

Clinical Examination of Cardiac Patients

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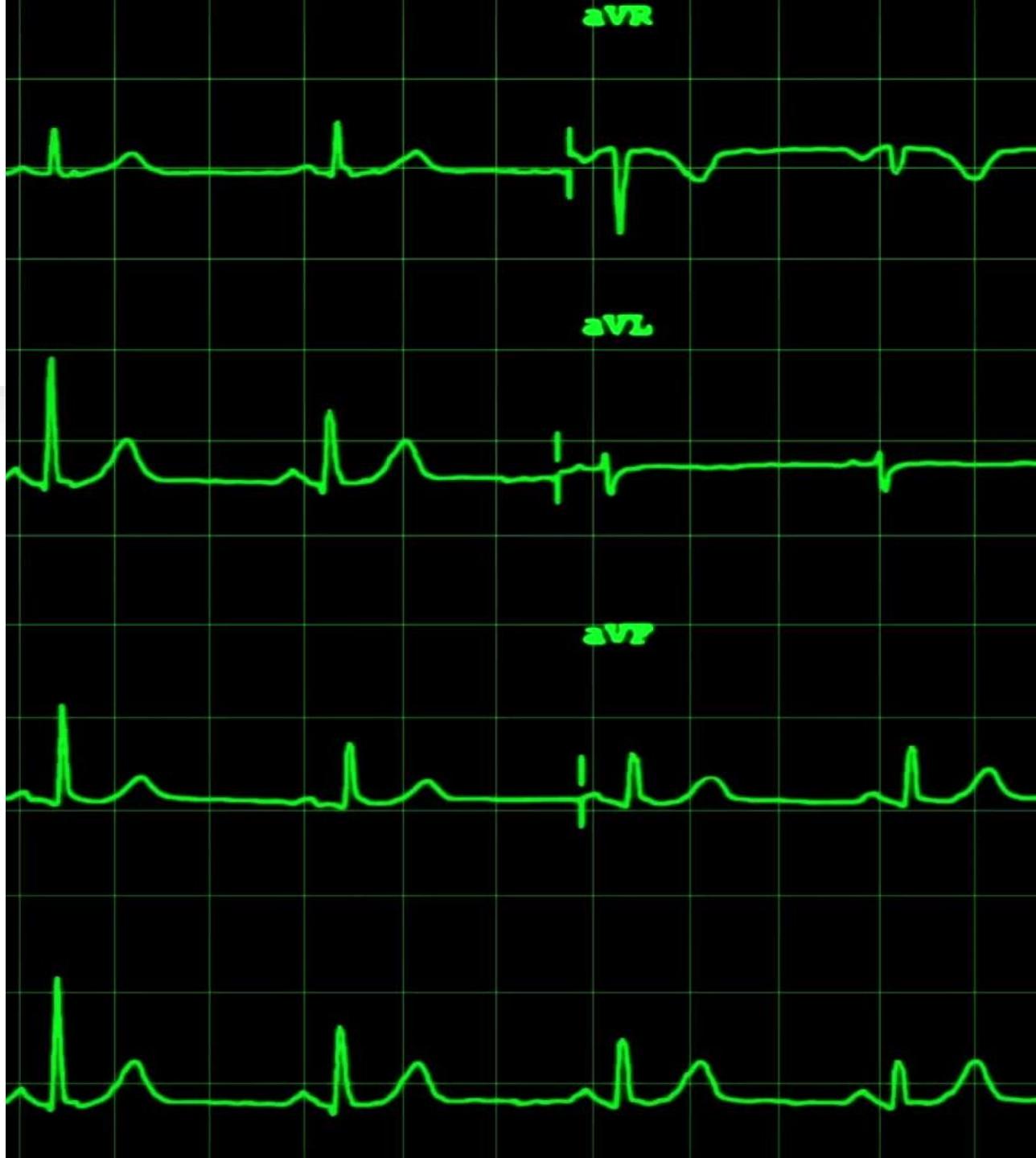
- Department of Internal Medicine, Merit University

2025



Introduction

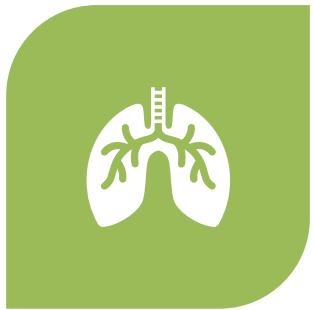
- Cardiac examination is an essential part of systemic examination.
- Aims to detect signs of heart disease through physical findings.
- Always begin with: General inspection → Hands → Face → Precordium.



General Inspection



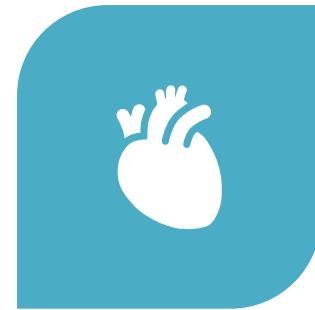
OBSERVE THE PATIENT'S
GENERAL APPEARANCE:



DYSPNEA, CYANOSIS,
PALLOR, PERIPHERAL
EDEMA.



POSITION: ORTHOPNEA
(PATIENT SITTING
FORWARD).



RESPIRATORY PATTERN:
CHEYNE-STOKES OR
LABORED BREATHING.

Hand Examination

Clubbing:
congenital heart
disease, infective
endocarditis.

Cyanosis:
peripheral or
central.

Tremor: due to
drugs (β -agonists).

Capillary refill
time: normal <2
sec.

Temperature: cold
in low output
states.

Face and Neck

Malar flush: mitral stenosis.

Central cyanosis:
congenital or
severe acquired
disease.

Eyes: xanthelasma
(hyperlipidemia).

Neck veins: jugular venous pressure (JVP).

Normal \leq 3 cm above sternal angle; raised in right heart failure.

Overview of Cardiovascular Examination

Local examination:

- Inspection

- Palpation

- Percussion

- Auscultation

Inspection

Inspection rules

What to do: Visually examine the patient for color, size, shape, symmetry, and movement.

What to use: Your eyes and sense of smell.

When to do it: First, but can be done at any time during the exam.

Palpation

Palpation rules

What to do: Touch the patient with different parts of your hands and varying degrees of pressure to check for texture, temperature, moisture, tenderness, size, and shape.

When to do it: Usually after inspection, but before percussion and auscultation, unless it's the abdomen.

Important: Palpate tender areas last.

Percussion

Percussion rules

What to do: Tap on specific areas of the body to listen for sounds that can reveal the consistency of the underlying organs.

When to do it: Usually after palpation, but before auscultation for most body systems.

Methods: Percussion can be done directly or indirectly.

Figure 2
Technique
for indirect
chest percussion



Auscultation

Auscultation rules

What to do: Listen to internal body sounds with a stethoscope.

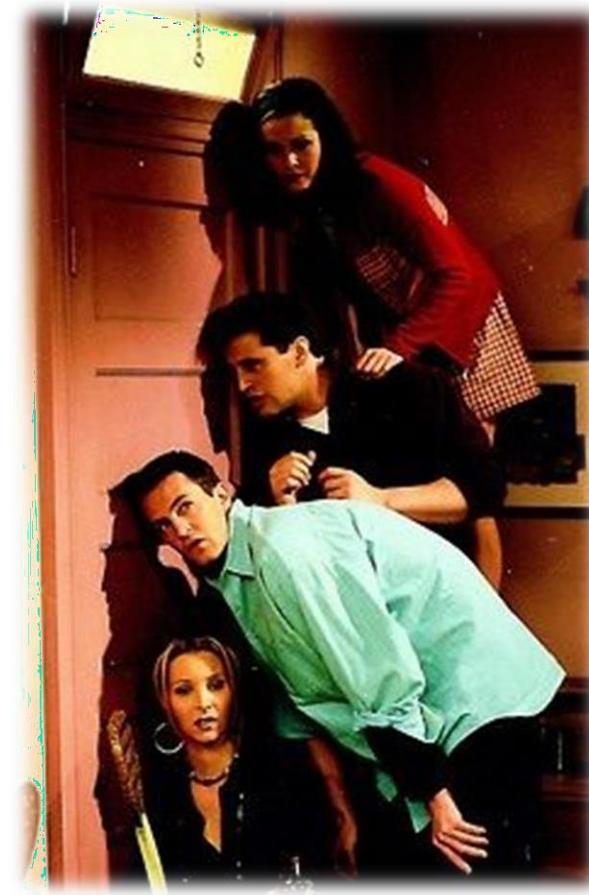
When to do it: After inspection, but before palpation and percussion for most body systems.

