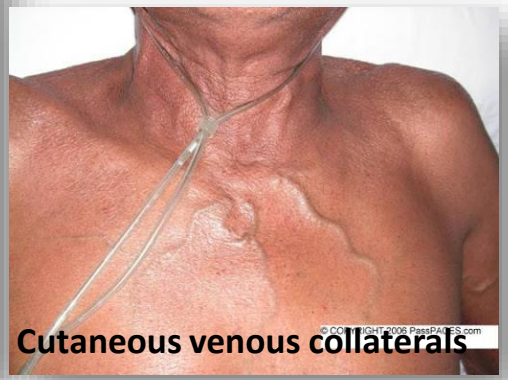
Facial rush

Central cyanosis

Clubbing

Pectus carinatum

Edema



Cutaneous venous collaterals

Acrocyanosis

Cyanosis

- **Cyanosis** is a bluish discoloration of the *skin and mucous membranes* resulting from abnormal perfusion by either an *increased amount of reduced hemoglobin or abnormal hemoglobin*.

  - **Central**
  - **Peripheral**
  - **Differential**

- **Central cyanosis** is characterized by *decreased arterial oxygenation* (in arterial saturation ≤ 85%). It is present with significant *right-to-left shunting at the level of the heart or lungs*, which allows deoxygenated blood to reach the systemic circulation.It is also a feature of *hereditary methemoglobinemia*.

- **Peripheral or acrocyanosis** of the fingers, toes, nose, and ears reflects reduced blood flow because of *small vessel constriction* seen in *severe heart failure, shock, or peripheral vascular disease.*

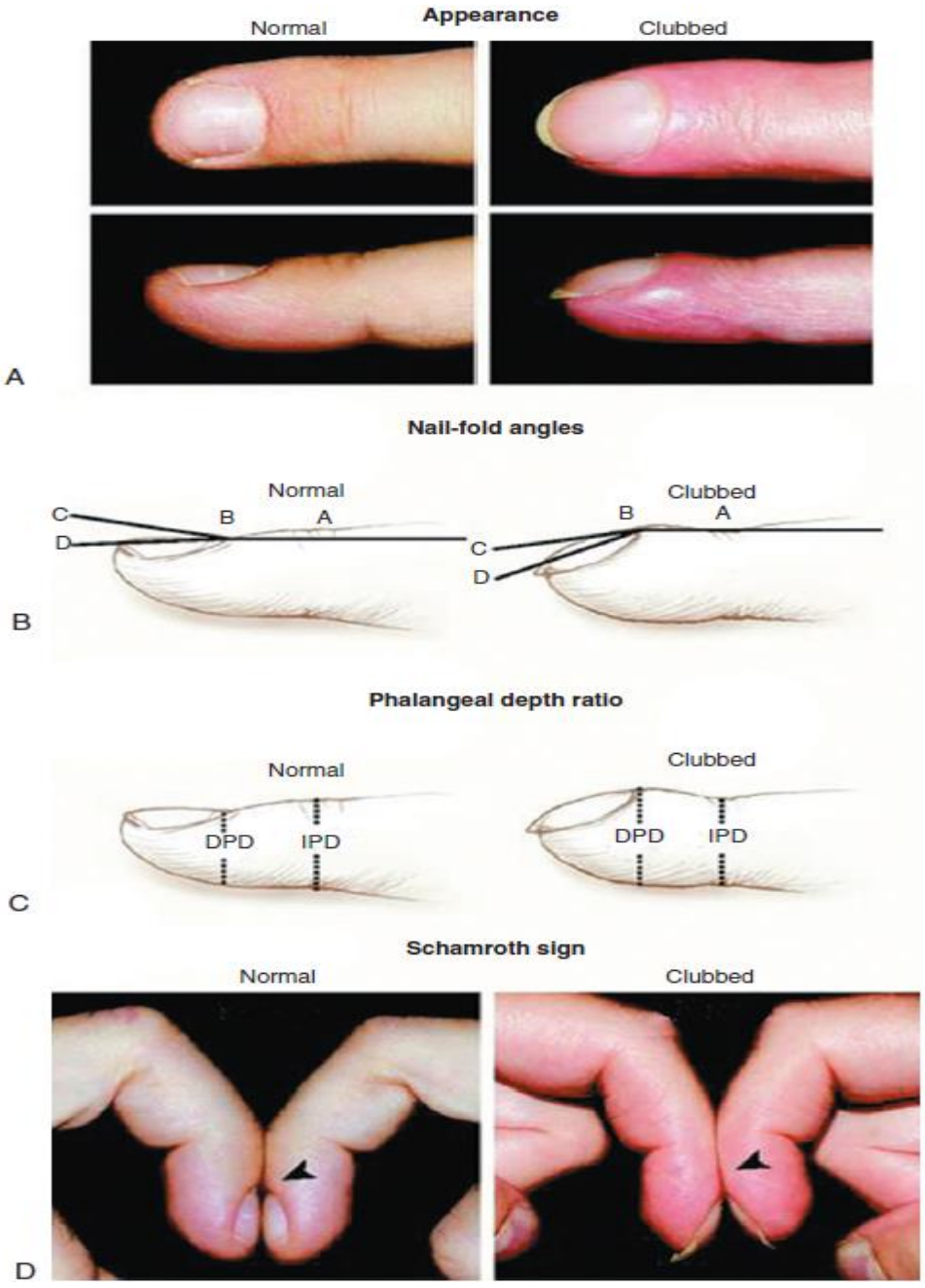
- **Differential cyanosis** affecting the lower but not the upper extremities occurs with a patent ductus arteriosus *(PDA)* and pulmonary artery *(PA) hypertension with right-to-left shunting* at the great vessel level.

Clubbing

- Clubbing refers to the **swelling of the soft tissue of the terminal phalanx of a digit** with subsequent loss of the normal angle between the nail and the nail bed.

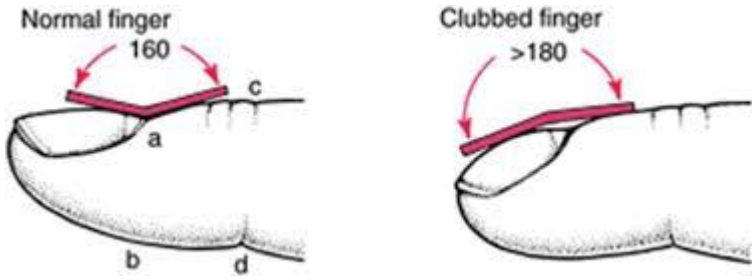
- The clubbed finger on the right shows increased profile and **increased nail fold angles.**
  - Distal phalangeal finger depth (DPD)– interphalangeal finger depth (IPD) represents the phalangeal depth ratio.
  - In normal fingers, the IPD is greater than the DPD. *In clubbing, this relationship is reversed.* ***DPD>IPD***

- **''Schamroth sign''→** In the absence of clubbing, nail to nail opposition of the index fingers creates **a diamond-shaped window**. In clubbed fingers, the loss of the profile angle caused by the increase in tissue at the nail bed causes obliteration of this space.



Braunwald, 9. Edition, 2013

Causes of Clubbing



- Pulmonary malignancy
- Chronic infection (or inflammation): *bronchiectasis, lung abscess, empyema, pulmonary tuberculosis, infective endocarditis, crohn disease*
- Cyanotic congenital heart disease

Rutherford, Circulation. 2013;127:1997–1999

Clinical Clues to Specific Cardiac Abnormalities Detectable from the General Examination *(some examples)*

Condition	Appearance	Associated Cardiac abnormalities
Marfan syndrome	**Tall, Long extremities**	Aortic root dilatation, Mitral valve prolapse
Jaundice	**Yellow skin or sclera**	Right-sided congestive heart failure, Prosthetic valve dysfunction (hemolysis)
Thoracic bony abnormality	**Pectus excavatum** **Straight back syndrome**	Mitral valve prolapse
Pickwickian syndrome	Severe **obesity, Somnolence**	Pulmonary hypertension
Right-to-left intracardiac shunt	**Cyanosis and clubbing** of distal extremities, Differential cyanosis and clubbing	Any of the lesions that cause Eisenmenger syndrome, Reversed shunt through patent ductus arteriosus
Anaemia	**Pallor** of the conjunctivae	Chronic heart failure
Down syndrome	**Mental retardation** **Simian crease of palm** **Characteristic facies**	Endocardial cushion defect
Scleroderma	**Tight, shiny skin of fingers** with contraction Characteristic **taut mouth and facies**	Pulmonary hypertension

