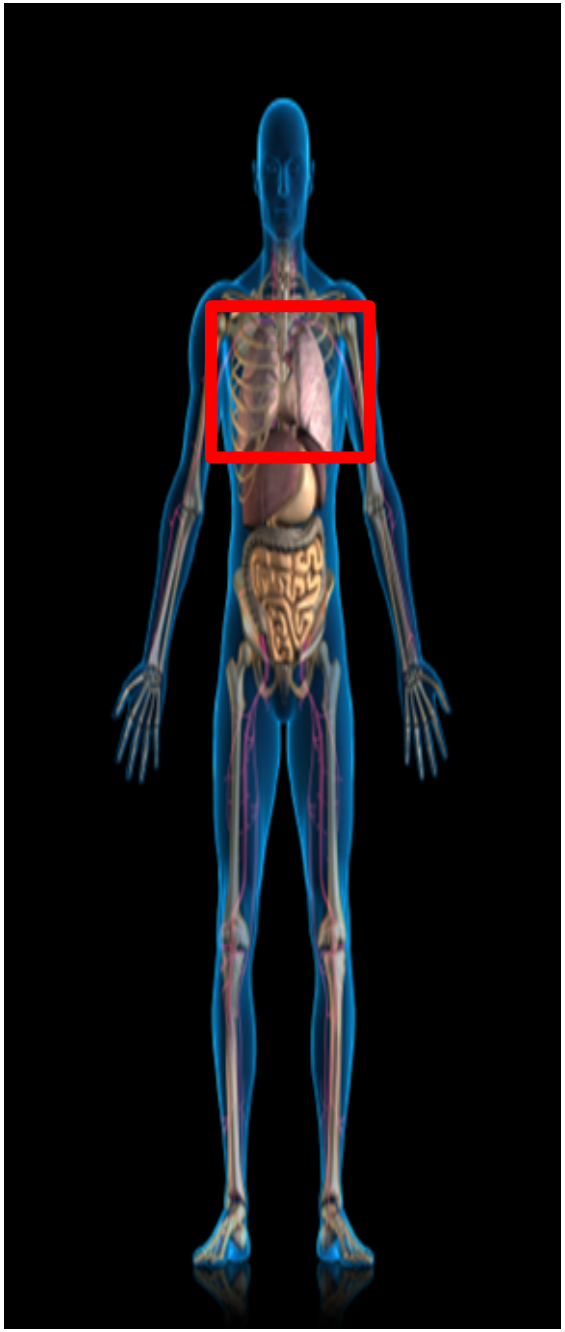
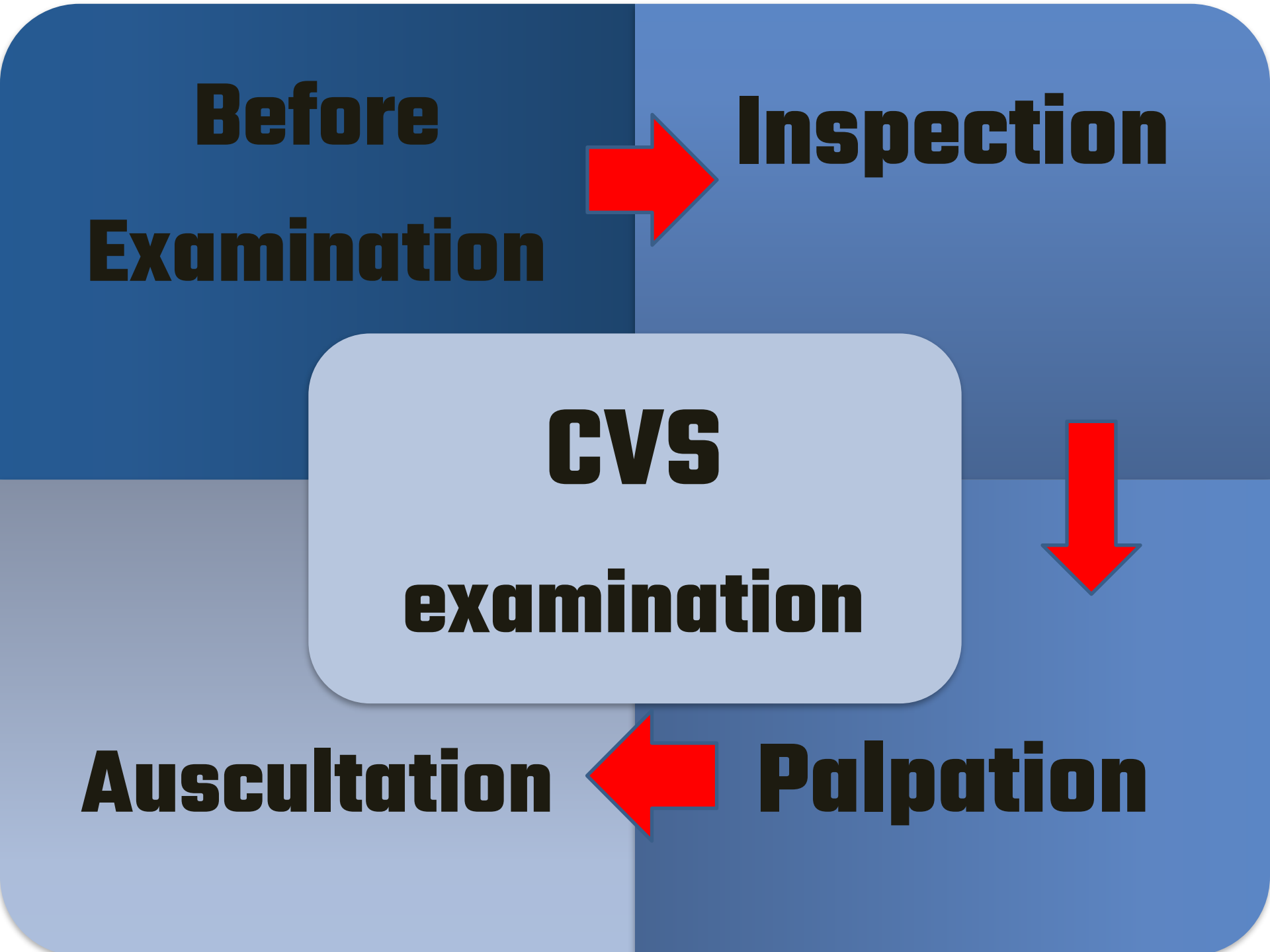