Important: Perform in a quiet environment to avoid interference.

Local cardiac Examination



Palpation(Which chamber enlarged?)



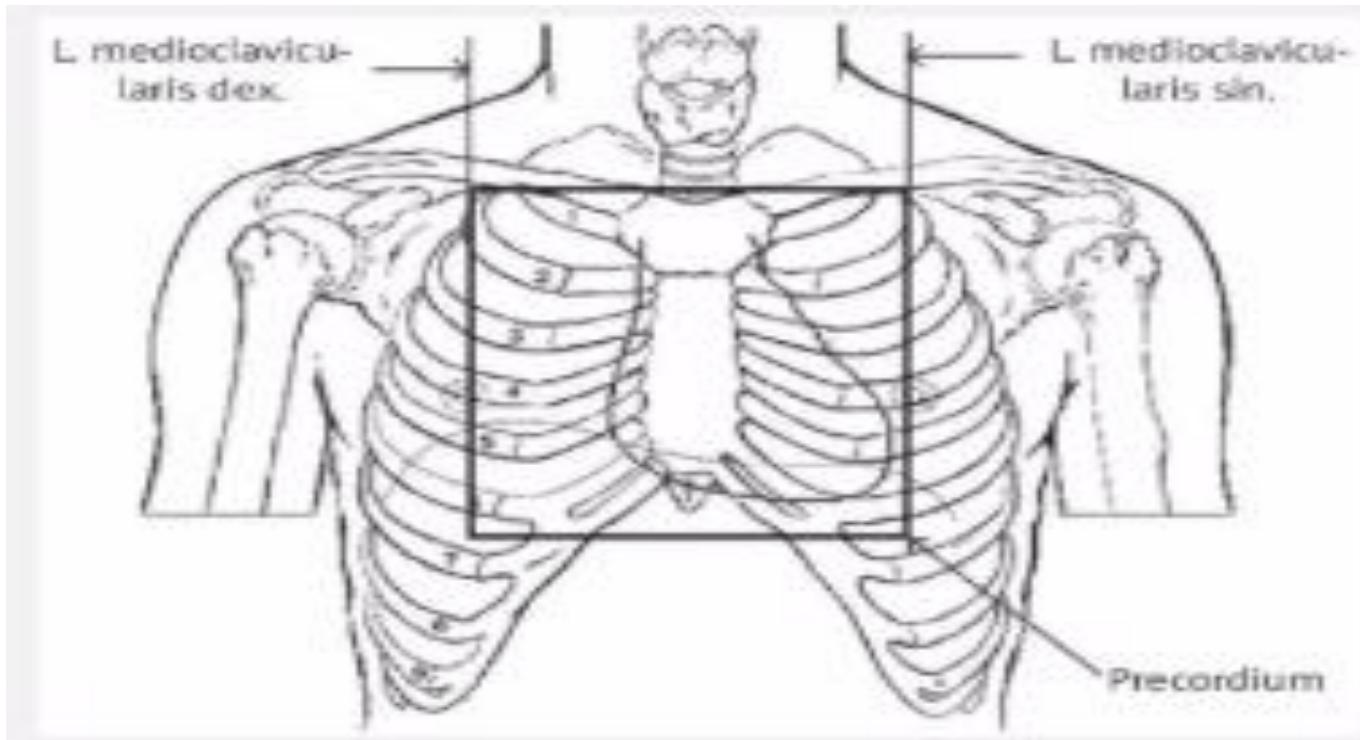
Auscultation (Which valve affected?)

Preparation and Positioning

- Patient in 45° semirecumbent position
- Ensure adequate exposure (chest visible from clavicle to upper abdomen)
- Use good lighting
- Maintain privacy and warmth

What is precordium?