Physical Examination of Cardiovascular system

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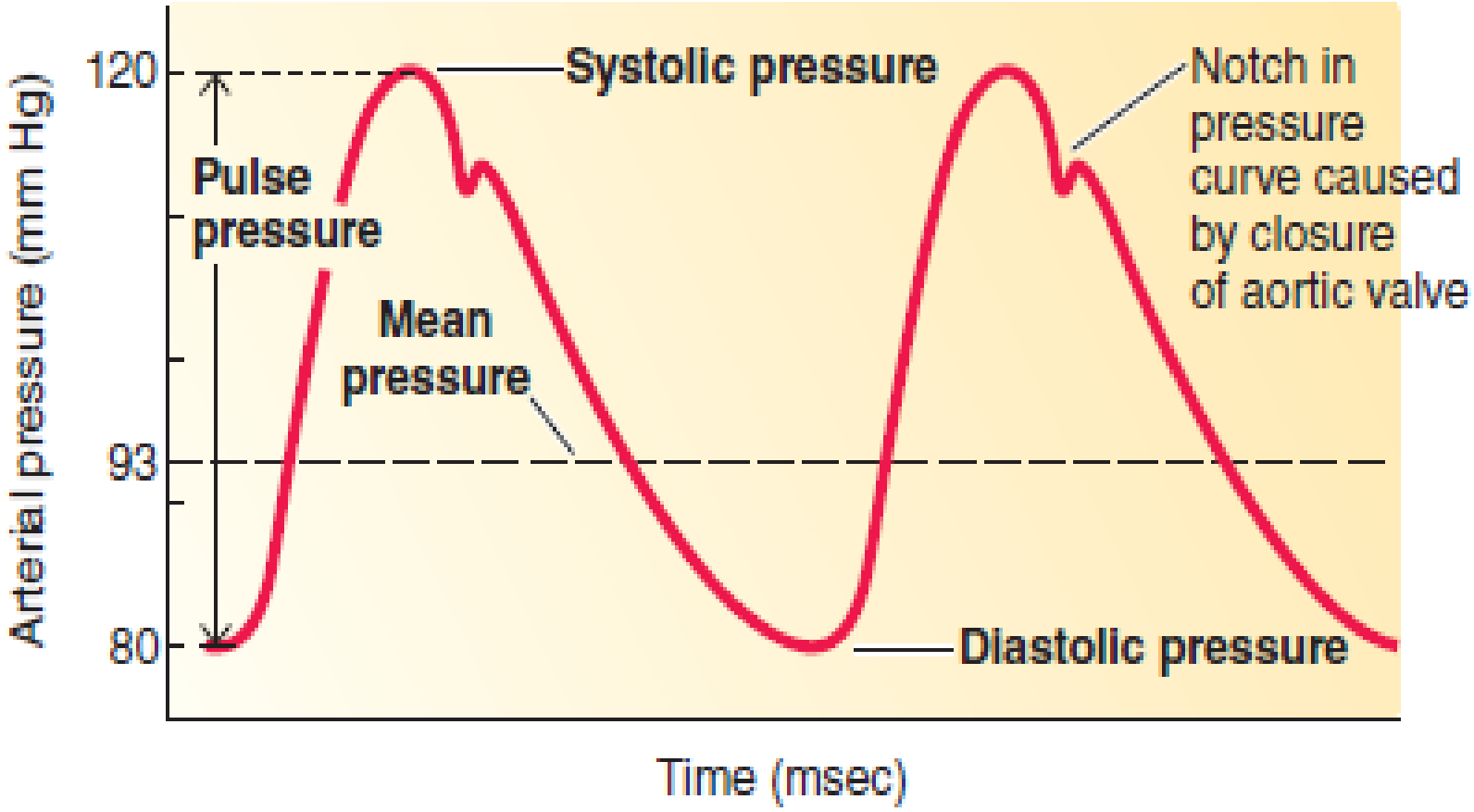
Measurement of the blood pressure

- Blood pressure should always be measured in **both arms.**

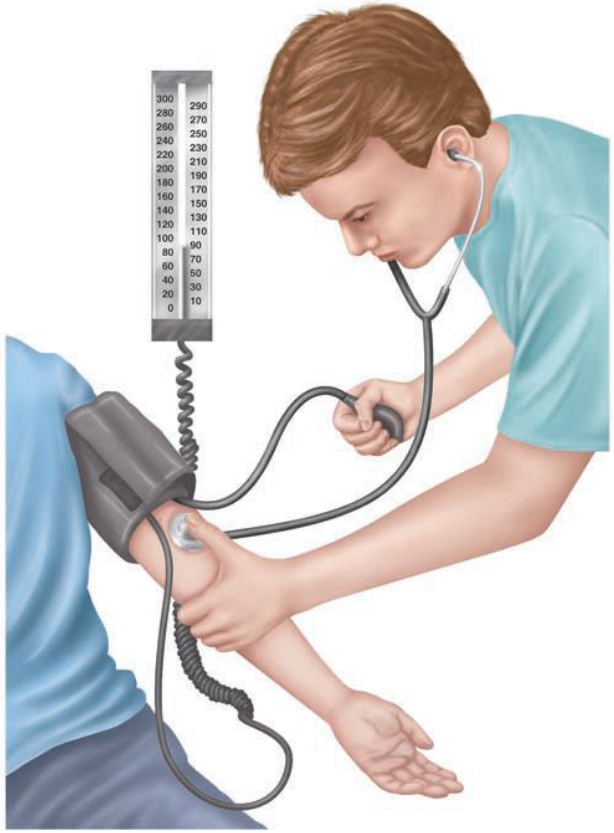
- If systolic blood pressure differs between arms by **more than 10 mm Hg, it is abnormal.**

Arterial blood pressure

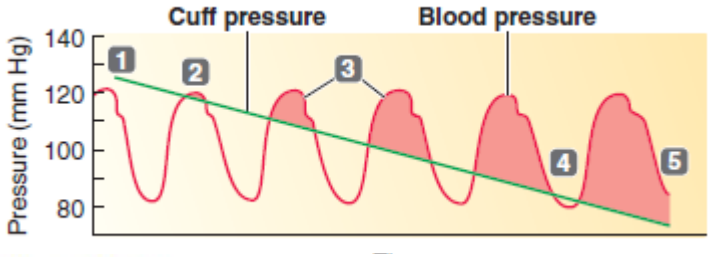


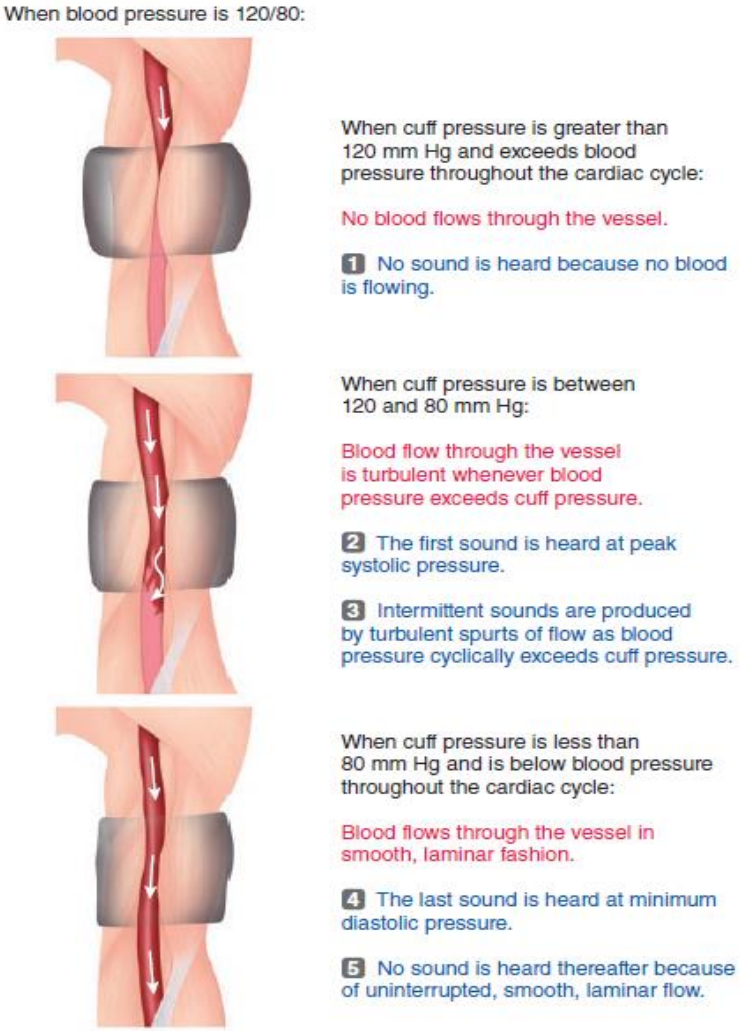
Sherwood, Fundamentals of Human Physiology, 4.edition, CH 10, 2012

Measuring blood pressure



Use of a sphygmomanometer in determining blood pressure





Blood flow through the brachial artery in relation to cuff pressure and sounds

Important aspects of blood pressure measurements

- Patient seated comfortably, back supported, bared upper arm, legs uncrossed
- Arm should be at heart level
- Cuff length/width should be 80%/40% of arm circumference
- Cuff should be deflated at <3 mm Hg/sec
- Column or dial should be read to nearest 2 mm Hg
- First audible Korotkoff sound is systolic pressure; last sound, diastolic pressure
- No talking between subject and observer

Braunwald's Heart Disease, 9. Ed, 2013

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Examination of the pulse and heart rate

- **A pulse wave** is produced by ventricular contraction during systole.
- **Three finger method:** palpation with 2nd–4th fingertips
- Palpation of the common carotid artery, **radial artery**, femoral artery, popliteal artery, tibialis posterior artery, and dorsalis pedis artery.
- **The thumb** of the examiner should **never be used** to take the pulse as it has its own strong pulse, which might be mistaken for the patient's pulse!