Precordium


Before Examination
Inspection
CVS examination
Palpation
Auscultation

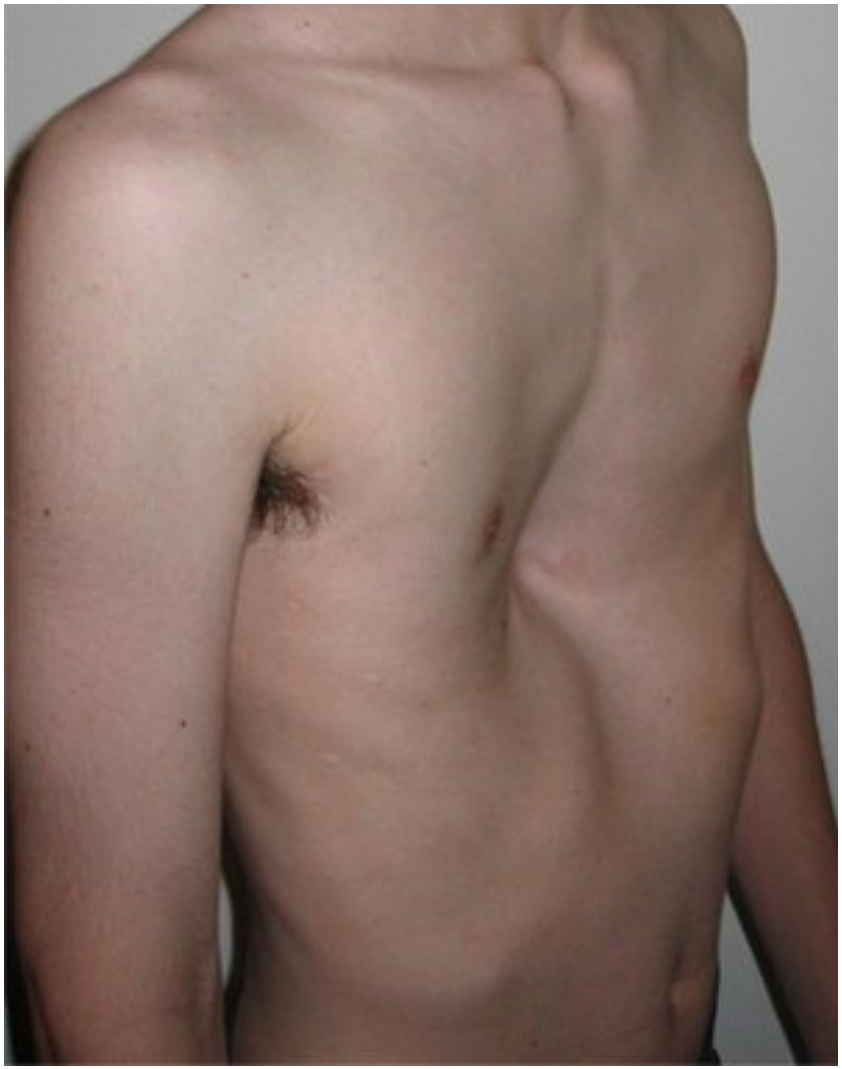
Before Examination

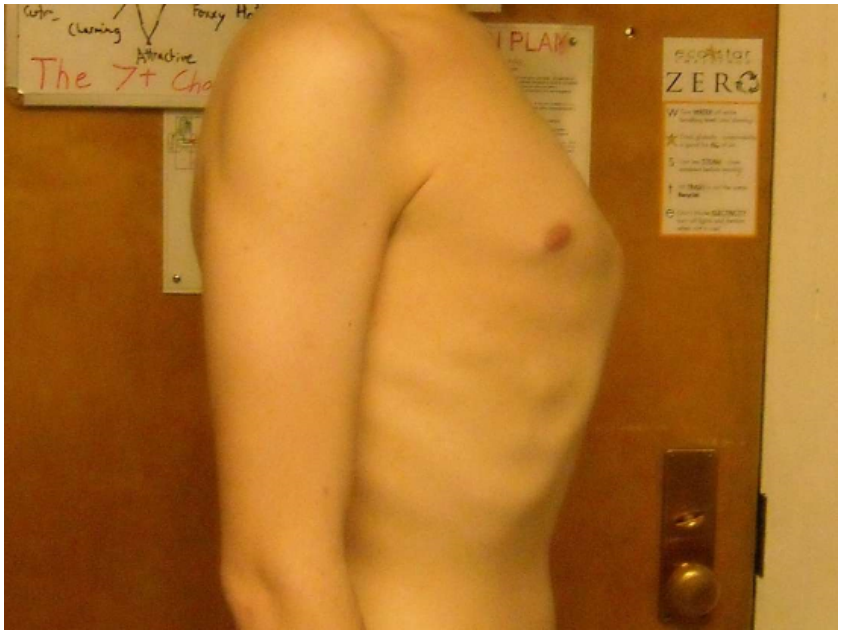
- Introduce your self
- Take permission
- Explain
- Privacy and ask for chaperon
- Good light
- Ideal Position
- Exposure

Inspection

From the foot of the pt:

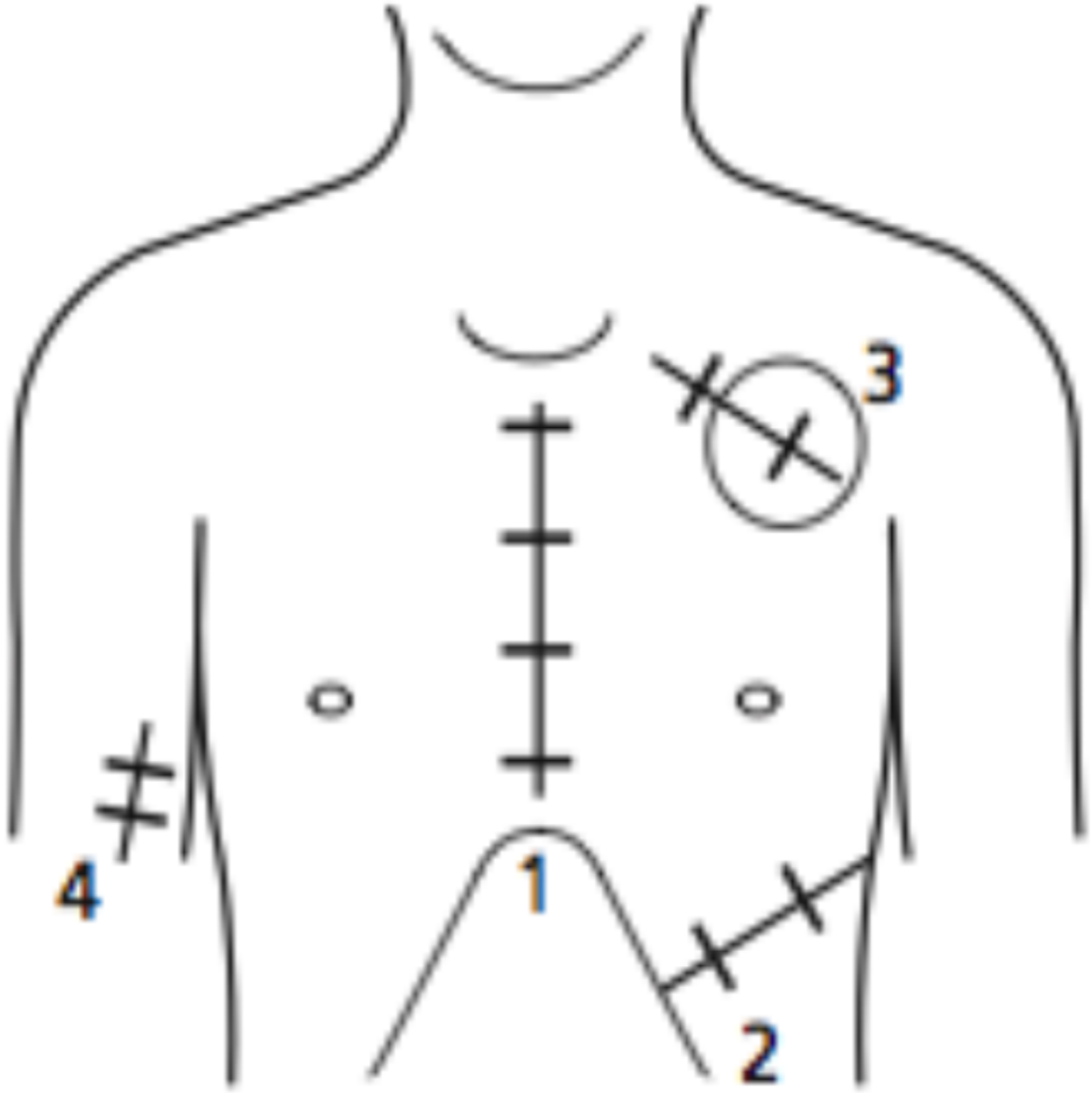
- Symmetry
- Deformity
- Moves with respiration




Attractive
The 7+
ZERO

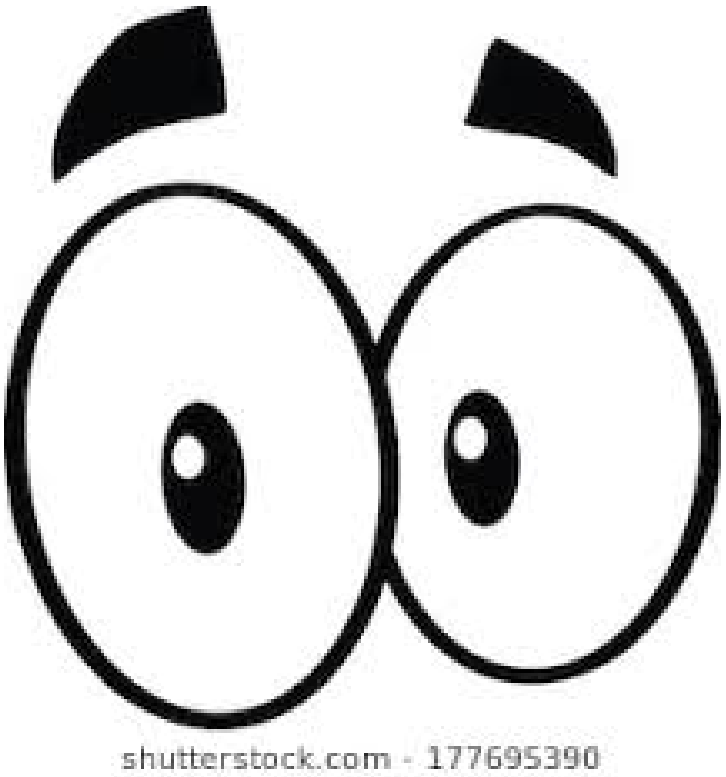
From the right side:

- Hair distribution
- Scars
- Dilated veins
- Visible pulsation and apex beat
- Skin lesions

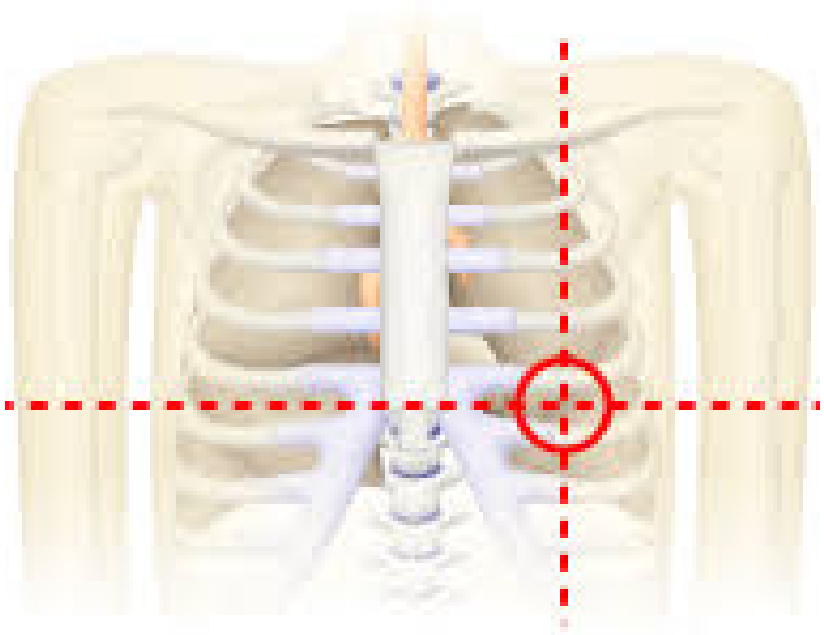

3
4
1
2

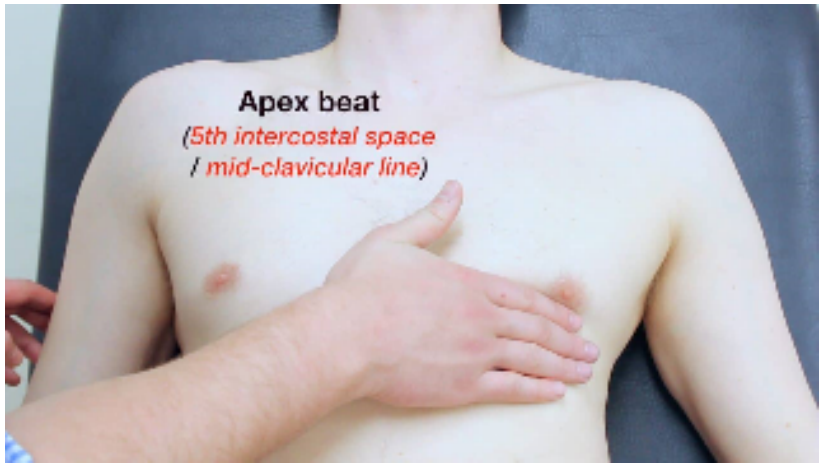
Palpation

- **Eye contact**
- **Ask about tender areas**



1. Apex beat position and character





- General palpation using flat of your right hand over the precordium for general impression, then locate it by your fingers lying parallel to ICS then locate with 2 fingers.
- If not palpable, roll the patient to the left side