- It is the area of the chest wall that is related to the heart

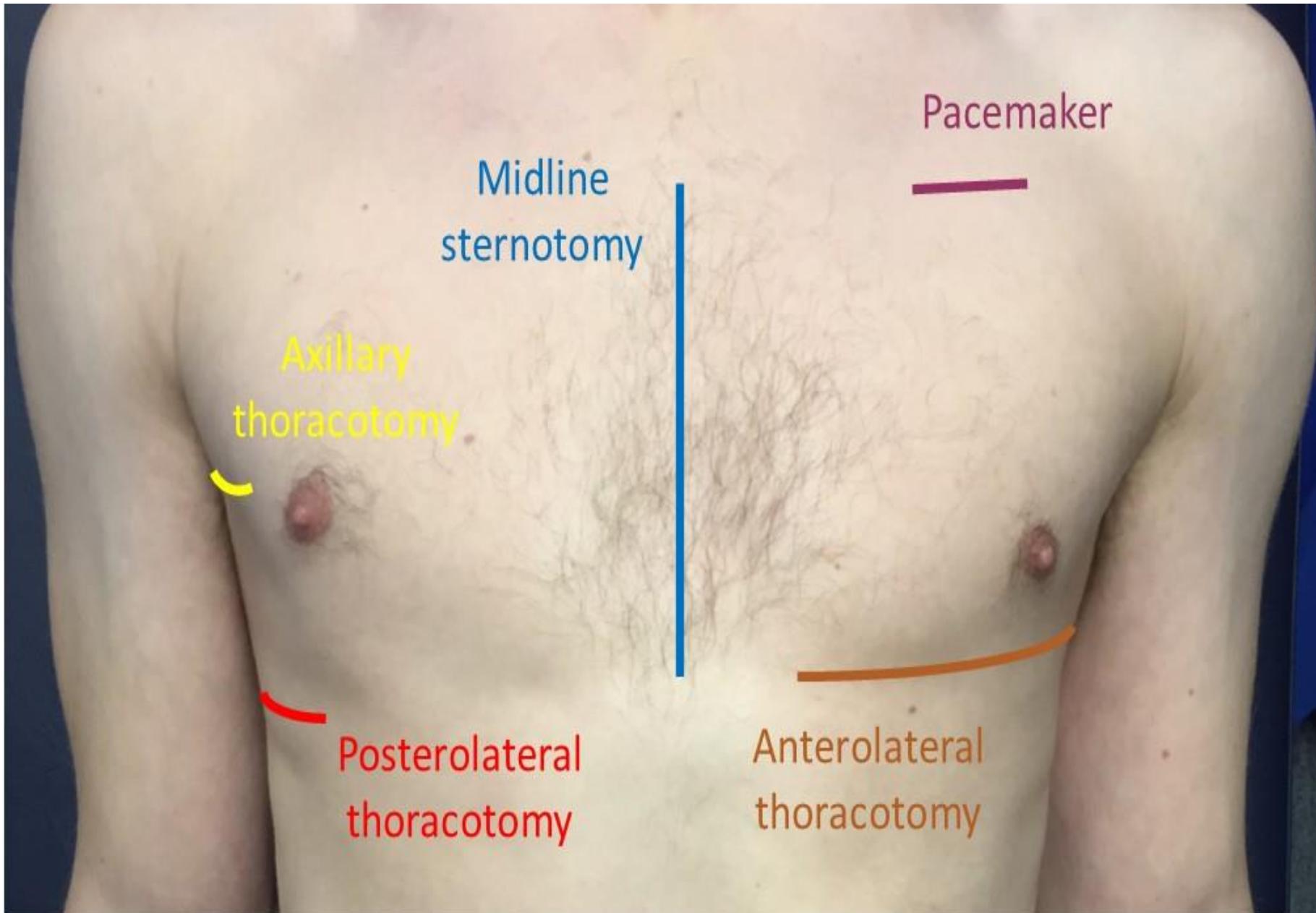


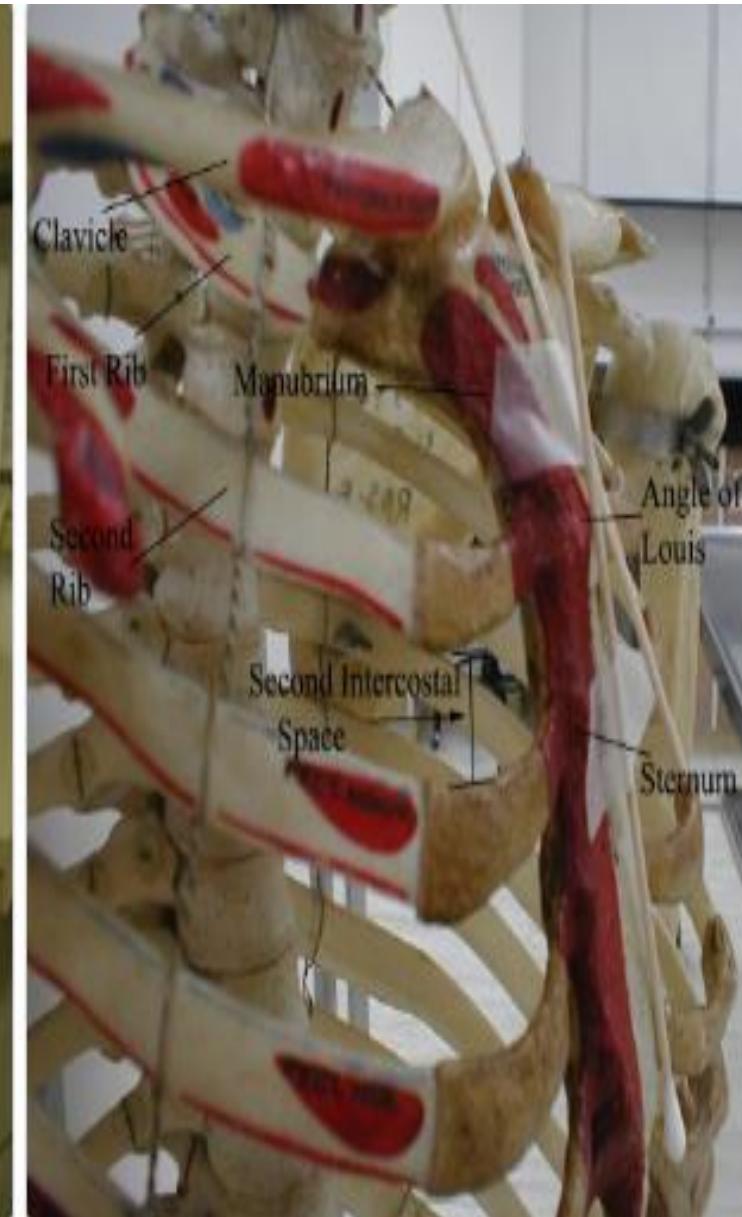
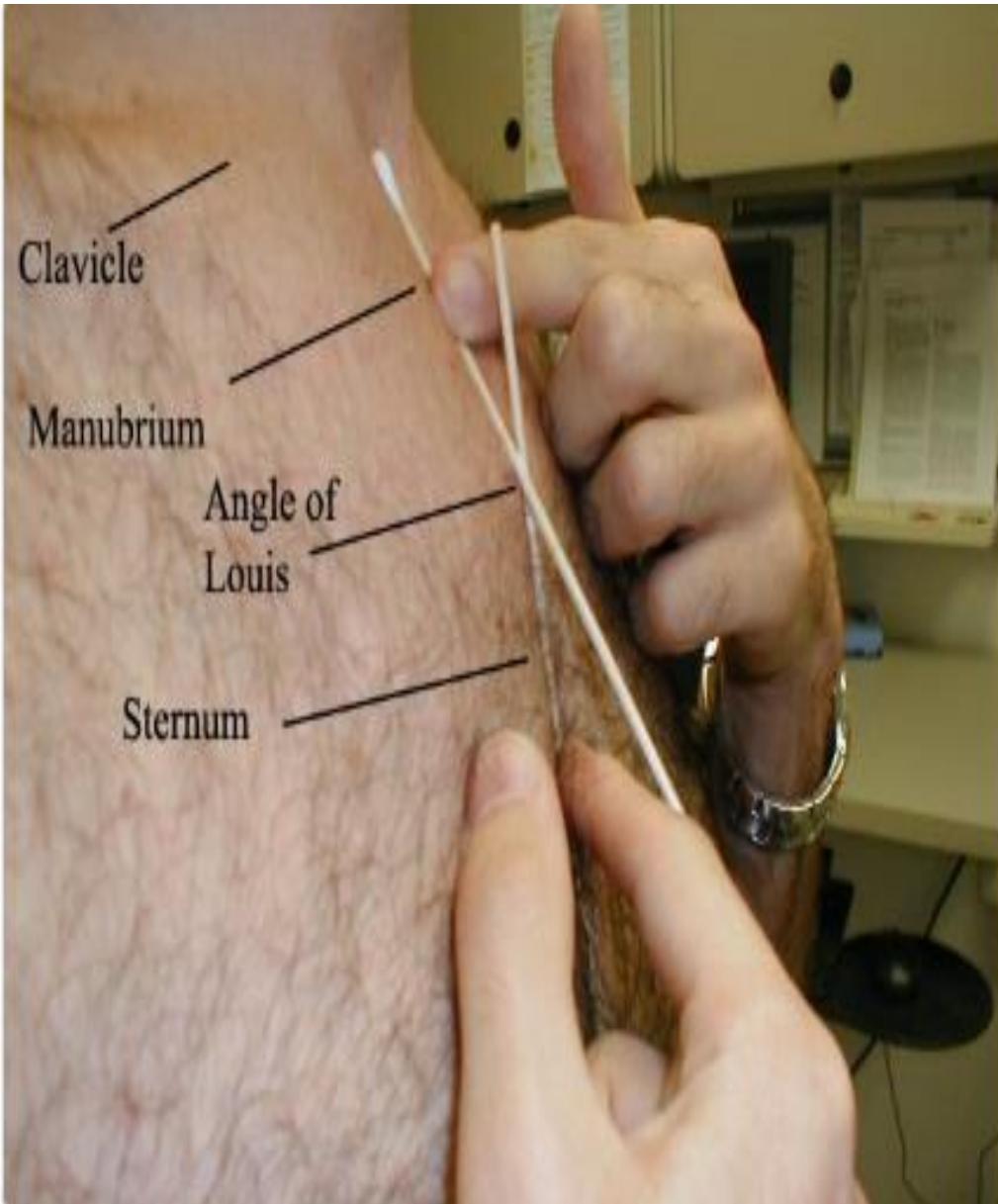
Inspection – Precordium

- Scars (cardiac surgery, pacemaker)

- Chest deformities (pectus excavatum, kyphoscoliosis)

- Visible pulsations – apex beat, parasternal or suprasternal pulsations





Inspection



Precordial bulge
(Congenital heart diseases)