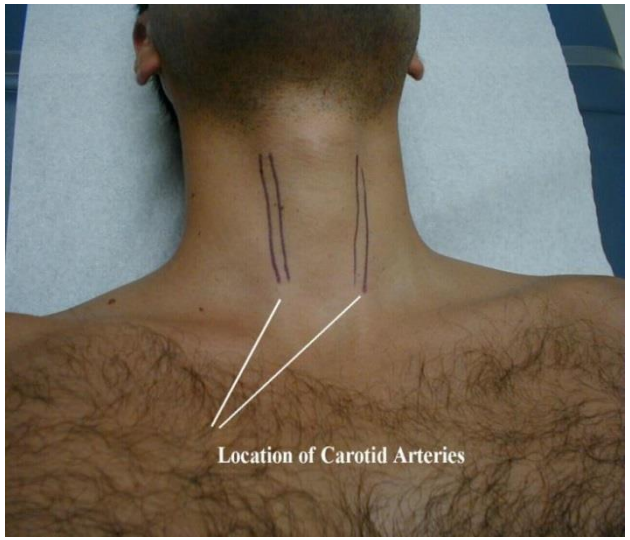
Carotid Arteries

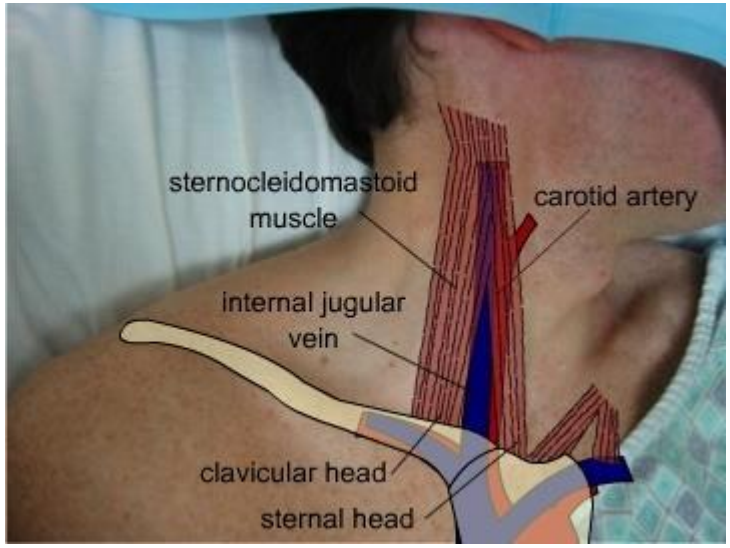
- The pulse of the carotid artery should never be palpated bilaterally and simultaneously!

  Each side separately!

  – Risk of compression of vessels → cerebral hypoperfusion → syncope

  – Risk of hyperstimulation of the carotid sinus reflex → bradycardia/low blood pressure → cerebral hypoperfusion → syncope





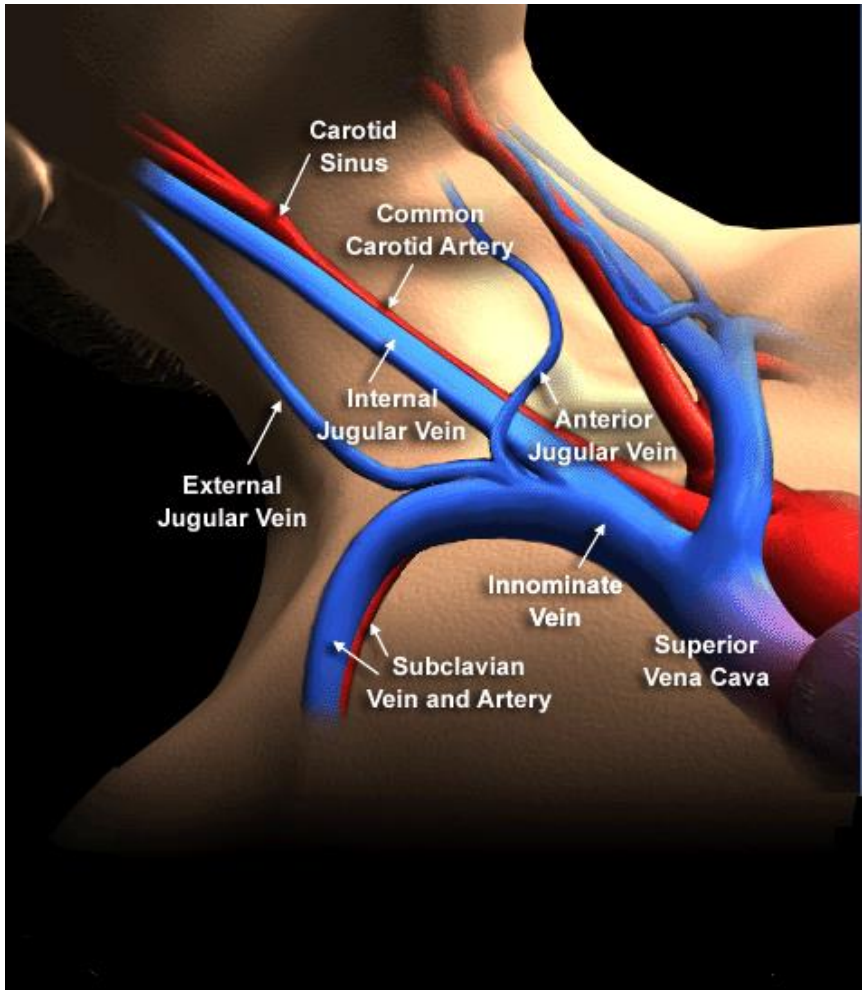
Assesment of the arteriel pulse

- Abnormality can be in the:
  - Rate (60-100 bpm)
  - Rhythm (Regular, irregular)
  - Volume
  - Character
  - Condition of vessel wall
  - Radiofemoral delay

Physical Examination of Cardiovascular system

- General appearance/Inspection of the patient
- Measurement of the heart rate and blood pressure
- Examination of the arterial pulse
- The examination of jugular vein (pulse/ pressure / distention)
- The examination of the precordium
- The examination of edema

Jugular venous examination (pulse/ pressure / distention)



- The left internal and external jugular veins anatomically are opened to the vena cava superior by angling.

- The right internal jugular vein connecting to the right brachiocephalic vein is in direct line with superior vena cava, so **right jugular veins are used in the assessment.**

Jugular venous examination technique

- Ensure the patient is positioned at **45°**
- Examiner stands at the **right side of the table**
- Ask patient to **turn their head** away from you
- **A penlight** can help to enhance visualization.