** **Position**: Lt 5th ICS, mid-clavicular line

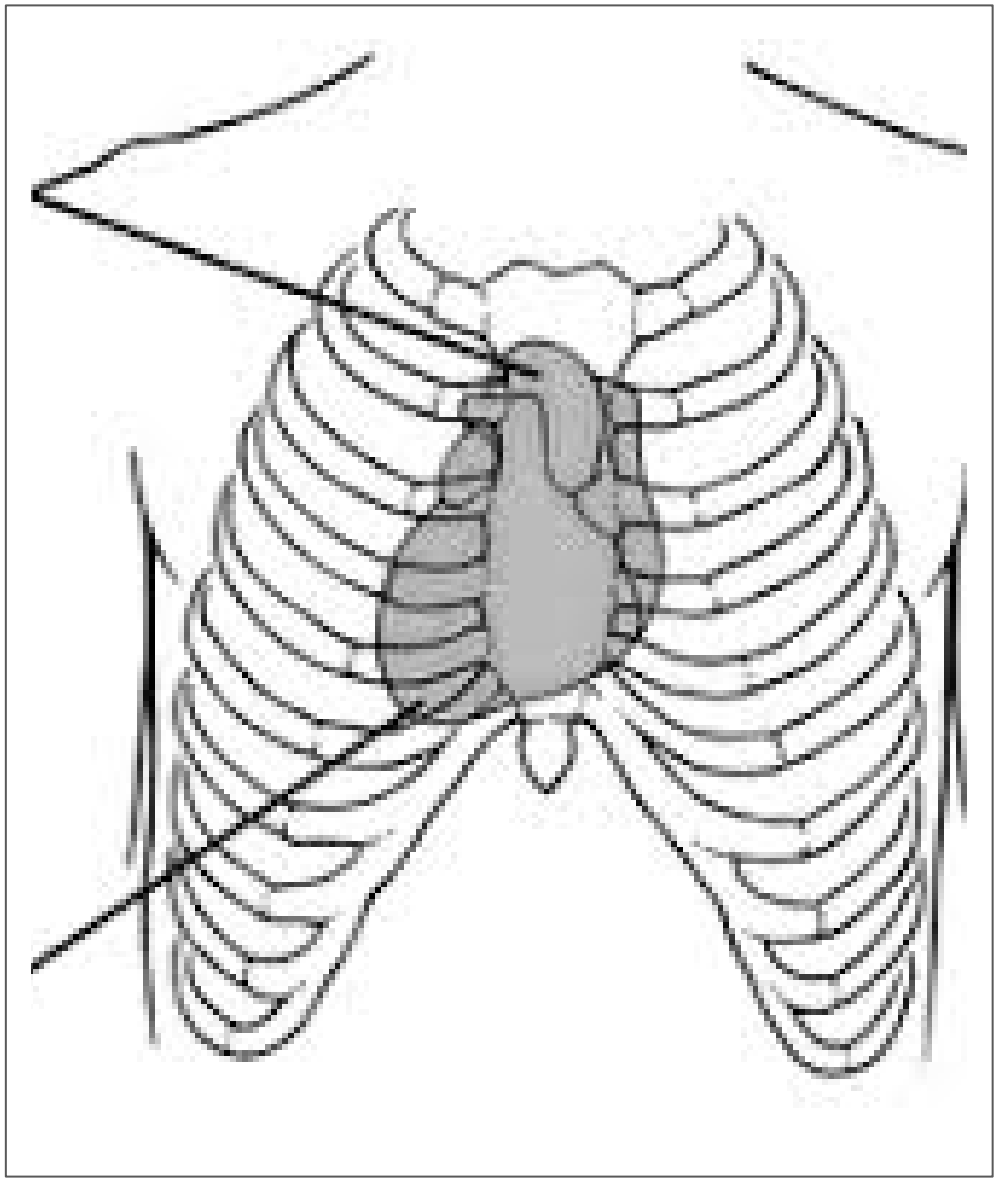
** **Character**: gentle tapping

Abnormal location of apex :beat

- Impalpable apex beat
- Displaced inferiorly and laterally
- Palpable on right side

Abnormal Character of apex beat:

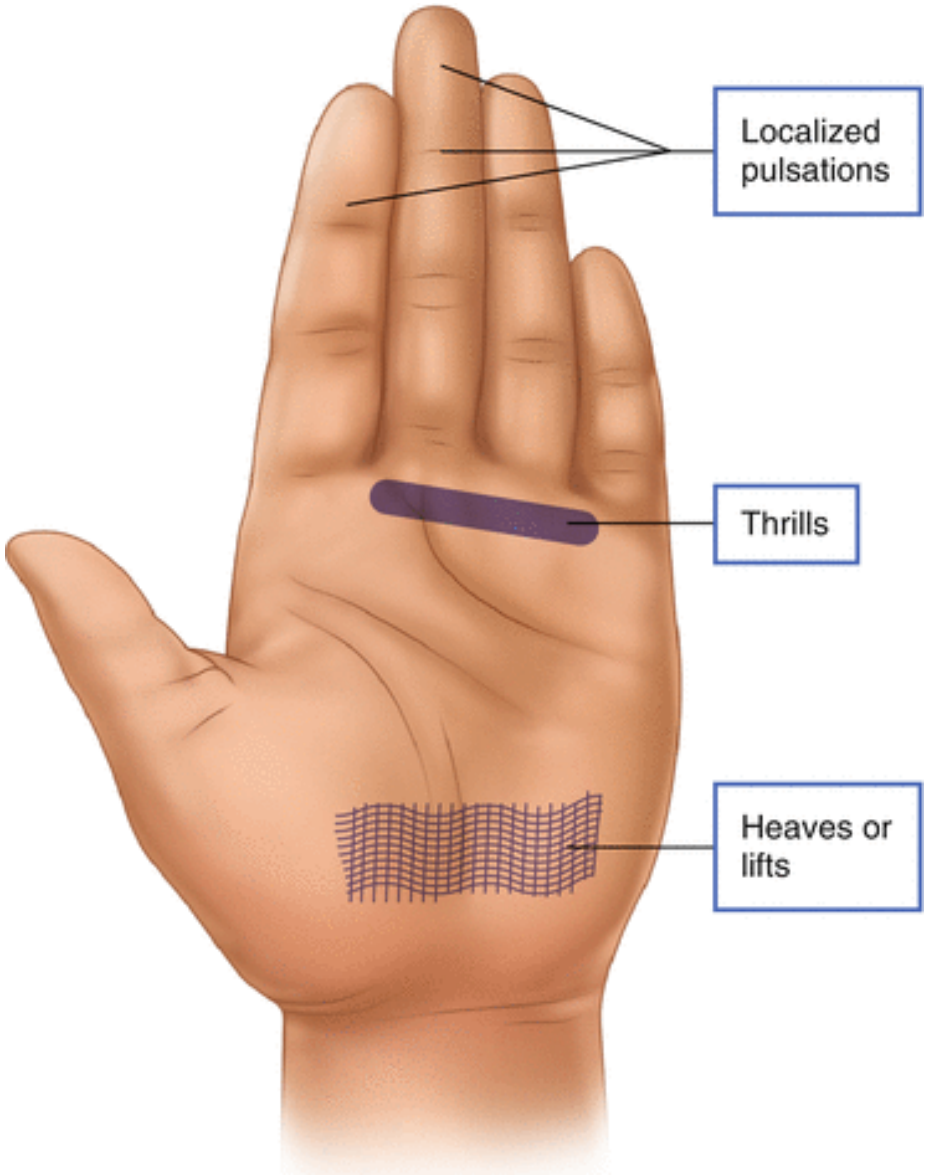
- Forceful pulsation (APICAL HEAVE)
- Tapping apex beat
- Double apical impulse



Heave. 2

- **Abnormal palpable impulse that noticeably lifts your hand**

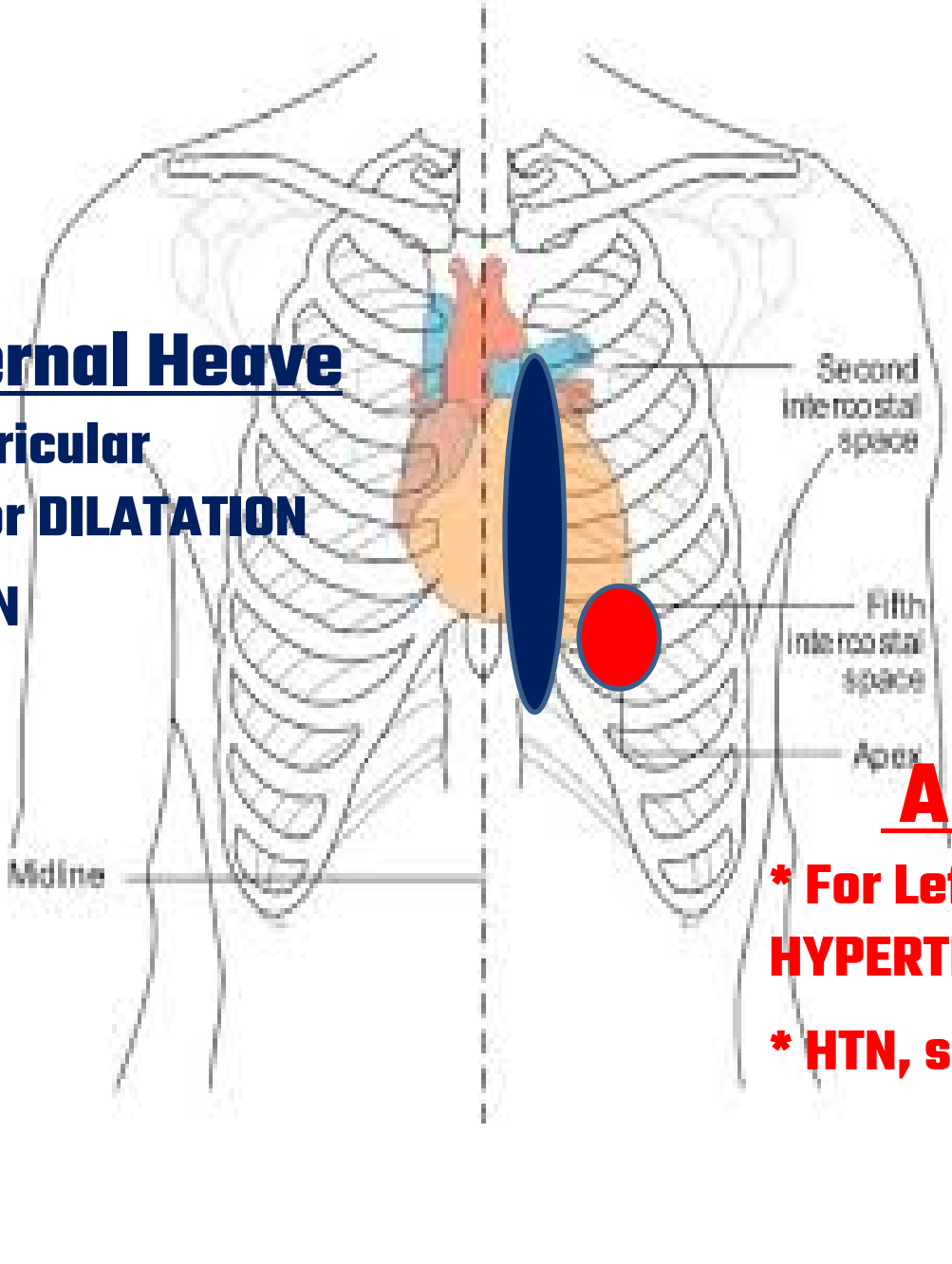
- **Palpate with the heel of your right hand firmly over 2 areas:**
  1) **Lt lower parasternal area (hold breath in expiration)**
  2) **Apex area**