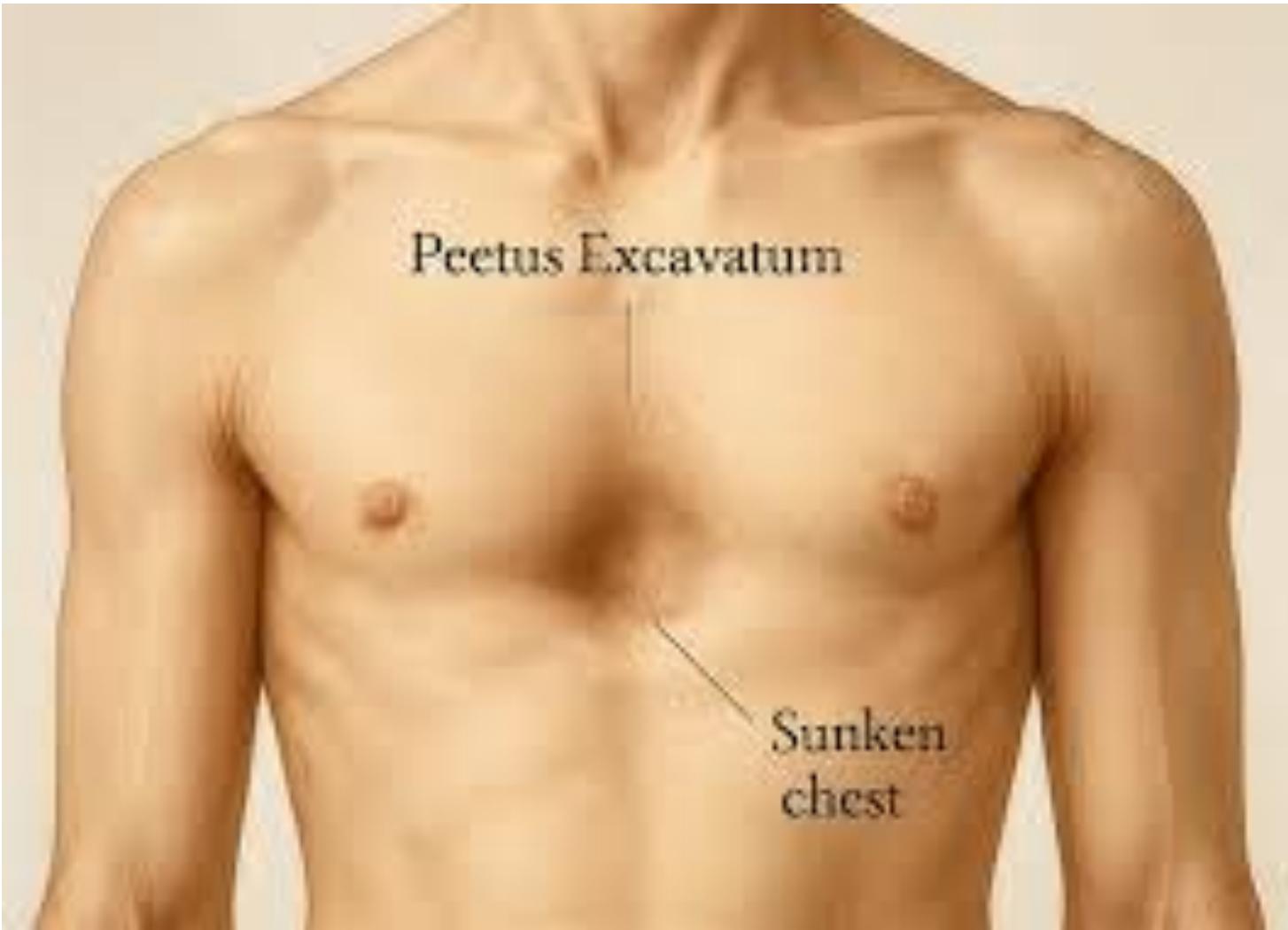
Scar
(CABG, Valve) surgery



Modern era
Minimal invasive

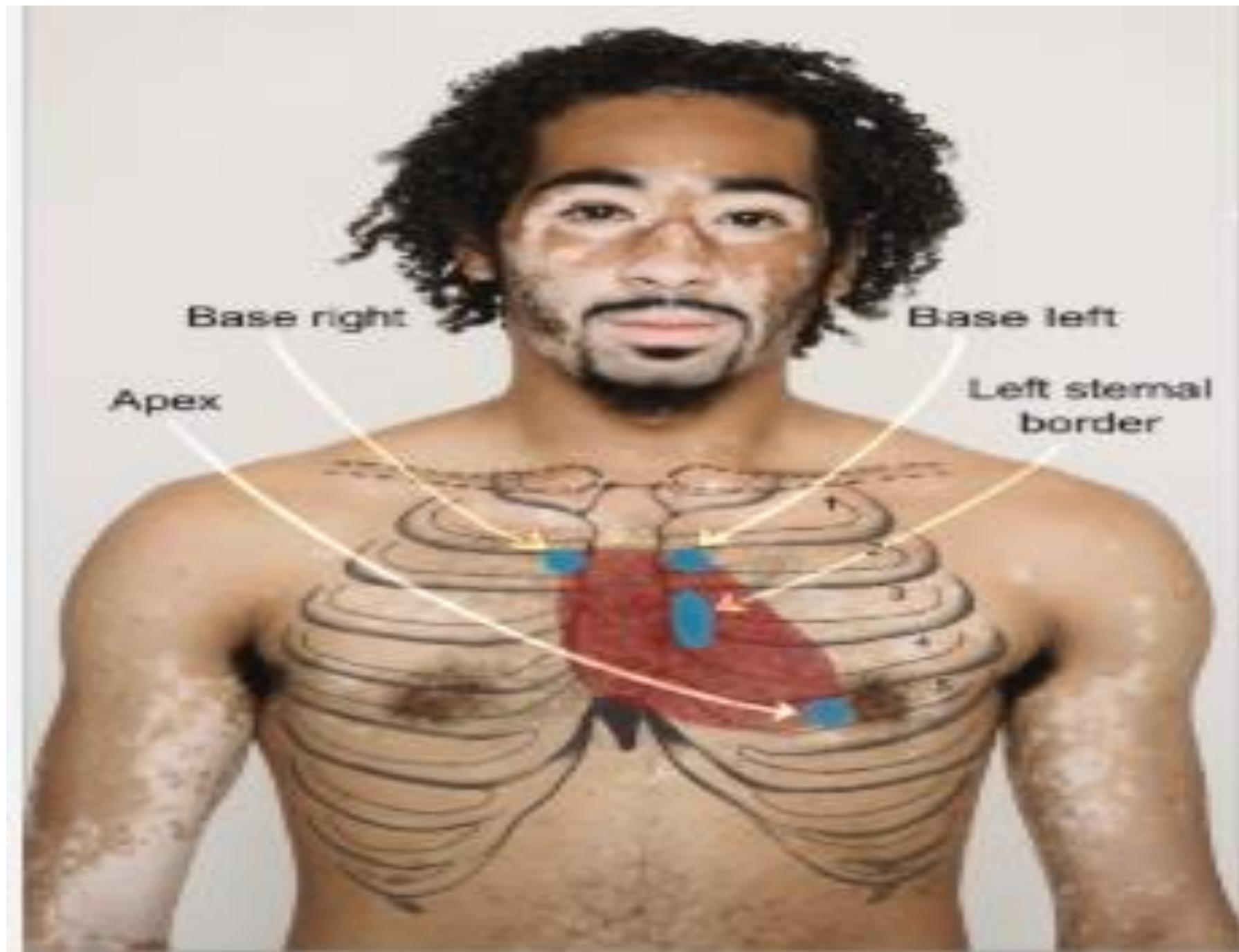


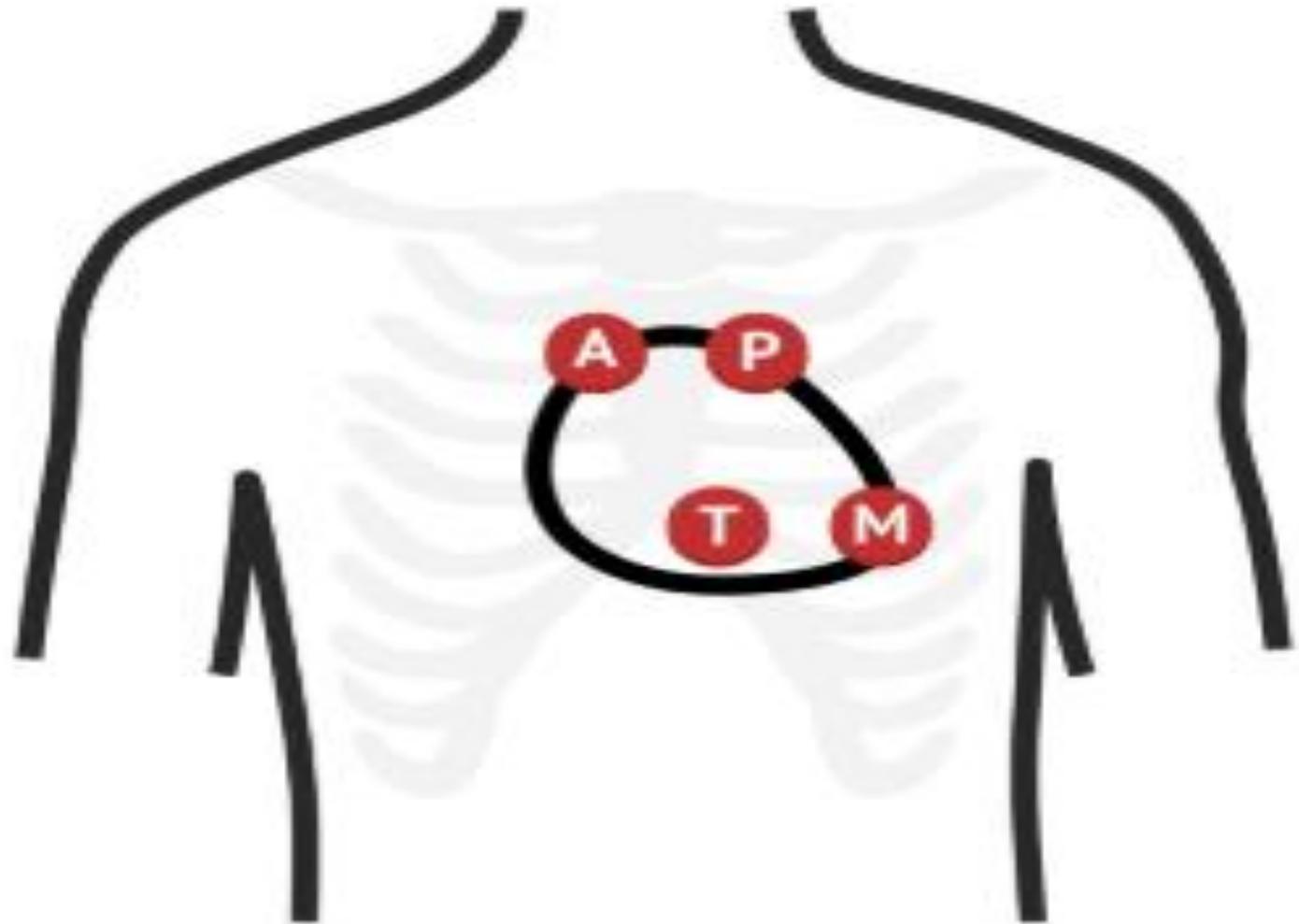
Dilated Vein
SVC obstruction

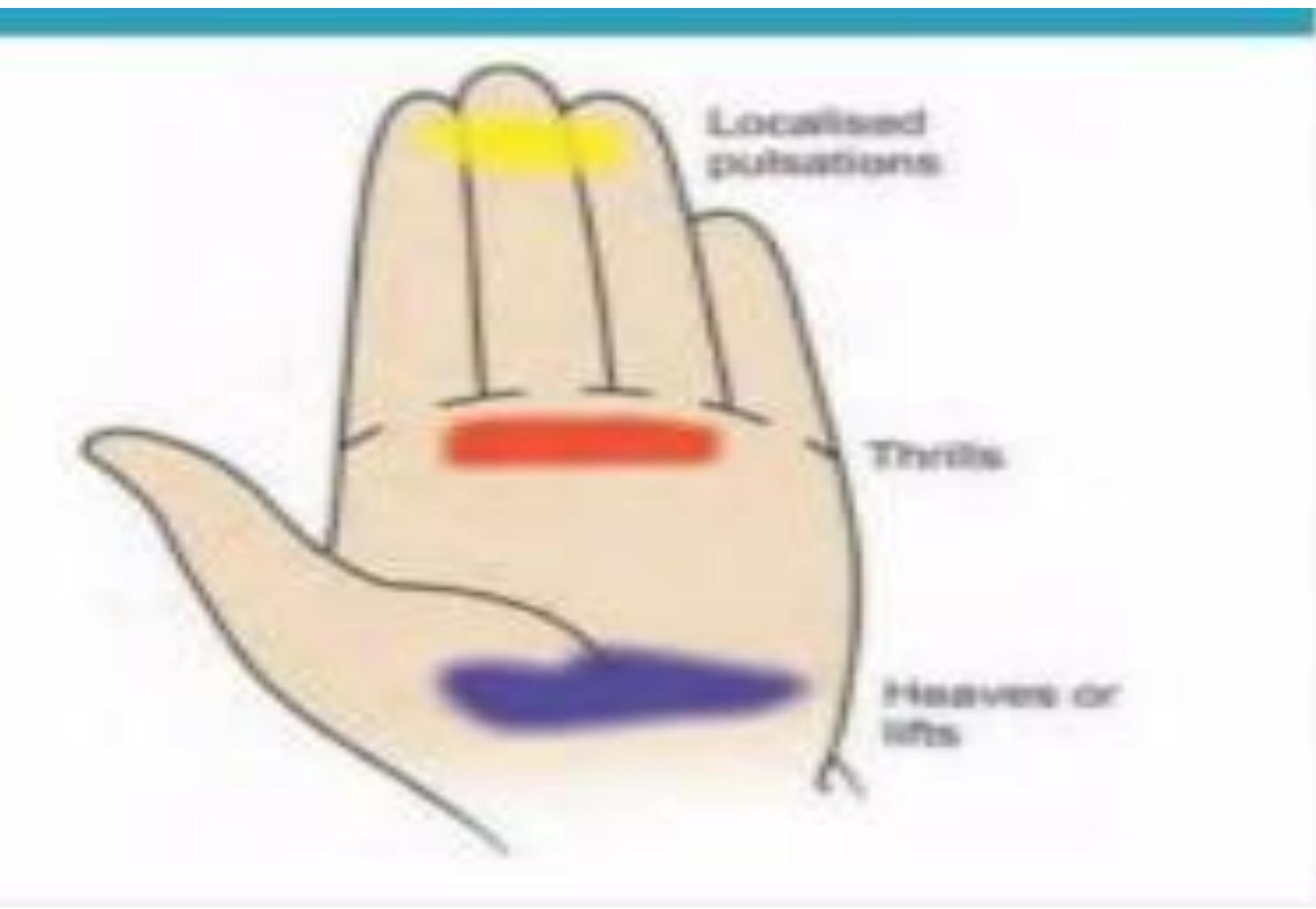


Palpation – Apex Beat

- Locate with flat hand → fingertips
- Note:
- - Site: 5th intercostal space, midclavicular line.
- - Character: tapping (MS), heaving (LVH), thrusting (volume overload).
- - Amplitude
- - Duration
- - Displacement: lateral/downward in cardiomegaly.