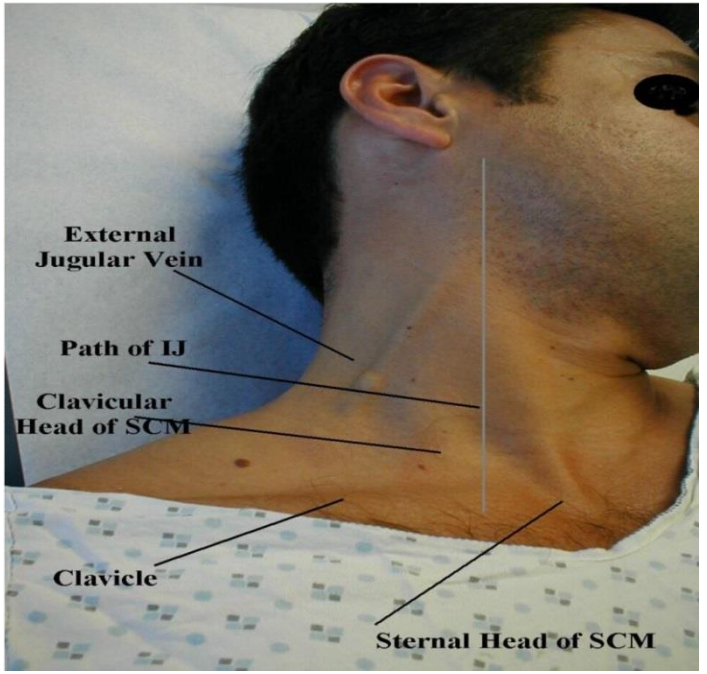
Assessment of Jugular venous distention (JVD)

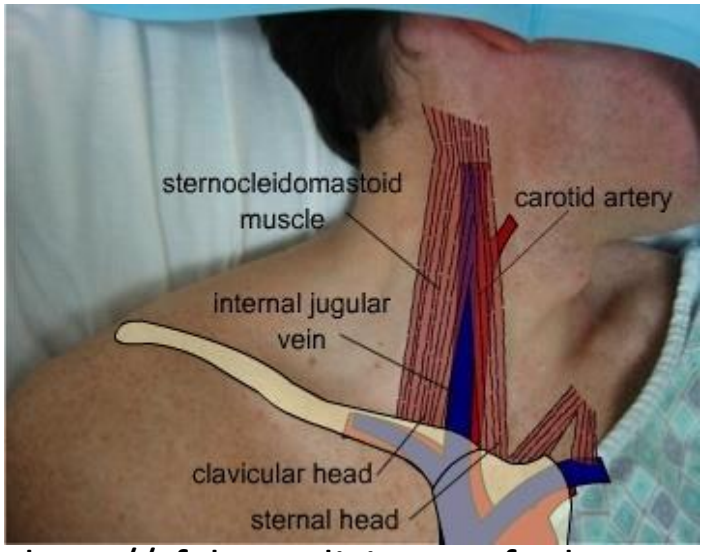
- JVD is when the **increased pressure of the superior vena cava** causes the jugular vein to **bulge**, making it most visible on the right side of a person's neck.

- The **right external jugular vein** is used for venous distention assessment.

Examination of the Jugular Venous Pressure (JVP)

- The JVP reflects pressure in the right atrium **(central venous pressure-CVP)**
- **Estimation of volume status (Non-invasive hemodynamic assessment)**
- Observe the neck for the JVP – located inline with the sternocleidomastoid muscle
- The **right internal jugular vein** is preferred because the EJV is valved and is not directly in line with the superior vena cava and right atrium.

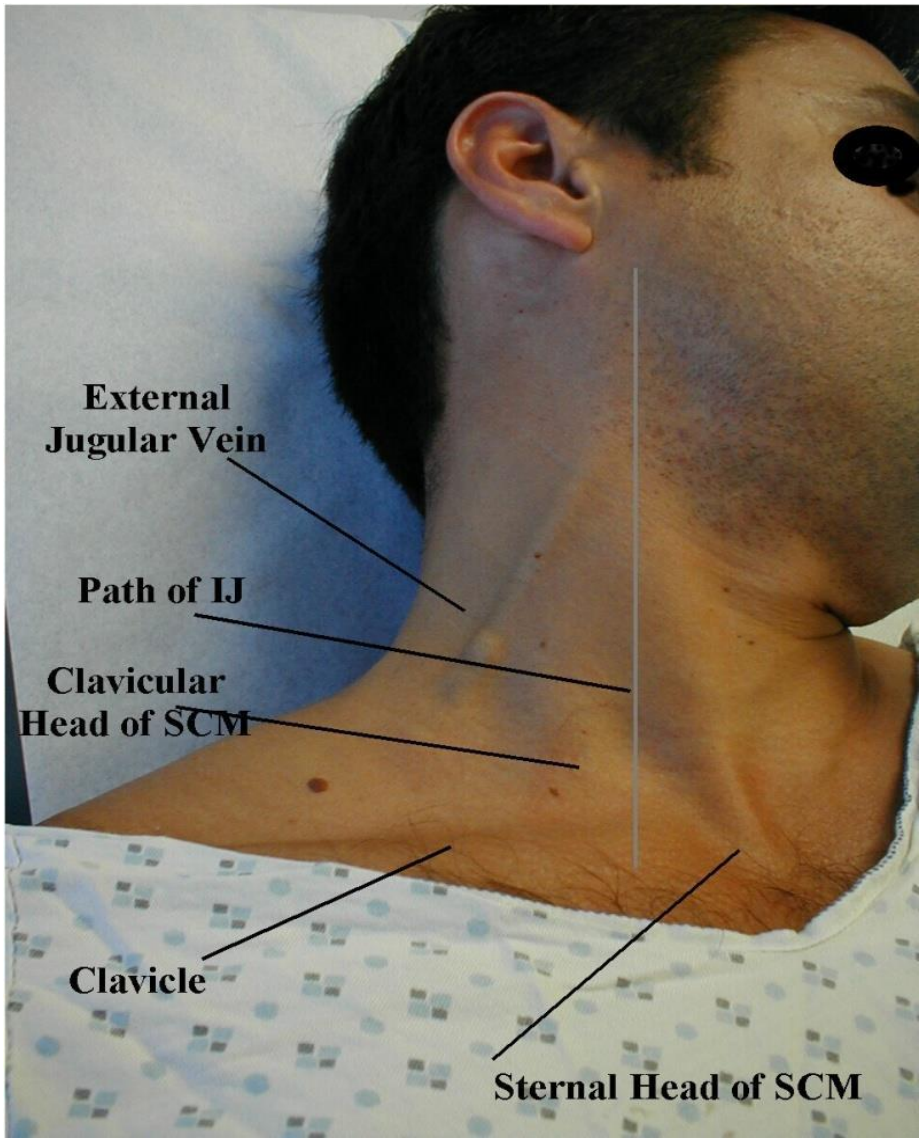




http://sfgh.medicine.ucsf.edu

JVP Technique

- **Find** correct **area** – helps to first identify SCM & triangle it forms with clavicle
- **Anatomy** of Internal Jugular Vein →Straight **line** with **RA**
- Look for **multi-phasic pulsations** (‘a’, ‘c’ & ‘v’ waves)
- **Isolate** from **carotid** pulsations, **respirations**

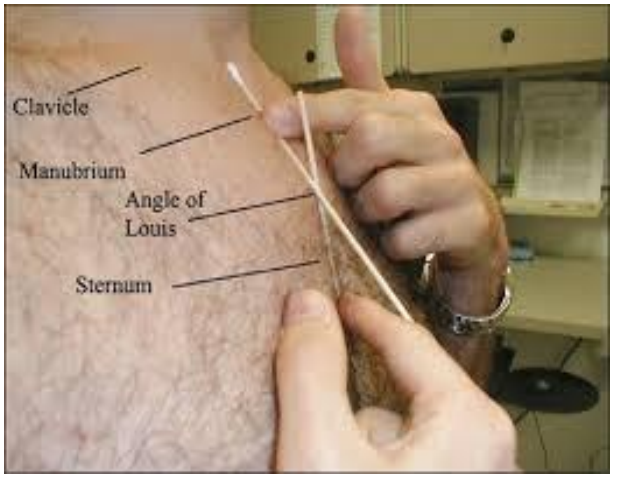


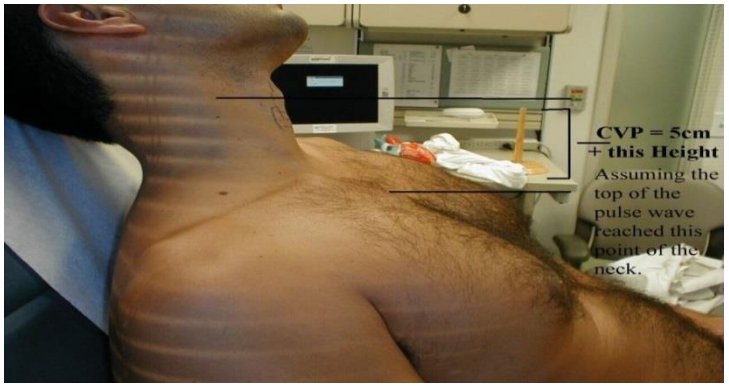
JVP Technique

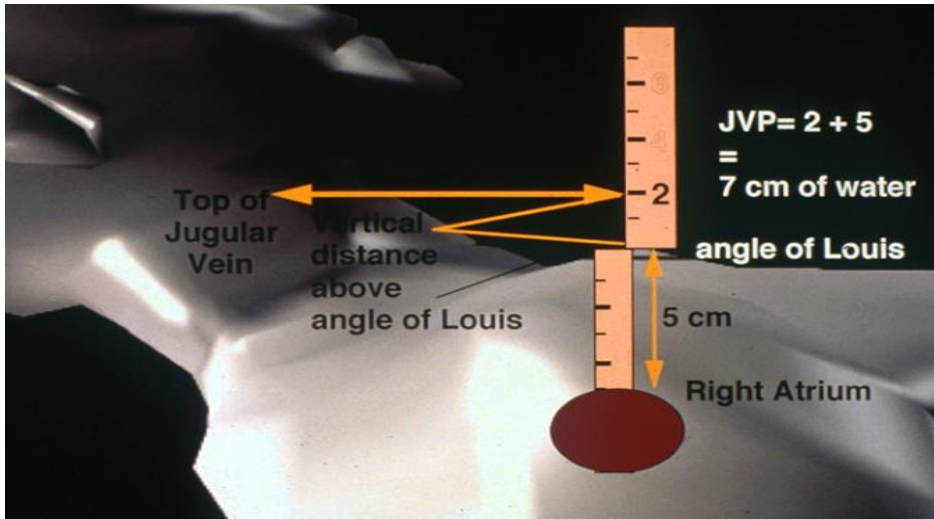
- The JVP is estimated to be the **vertical distance** between the **highest point of pulsation and the right atrium.**