ASSESS FOR A
PARASTERNAL HEAVE
RIGHT VENTRICULAR HYPERTROPHY
GEEKY MEDICS

Left parasternal Heave

* For Right Ventricular HYPERTROPHY or DILATATION
* Pulmonary HTN



Apical Heave

* For Left Ventricular HYPERTROPHY
* HTN, severe aortic stenosi

3. Thrill

- The tactile equivalent of a murmur, palpable vibration

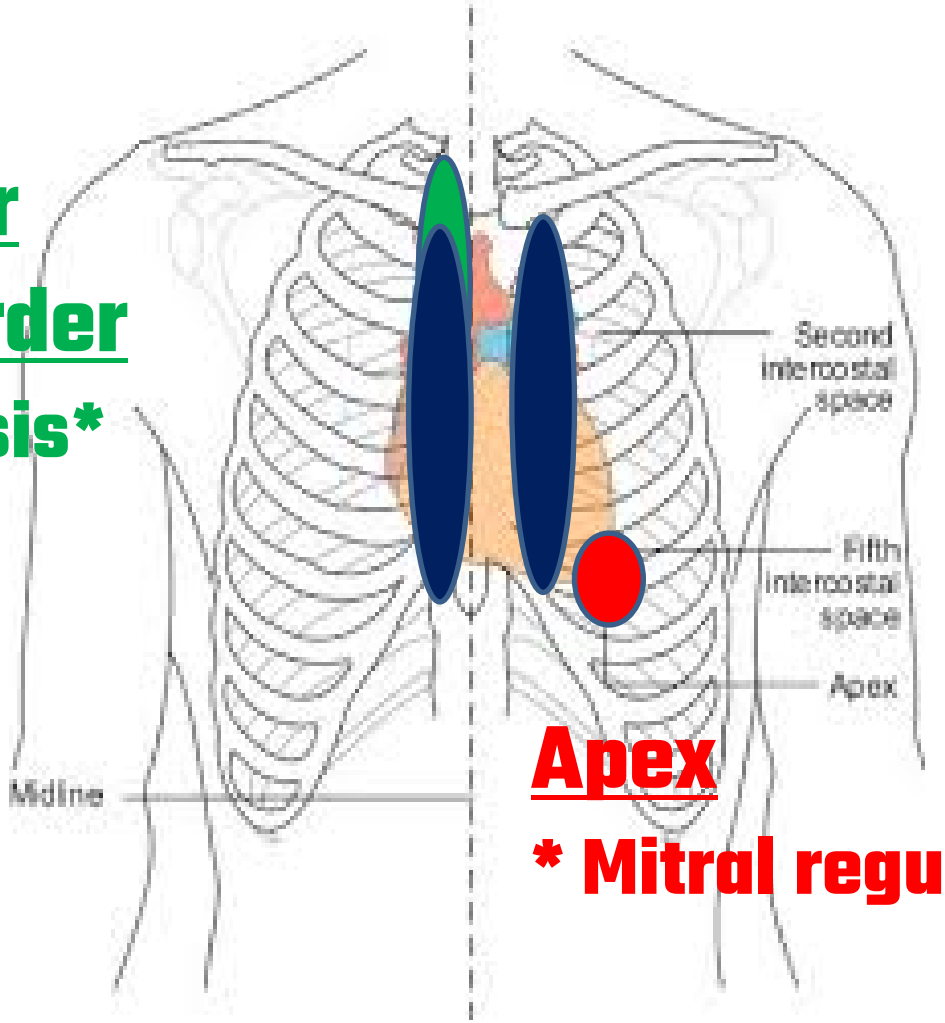
(PALPABLE MURMUR)

Palpate with the palmar aspect of fingers (PLACED VERTICALLY) over 3 areas:

1) Apex
2) Left parasternal area
3) Right parasternal area

Rt upper sternal border

Aortic stenosis*

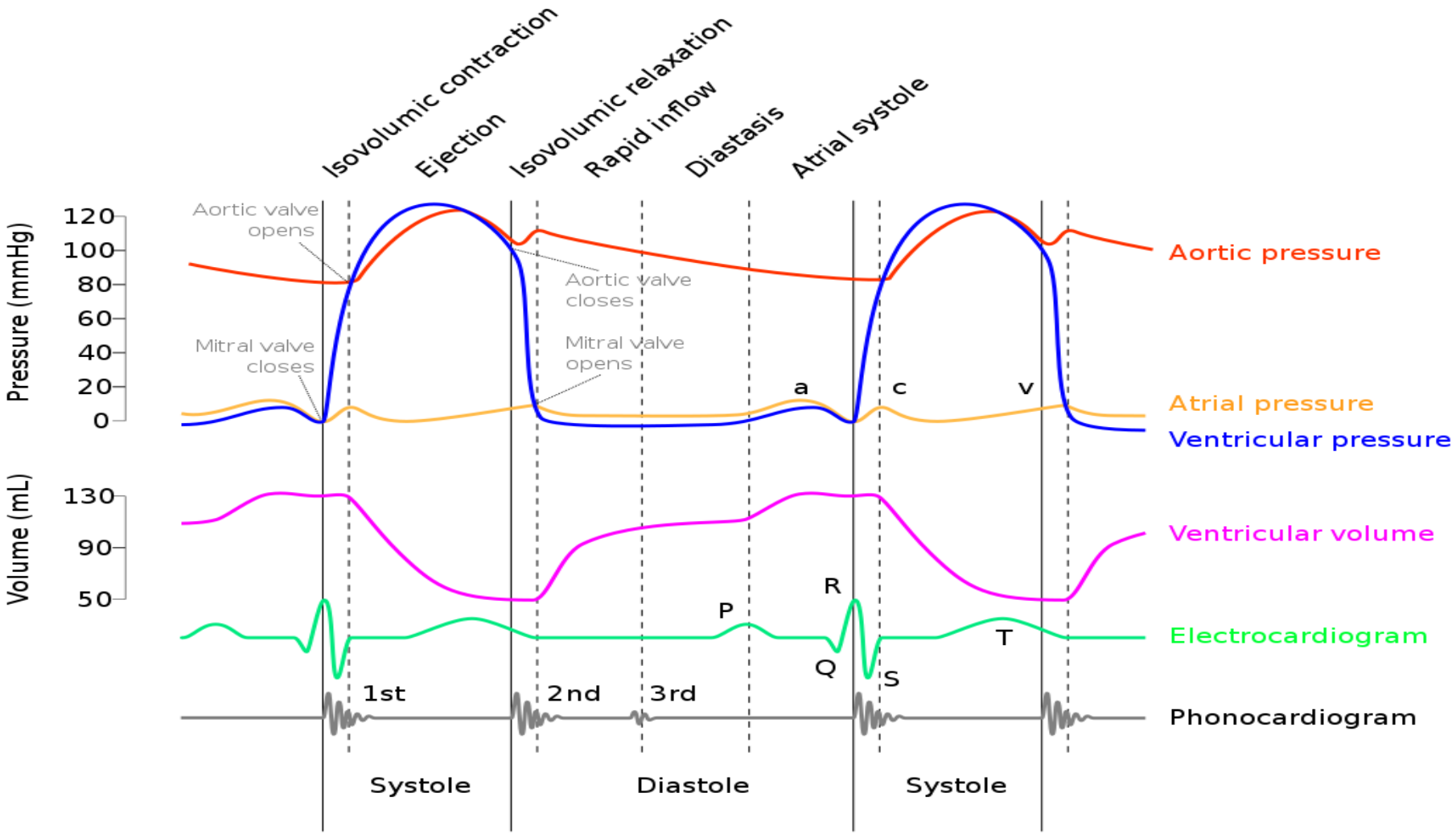


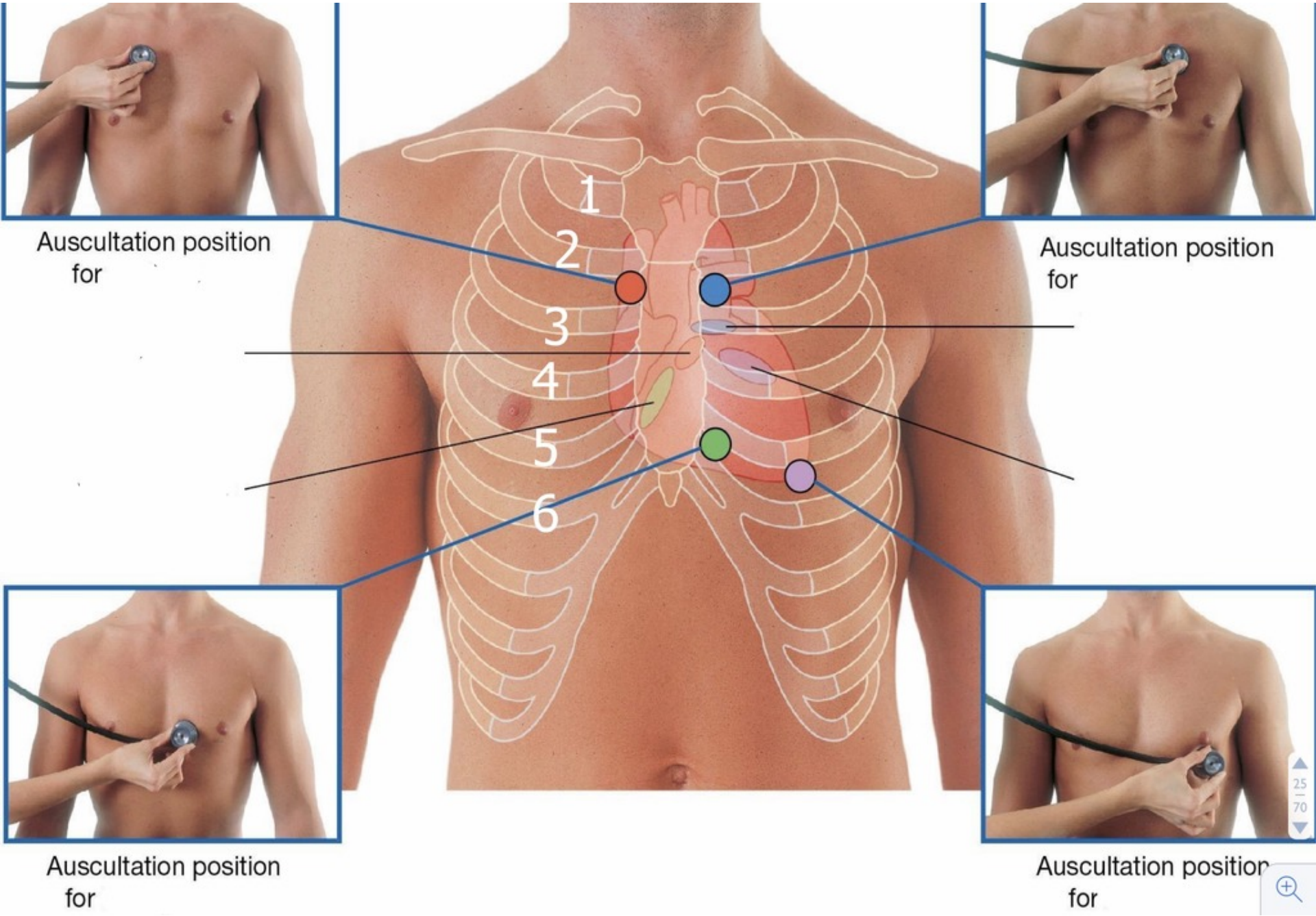
Rt and Lt sternal borders

Apex

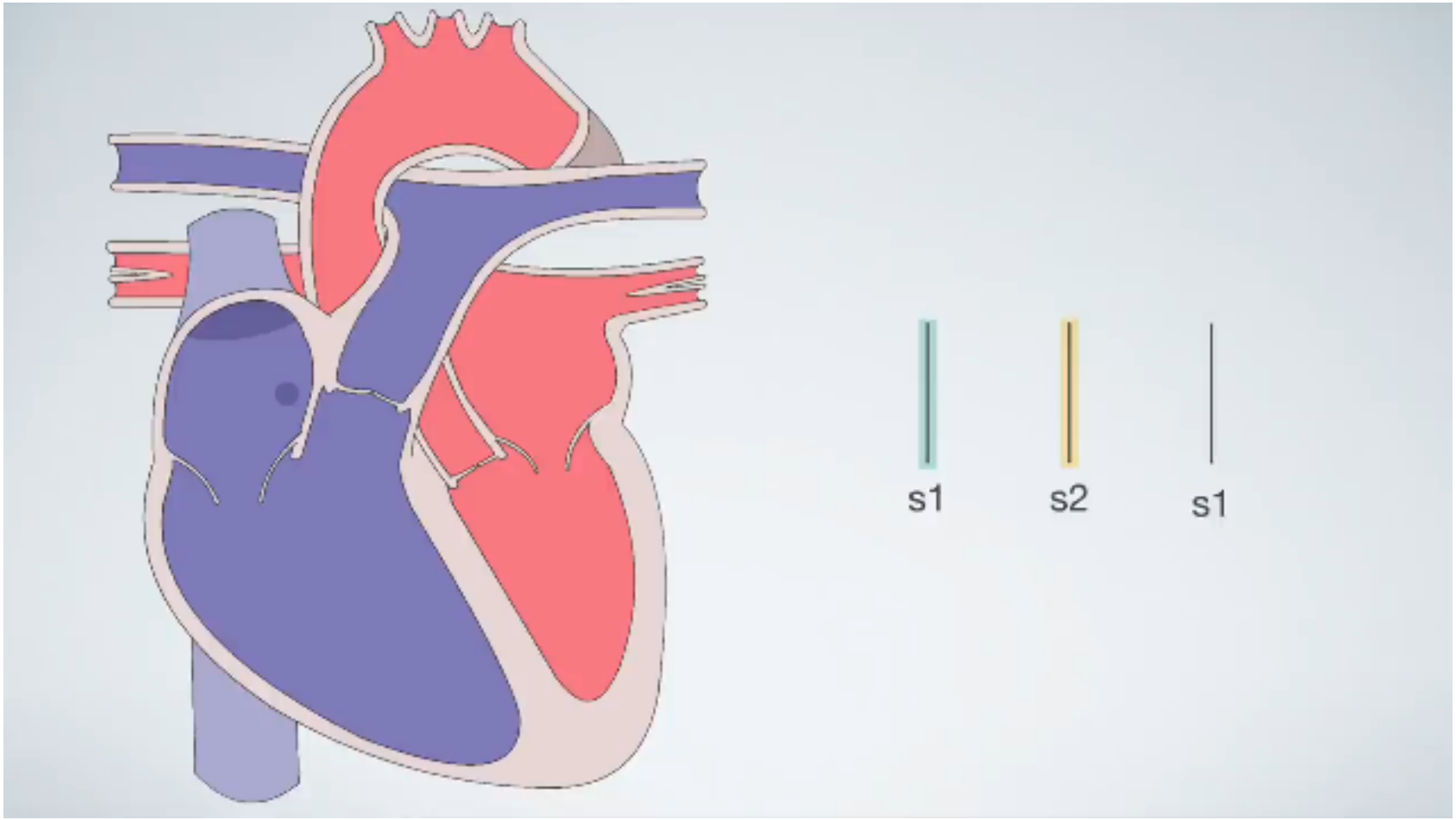
*** Mitral regurgitation**

Auscultation


Isovolumic contraction
Ejection
Isovolumic relaxation
Rapid inflow
Diastasis
Atrial systole
Pressure (mmHg)
120
100
80
60
40
20
0
Aortic valve opens
Mitral valve closes
Aortic valve closes
Mitral valve opens
a
c
v
Aortic pressure
Atrial pressure
Ventricular pressure
Volume (mL)
130
90
50
Ventricular volume
R
P
T
Q
S
Electrocardiogram
1st
2nd
3rd
Phonocardiogram
Systole
Diastole
Systole