A



B

Palpation – Other Areas

- Parasternal area: heave → RV hypertrophy
- Thrills: palpable murmurs
 - Base – aortic/pulmonary stenosis
 - Apex – mitral regurgitation



Pulsation

- A general term for the rhythmic throbbing of a blood vessel. In the context of a cardiac exam, it can refer to the normal apical impulse, which is the point where the heart's contraction is most strongly felt against the chest wall.
- **Abnormal pulsations:** These can be more forceful, sustained, or displaced than normal, and their characteristics can suggest conditions like left ventricular hypertrophy or dilation.

thrill

- **Definition:**
 - A palpable, vibration-like sensation on the chest wall that feels like a "purr".
- **Cause:**
 - A thrill is the palpable sign of a loud heart murmur, which is caused by turbulent blood flow through the heart valves or across a septal defect.
- **Location:**
 - A thrill's location can help identify the underlying cardiac abnormality. For example, a systolic thrill in the second right intercostal space suggests aortic stenosis.

Heave

- **Definition:** A lifting or heaving sensation on the chest wall.
- **Cause:** A heave is typically associated with right ventricular hypertrophy, which can be caused by conditions like pulmonary hypertension or certain valve issues. It is caused by the enlarged ventricle pushing outward with each beat.
- **Location:** A "parasternal heave" is often felt to the left of the sternum in the lower chest and is a sign of right ventricular enlargement.

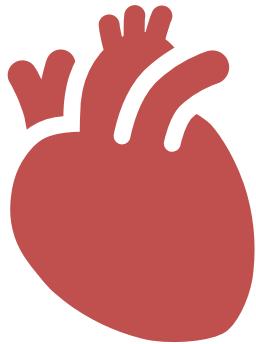
Comment on apex pulse

- 1. site (normal, shifted out (right ventricle apex), shifted out and down (left))
- 2. localized (surface area of 2 fingers), diffuse (> 2 fingers)
- 3. character (heaving or hyperdynamic)
- 4. thrills (and their timing)

Percussion

- Not commonly used today (limited accuracy)
- Used to estimate cardiac borders
- Start from lateral chest toward dullness
- Right border: 1 cm right of sternum
- Left border: near apex beat

Percussion – Interpretation



- Enlarged cardiac dullness:
cardiomegaly, pericardial effusion



- Shift of cardiac dullness: mediastinal shift (effusion, pneumothorax)

Auscultation – Heart Sounds

Areas: Aortic (2RICS), Pulmonary (2LICS), Tricuspid (LLSB), Mitral (apex).

S1: closure of AV valves;

S2: closure of semilunar valves.

S3: ventricular filling (heart failure).

S4: atrial contraction (LV hypertrophy).

Murmurs



Timing: systolic or diastolic.



Character: harsh, blowing, rumbling.



Location & radiation:



Aortic stenosis → to carotids.



Mitral regurgitation → to axilla.



Mitral stenosis → apex (rumbling).

Auscultation – Technique



- Use diaphragm and bell of stethoscope



- Listen in 4 main areas:



1. Mitral – 5th ICS, midclavicular line



2. Tricuspid – lower left sternal edge

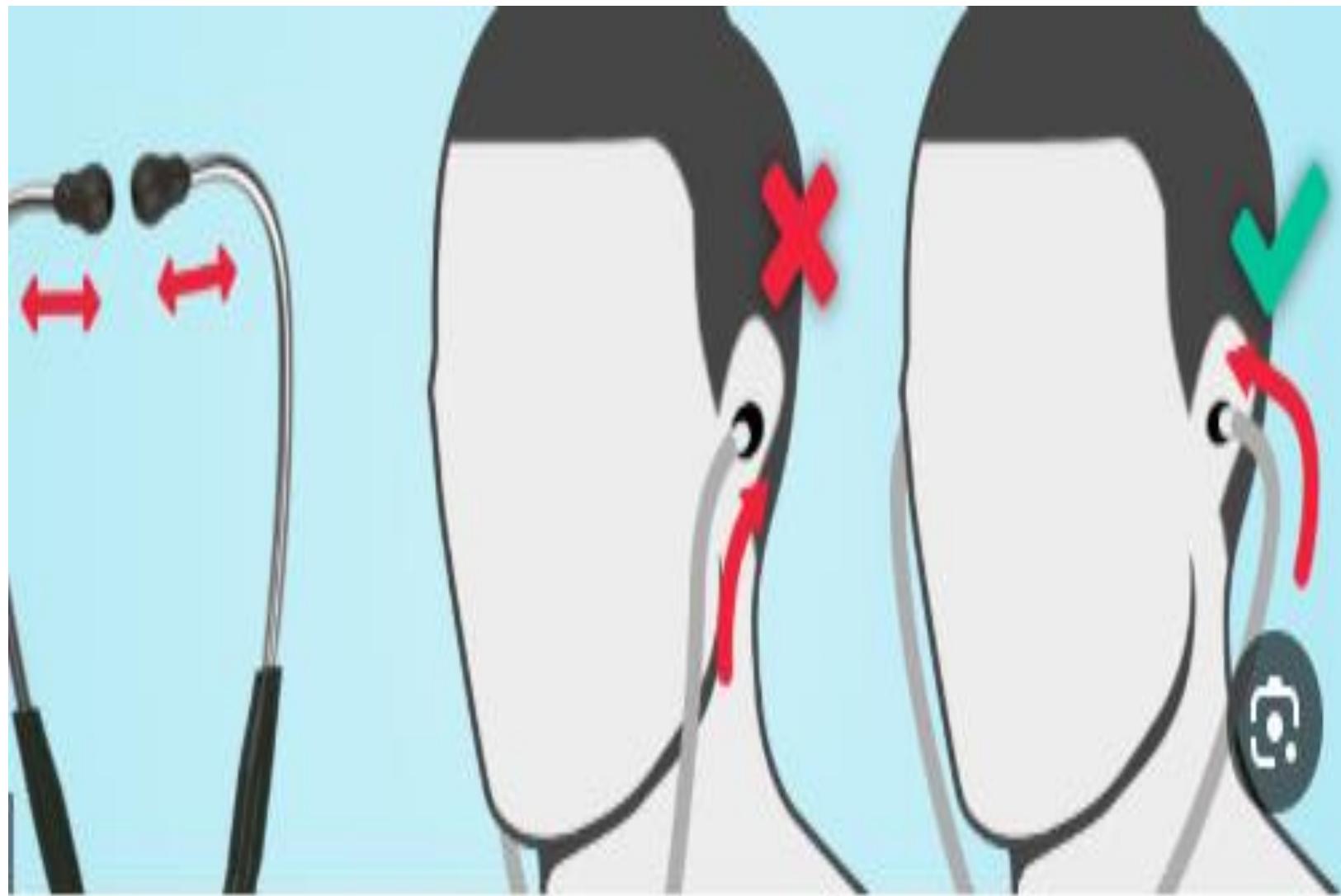


3. Pulmonary – 2nd left ICS

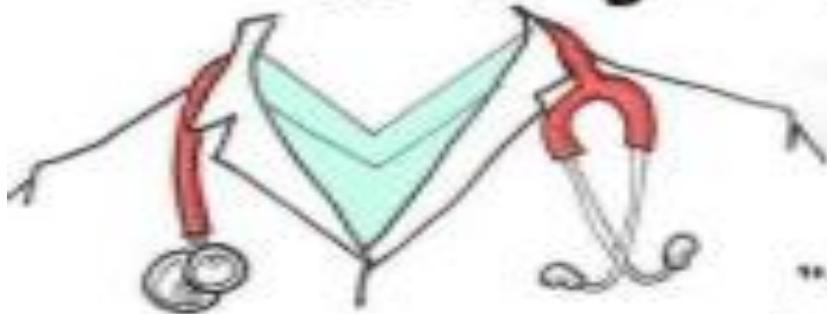


4. Aortic – 2nd right ICS





how do you tote your scope?