- **The distance between the angle of Louis and center of RA is about 5 cm.**

- It is measured as the vertical height of the venous pulsation above the angle of Louis by ruler- *up to 4 cm being considered normal*

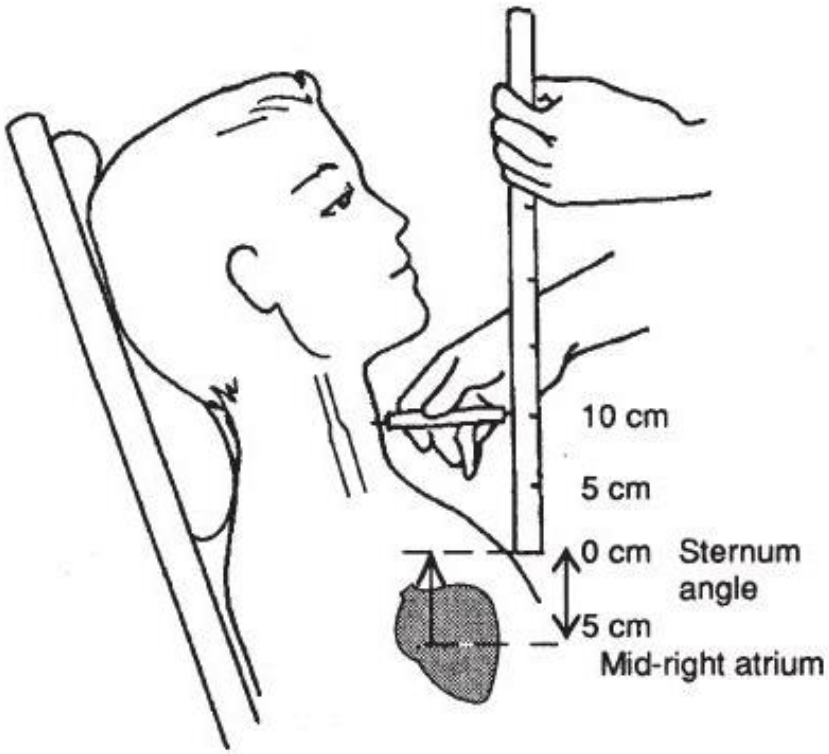






https://meded.ucsd.edu/clinicalmed/cvp_movie.htm

Courtesy Chinese University of Hong Kong
http:www.cuhk.edu.hk/cslc/materials/pclm1011/pclm1011.html



- **JVP= 5 cm+ vertical distance from sternal-manubrial angle to top of pulse wave**

- **Normal:**
  - **JVP is 6 to 8 cm** above the right atrium
- **Abnormal/ Elevated:**
  - **JVP is > 9 cm** above the right atrium (> 4 cm above the sternal angle)

JVP

- Normal JVP →↓↓↓ **w/ inspiration and ↑↑↑ w/expiration.**

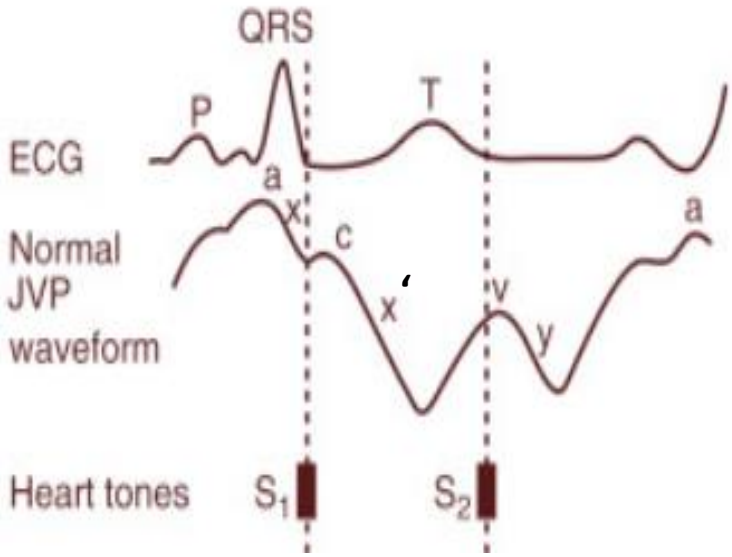
- **Kussmaul sign is a parodoxical rise in JVP on inspiration.** *(constrictive pericarditis, pulmonary embolism, or RV infarction)*

Elevated JVP causes

- Volume overload
- Right/left heart failure
- Pulmonary embolism
- Pulmonary hypertension
- Tricuspid stenosis or regurgitation
- Constrictive pericarditis
- Pericardial compression/tamponade
- Superior vena cava obstruction

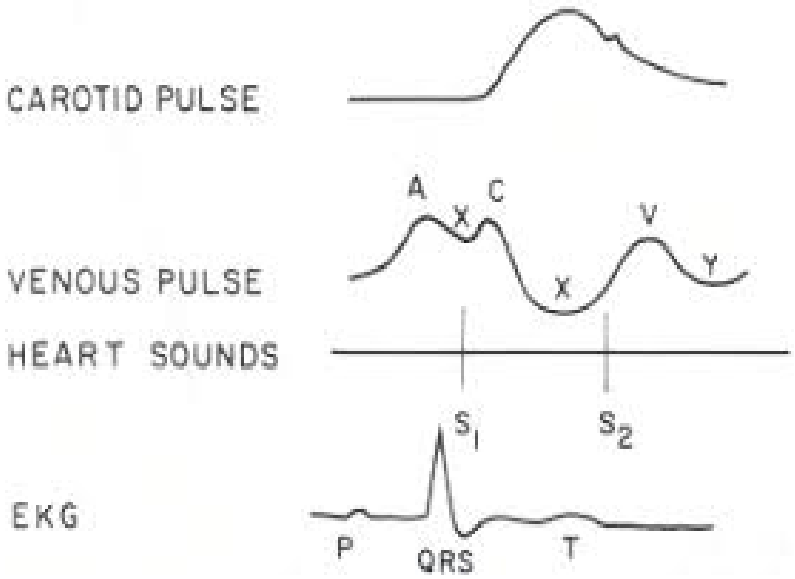
Juguler venous pulse waveform

- The **right IJV is used** the assessment for the jugular venous pulsation.
- The venous waveforms include three **positive waves–a,c and v** ; **negative waves x, x' and y**
- The **a wave** reflects RA presystolic **contraction**, occurs just after the electrocardiographic P wave, and precedes S1.



- **A= atrial contraction**
- **X= atrial relaxation**
- **C= tricuspid valve closure**
- **X'=ventricular systole**
- **V= atrial filling**
- **Y= atrial emptying**

- The **x descent** reflects **the fall in RA pressure** after the a wave peak.
- The **c wave** interrupts this descent as **ventricular systole** pushes the closed TV into the RA.
- The **x' descent** follows because of atrial diastolic suction created by **ventricular systole** pulling the TV downward.
- The **v wave** represents **atrial filling**, occurs at the end of ventricular systole, and follows just after S2.
- The **y descent** follows the v wave peak and reflects **the fall in RA pressure after TV opening.**



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- In normal individuals, **the x' descent is the predominant waveform** in the jugular venous pulse.

- The **a wave is normally larger than the v wave**, and the **x descent is more marked than the y descent.**

TABLE 12-2 Distinguishing Jugular Venous Pulse from Carotid Pulse

FEATURE	INTERNAL JUGULAR VEIN	CAROTID ARTERY
Appearance of pulse	Undulating two troughs and two peaks for every cardiac cycle (biphasic)	Single brisk upstroke (monophasic)
Response to inspiration	Height of column falls and troughs become more prominent	No respiratory change to contour
Palpability	Generally not palpable (except in severe TR)	Palpable
Effect of pressure	Can be obliterated with gentle pressure at base of vein/clavicle	Cannot be obliterated

Braunwald's Heart Disease, 9. Ed, 2013

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- The examination of the precordium

Check for pedal edema

- Over medial malleolus or 5 cm above it with right thumb..

- Apply pressure for minimum 30 seconds…and look for dimple→ **pitting edema**

Examination of Pedal edema

- Some medications *(eg. Ca CB)*
- Pregnancy
- Deep venous thrombosis
- Congestive heart failure
- Chronic renal disease
- Liver cirrhosis

Physical Examination of Cardiovascular system

- General appearance/Inspection of the patient
- Measurement of the blood pressure
- Examination of the arterial pulse
- The examination of jugular vein
- The examination of edema
- The examination of the precordium

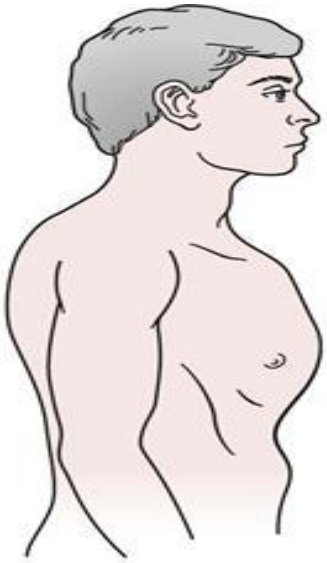
Physical Examination of Cardiovascular system

- The precordial cardiac examination:
  - –4 basic components:
    - Inspection
    - Palpation
    - Percussion (omitted in cardiac exam)
    - Auscultation

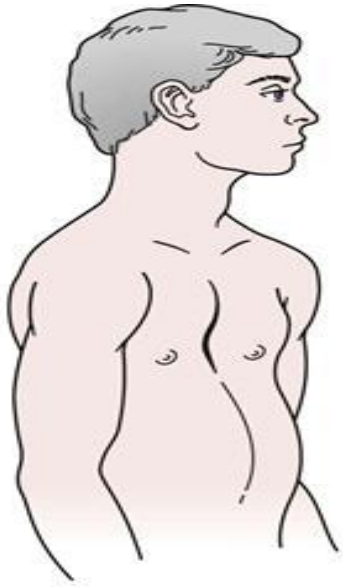
Inspection

- Pay attention to:
  - **Chest shape** *(pectus excavatum, pectus carinatum)*
  - Shortness of breath *(**rest** or **walking ?**)*
  - **Sitting** upright? Able to **speak**?
  - Visible **impulse** on chest wall from vigorously contracting ventricle ?

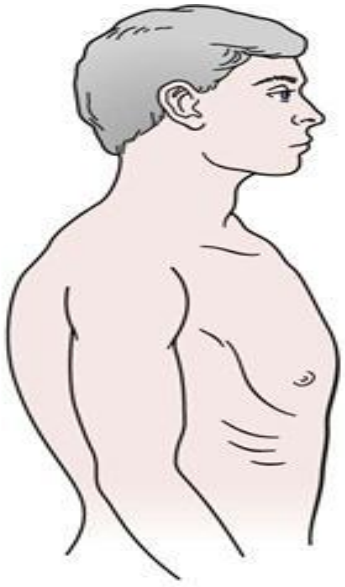
Chest wall deformities



Pectus carinatum (pigeon chest)



Pectus excavatum (funnel or sunken chest)

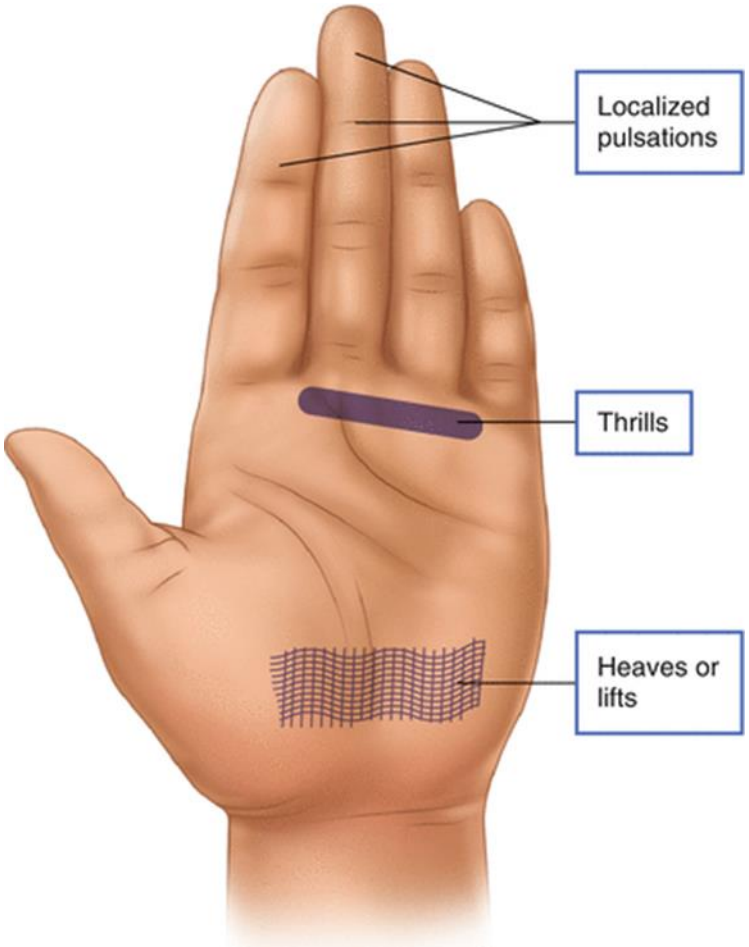


Barrel chest

- **Pectus carinatum**= the sternum and ribs are prominently in an **outward position**
- **Pectus excavatum**= the sternum and ribs are prominently in an **inward position**
- **Barrel chest**= **Elevated anteroposterior torax diameter**, the AP to transverse diameter is 1:1, seen in COPD.
- Thoracic deformities can affect the functions of the heart and lungs.