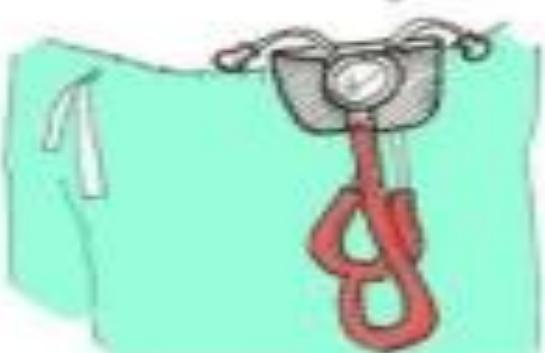


"the traditional"

"the 24 hour"



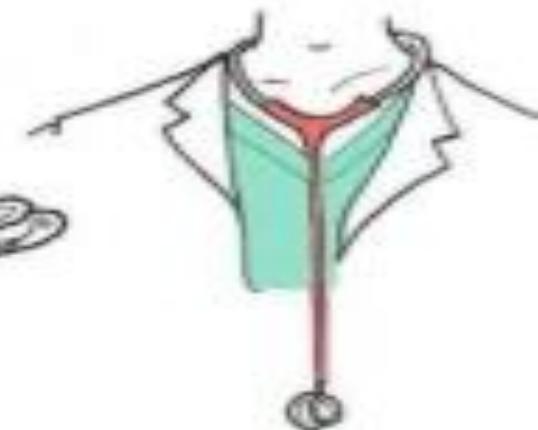
"the sophisticated attending"



"the adrenaline junkie"

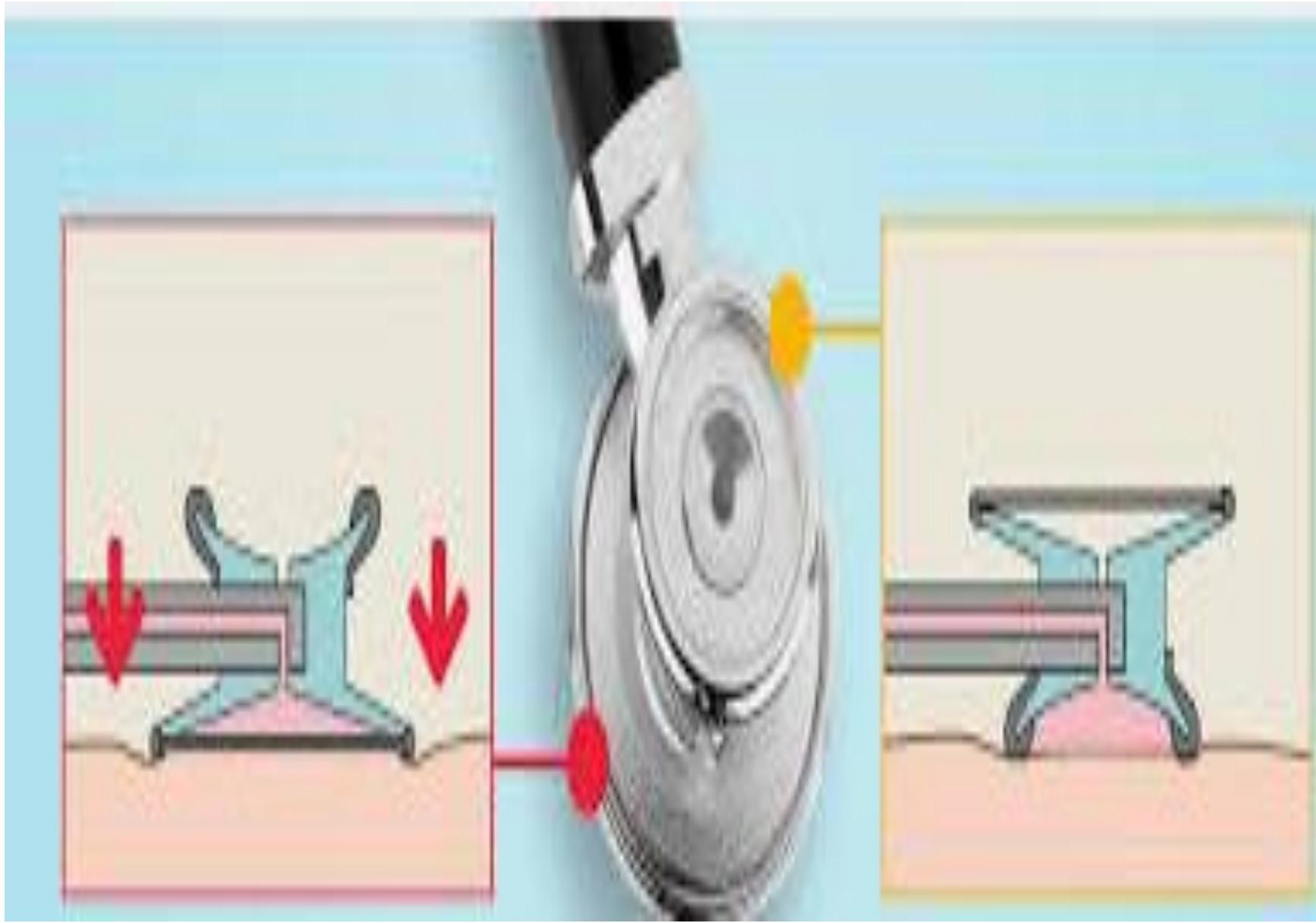


"the pretzel"



"the bolo tie"

natter





Normal Heart Sounds

- S1 – closure of mitral & tricuspid valves
- S2 – closure of aortic & pulmonary valves
- S3 – ventricular filling (normal in young)
- S4 – atrial contraction (pathological)

S1

- **Cause:** The closure of the mitral and tricuspid valves, which happens when the pressure in the ventricles becomes higher than the pressure in the atria.
- **Timing:** Marks the beginning of systole (ventricular contraction).
- **Acoustic Characteristics:** Often described as a "lub" sound, it is generally louder at the apex of the heart.

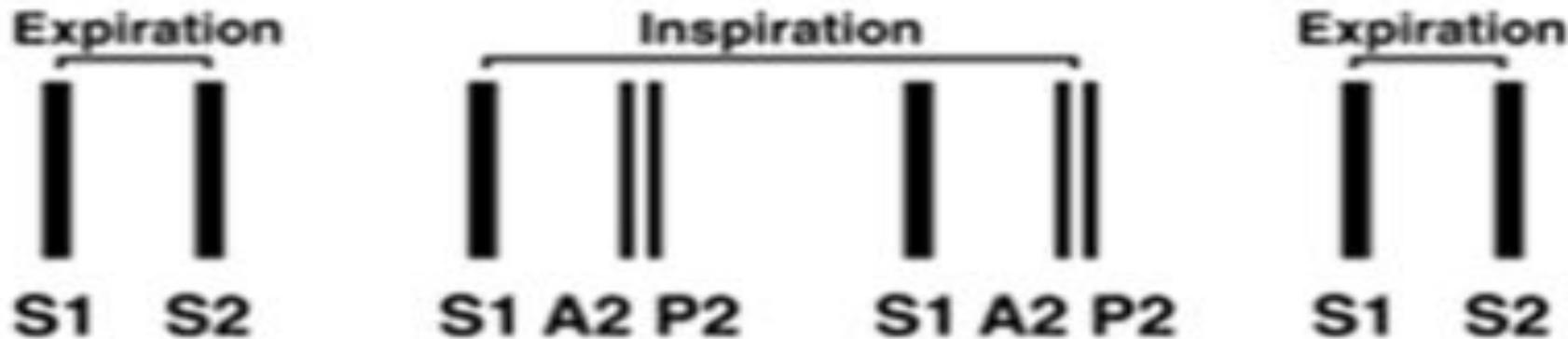
S2

- **Cause:** The closure of the aortic and pulmonary valves.
- **Timing:** Marks the beginning of diastole (ventricular relaxation).
- **Acoustic Characteristics:** Often described as a "dub" sound, it can be heard as a single sound or split into two components
- **Splitting:** The aortic valve usually closes before the pulmonary valve, leading to a slight split that widens during inspiration and narrows during expiration.