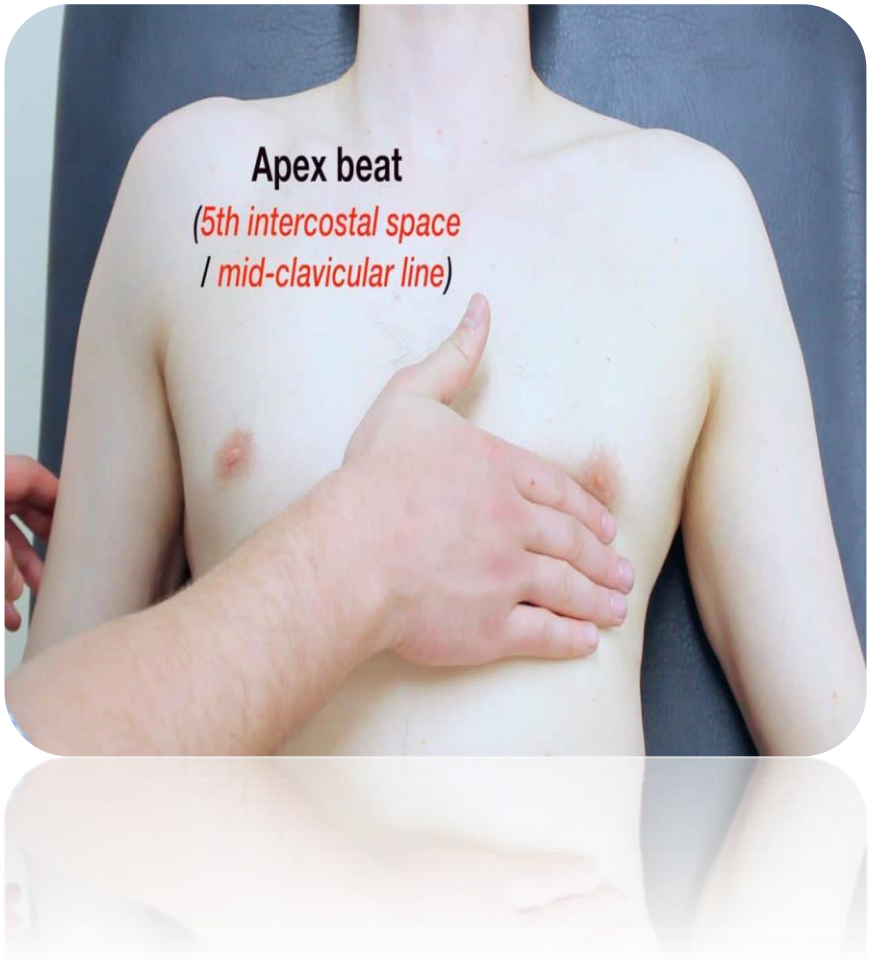
Palpation

- Apical impulse
- Thrills
- Parasternal lift



Apex beat

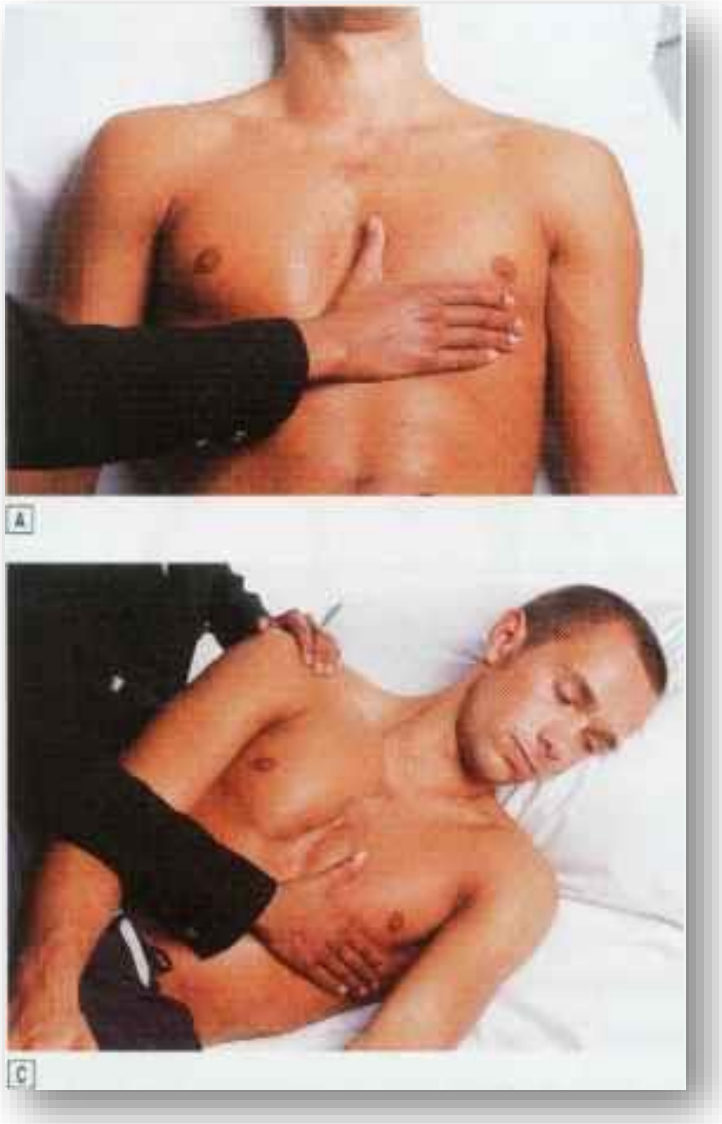
- The **apex beat** also called the **apical impulse**, is the pulse felt at the point of maximum impulse (PMI).
- The PMI is normally **over the left ventricular apex** in the **midclavicular line at the 5th intercostal space.**
- **It is <2 cm in diameter**, and moves quickly away from the fingers.
- It is best felt at **end-expiration**, when the heart is closest to the chest wall.



http://fourthstage2017.byethost16.com/[OSCE]/Cardiovascular%20Examination%20HDD.pdf?i=1

Apex beat

- **Supine position**
- **Left lateral decubitis position**



- The apical impulse of **LV enlargement** is usually widened or diffuse **(>3 cm in diameter),** can be palpated in **2 interspaces**, and is displaced **leftward.**

Parasternal lift

- Precordial motion in the **lower sternal area** usually reflects **RV motion.**

- **RV** pressure overload (eg, in pulmonary stenosis) or volume overload (eg, in ASD) causes a sustained outward lift. It is called **"parasternal lift**".

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Thrills

- **Palpable vibrations**
- Thrills signify **turbulent, high-velocity blood flow**, and help localize the origins of heart murmurs.
- It can be palpated in murmurs of **4th degree and above.**

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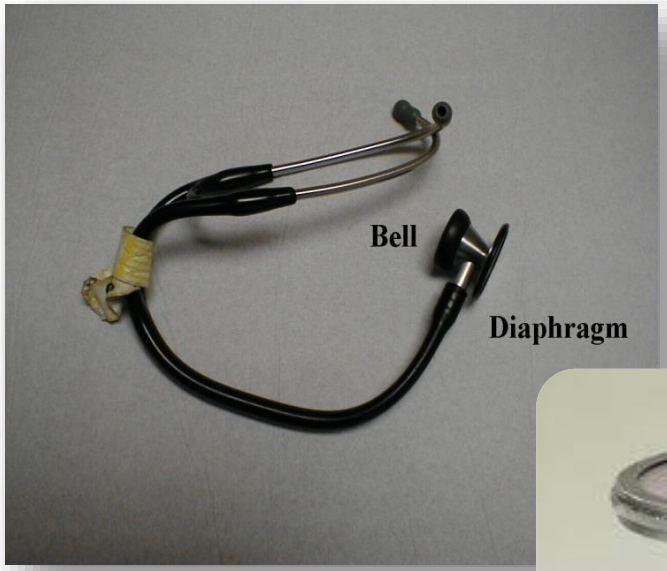
Auscultation: Using your stethescope



- Diaphragm →Higher pitched sounds
- Bell → Lower pitched sounds

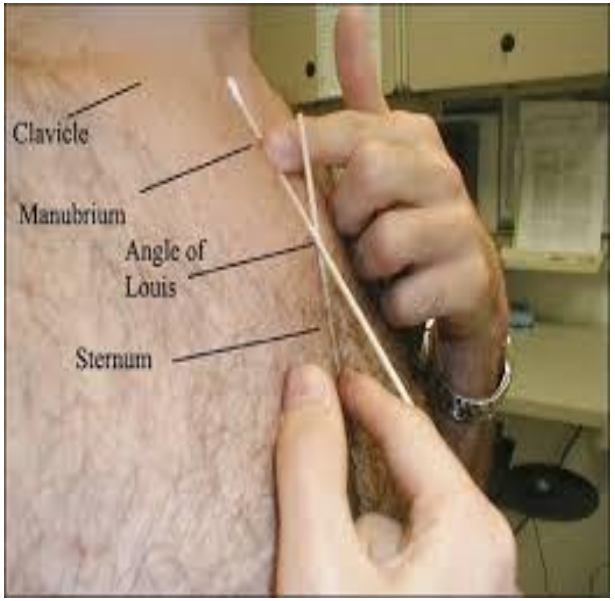
Auscultation Technique

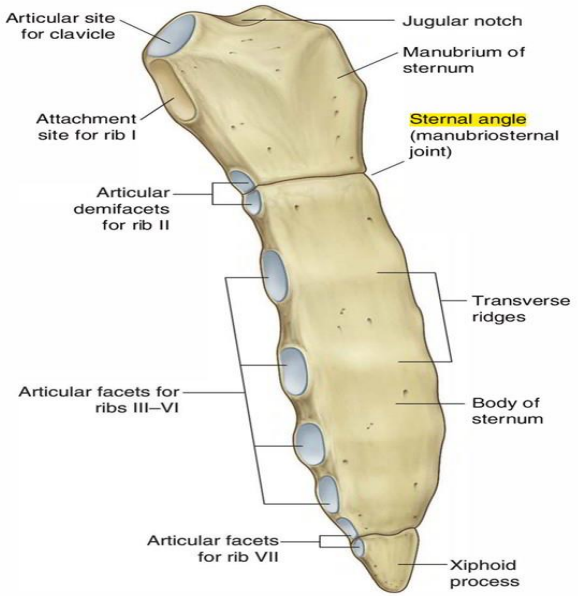
- Patient **lying at 30-45** degree incline position
- Don’t examine over clothes
  - –need to see area where placing stethescope
  - –stethescope must contact skin
- Stethescope with **diaphragm** at first (higher pitched sounds)

Angle of Louis

- The sternal angle (also known as the **angle of Louis** or **manubriosternal junction**) is the synarthrotic joint formed by the articulation of the manubrium and the body of the sternum.

- The sternal angle is a palpable **clinical landmark** in surface anatomy.

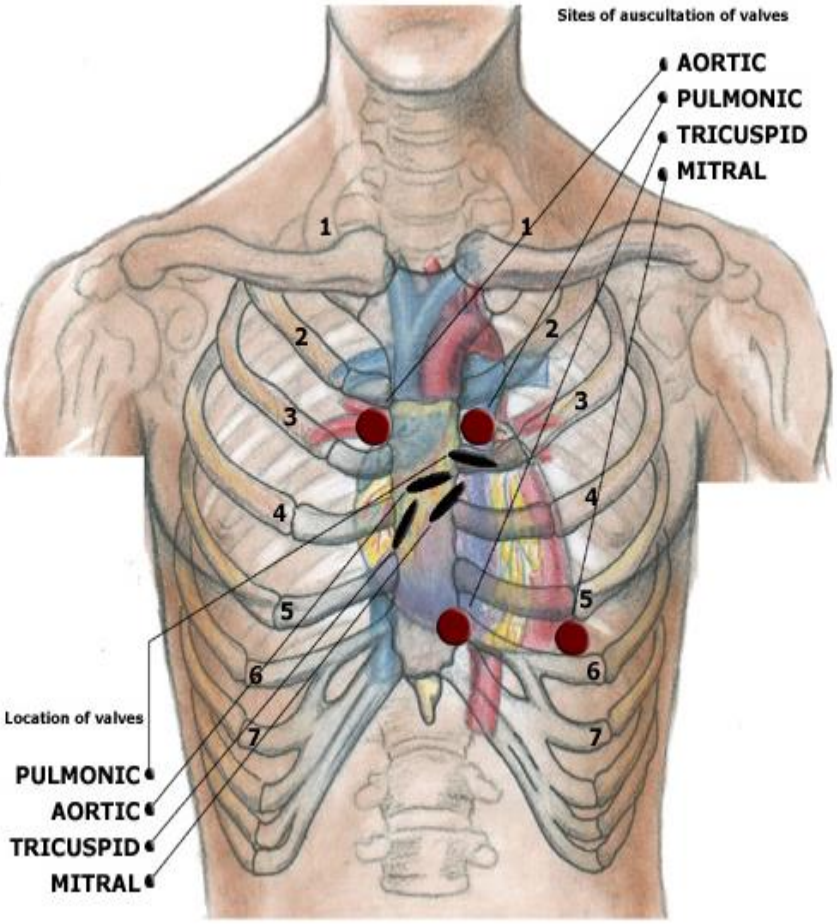




Joshi S et al, Indian J Crit Care Med 2010;14:180-4.
https://www.earthslab.com/anatomy/sternal-angle/

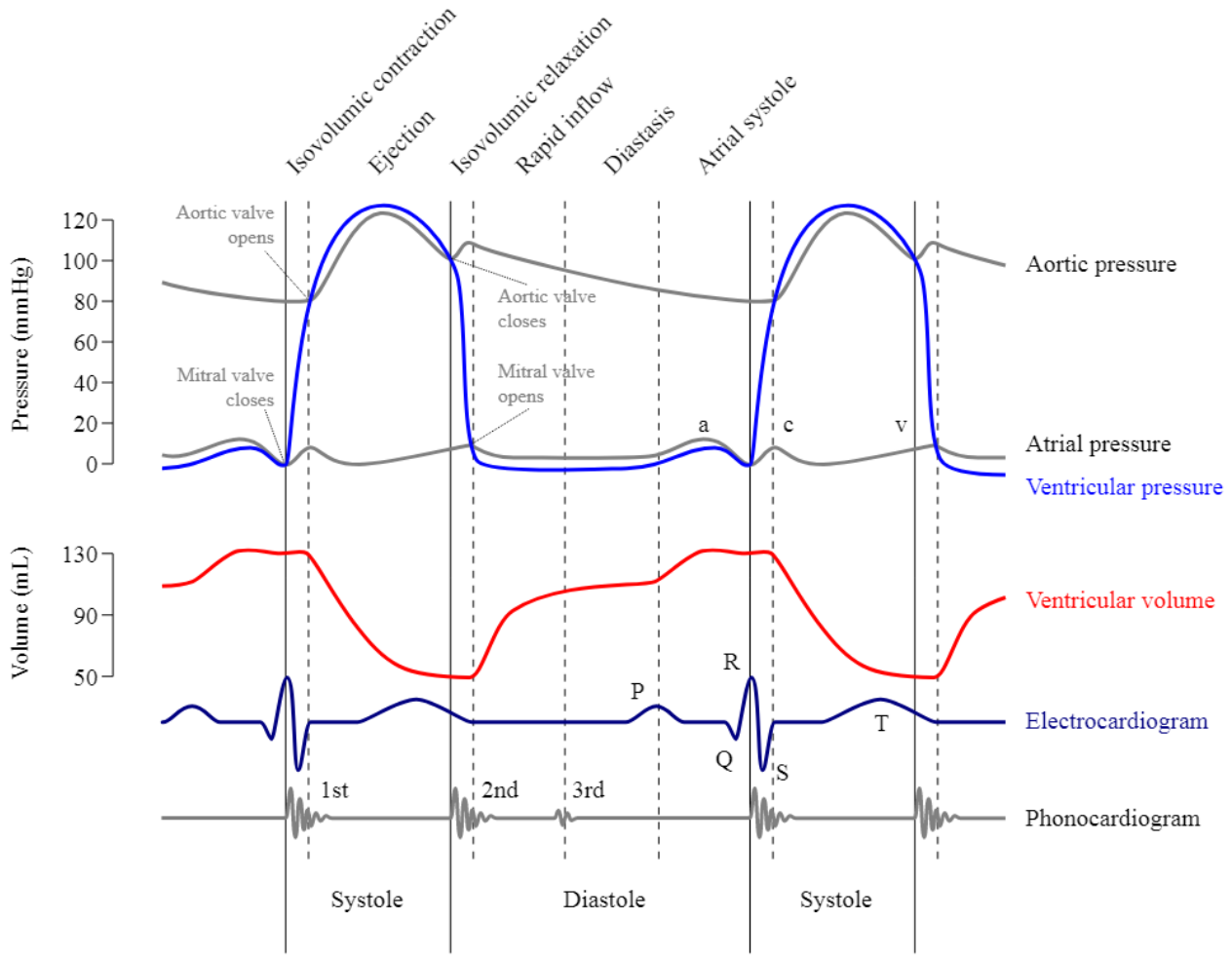
Auscultatory sites

- There are four important areas used for listening to heart sounds.
- These are:
  - Aortic area→ 2nd intercostal space to the right of the sternum
  - Pulmonic area→ 2nd intercostal space to the left of the sternum
  - Tricuspid area→ 5th intercostal space to the left of the sternum
  - Mitral Area (Apex) → The intersection of the 5th intercostal space with the midclavicular line



http://www.stethographics.com/heart/main/sites.htm

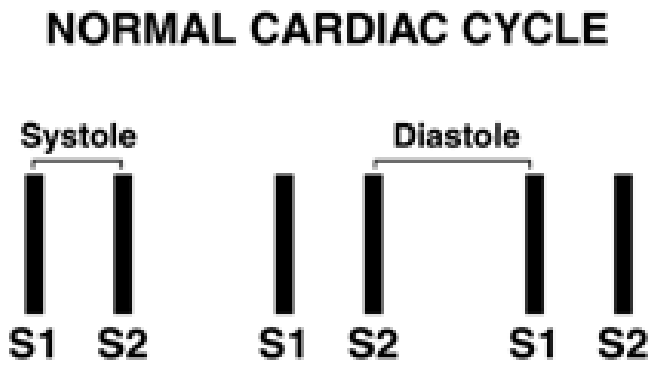
What are we listening for?

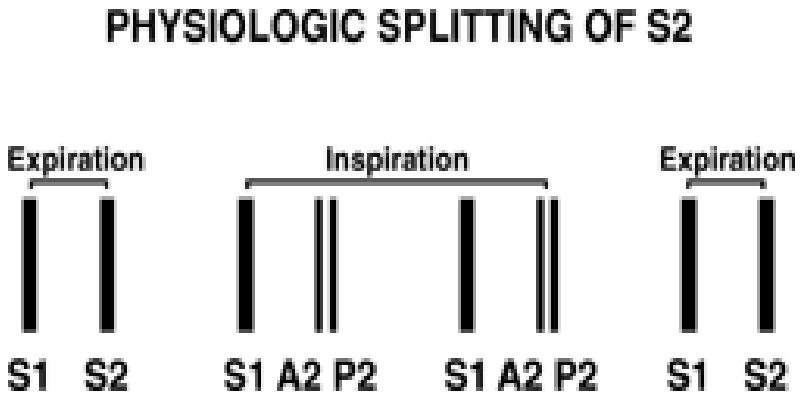


- **Normal valve closure** creates **sound**
- **First** Heart Sound = **S1**→ closure of **Mitral, Tricuspid** valves
- **Second** Heart Sound = **S2**→ closure of **Aortic, Pulmonic** valves

What are we listening for?

- **Systole** =time **between S1** & **S2**;
- **Diastole** = time **between S2** & **S1**
- Normally, **S1** & **S2 = distinct** sounds
- **Physiologic splitting** =S2 components of second heart sound (**Aortic** & **Pulmonic** valve closure) **audible with inspiration**





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- Charlie Goldberg, Exam of the CVS, images on ppt
- https://www.slideshare.net/AryaAnish/pulse-abnormal-findings-59418571
- https://www.amboss.com/us/knowledge/Cardiovascular_examination
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Thank you…