NORMAL CARDIAC CYCLE

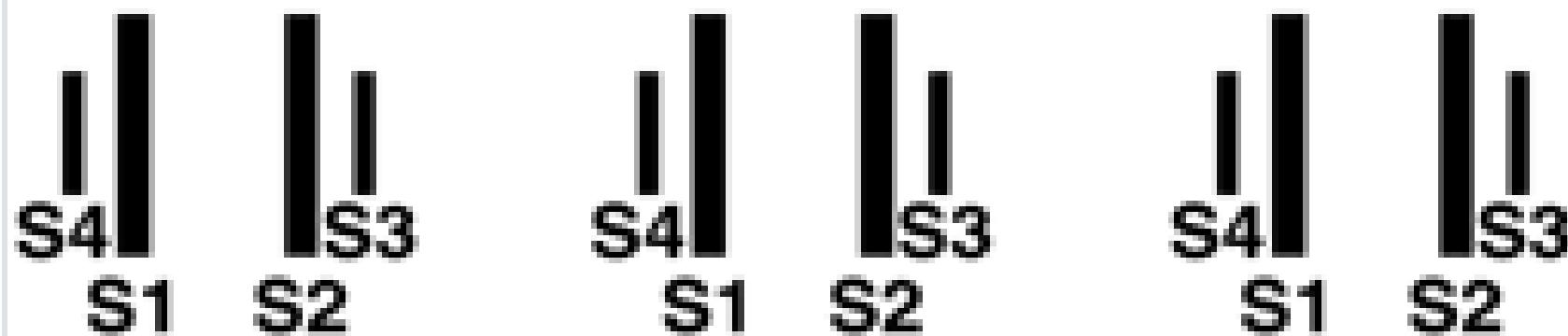


PHYSIOLOGIC SPLITTING OF S2



EXTRA HEART SOUNDS - S3 AND S4

Summation Gallop



Abnormal Heart Sounds

- Splitting of S2 – physiological or pathological
- Added sounds:
 - Clicks (valve disease)
 - Snaps (mitral stenosis)
 - Pericardial rub (pericarditis)

Murmer

- A medical murmur is an abnormal, whooshing, or swishing sound heard during a heartbeat, caused by turbulent blood flow through the heart or its valves.
- While often harmless (innocent murmurs), they can also indicate an underlying heart issue that requires further medical evaluation.

Causes of murmur

- **Innocent murmers:** These are common and harmless, especially in children, and don't indicate a heart problem. They are often caused by increased blood flow during times like exercise, pregnancy, or rapid growth.
- **Structural heart problems:** A murmur can be a sign of a more serious issue, such as a problem with the heart valves or a congenital heart defect.
- **Other health conditions:** Conditions like anemia or hyperthyroidism can also cause increased blood flow, leading to a murmur.

Description:

- **Timing:** Whether it occurs during systole (heart squeezing blood out) or diastole (heart filling with blood).
- **Intensity:** How loud it is, using a grading scale (e.g., Grade I to VI for systolic murmurs).
- **Pitch and quality:** The tone and quality of the sound.
- **Significance:** Can be benign (especially common in children and during pregnancy) or a sign of a heart condition. A doctor will look for other signs to determine the cause, such as a "thrill," which is a palpable vibration associated with louder murmurs (Grade 4 or higher).

Maneuver	How it affects the heart	What it accentuates
Sitting up and leaning forward	Brings the heart closer to the chest wall.	Aortic regurgitation (loudest when the patient holds their breath in expiration).
Left lateral decubitus position	Moves the heart closer to the chest wall.	Mitral stenosis (best heard with the bell at the apex after the patient exhales).
Isometric handgrip	Increases afterload and peripheral resistance.	Ventricular septal defect (VSD), aortic regurgitation, and mitral regurgitation murmurs.
<u>Valsalva maneuver</u>	Increases intrathoracic pressure, which decreases venous return and left ventricular volume.	Mitral valve prolapse and hypertrophic obstructive cardiomyopathy murmurs.
<u>Release of Valsalva maneuver</u>	Increases venous return and ventricular volume after the maneuver is released.	Aortic stenosis and aortic regurgitation (after a few beats).
Squatting	Increases venous return and afterload.	Aortic regurgitation, aortic stenosis, and mitral regurgitation murmurs.
Breathing	Inspiration accentuates right-sided murmurs (e.g., tricuspid or pulmonic), while expiration accentuates left-sided murmurs (e.g., mitral or aortic).	Distinguishes between left-sided and right-sided murmurs.

Table 2. Levine's Grading of Heart Murmur.¹⁹

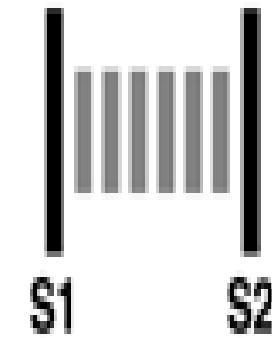
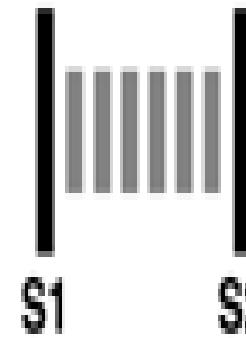
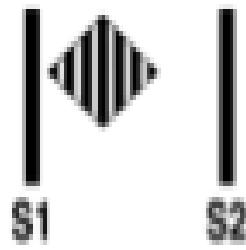
Grade	Description
Grade I	Very faint, may only be heard by an expert, not heard in all positions, no thrill
Grade II	Soft, heard in all positions, no thrill
Grade III	Moderately loud, no thrill
Grade IV	Loud and associated with a palpable thrill
Grade V	Very loud, with thrill, heard with the stethoscope partly off the chest
Grade VI	Loudest, with thrill, heard with the stethoscope entirely off the chest (just above the precordium, not touching the skin)

Murmurs

- • Systolic murmurs:
 - Aortic stenosis
 - Mitral regurgitation
- • Diastolic murmurs:
 - Aortic regurgitation
 - Mitral stenosis
- • Assess: timing, location, radiation, intensity, pitch

MITRAL REGURGITATION

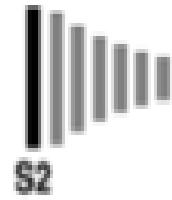
EARLY PEAKING MURMUR
Aortic Stenosis



AORTIC INSUFFICIENCY



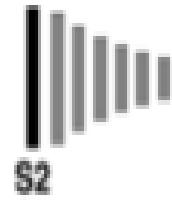
S1



S2



S1



S2

Additional Signs

Peripheral pulses: radiofemoral delay (coarctation).

BP measurement: both arms.

Edema & ascites: right heart failure.

Hepatomegaly: congestive heart failure.

Summary



Systematic approach: Inspection, Palpation, Percussion, Auscultation.



Integrate findings with history and investigations.



Examine in a quiet, well-lit environment.

References

- Macleod's Clinical Examination, 15th Edition.
- Talley & O'Connor, Clinical Examination, 9th Edition.
- Kumar & Clark, Clinical Medicine, 10th Edition.