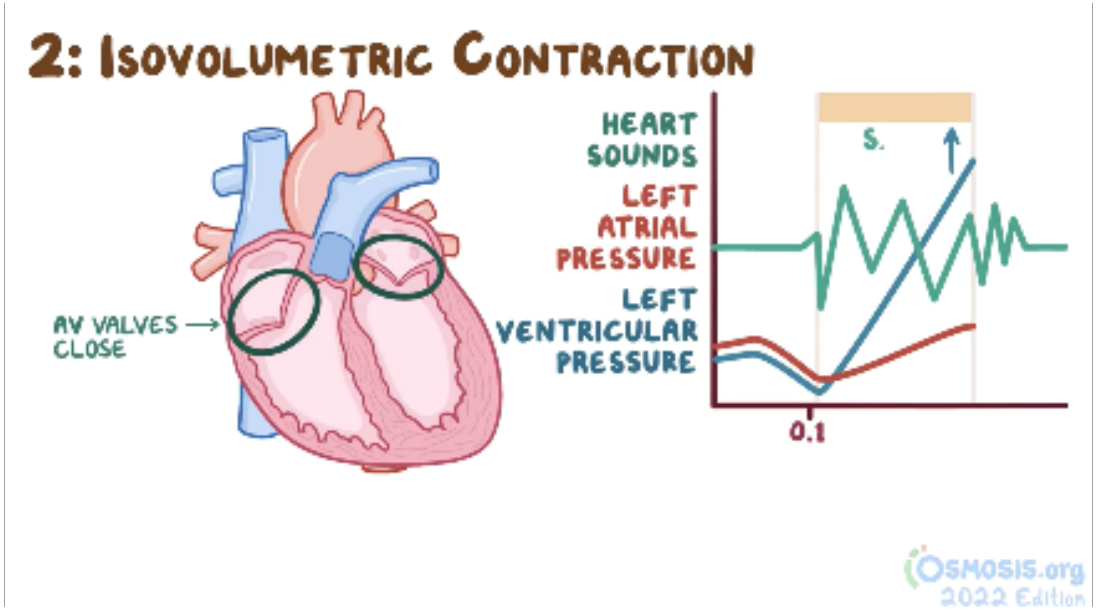

1
2
3
4
5
6
Auscultation position for
Auscultation position for
Auscultation position for
Auscultation position for

Heart sounds



First heart sound, S1

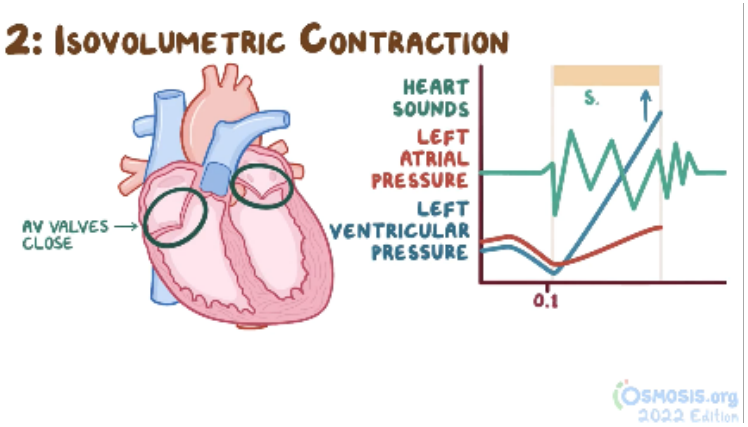
- Closure of mitral and tricuspid valve
- At onset of ventricular systole
- Heard at the apex




1

Abnormal intensity of S1

Quiet	Loud	Variable
• Low cardiac output • Poor Lt ventricular function • Rheumatic mitral regurgitation • Long PR interval	• Increased cardiac output • Large stroke volume • Mitral stenosis • Short PR interval • Atrial myxoma	• Atrial fibrillation • Complete heart block • Extrasysytole



Second heart sound, S2

.Closure of Aortic and pulmonic valves

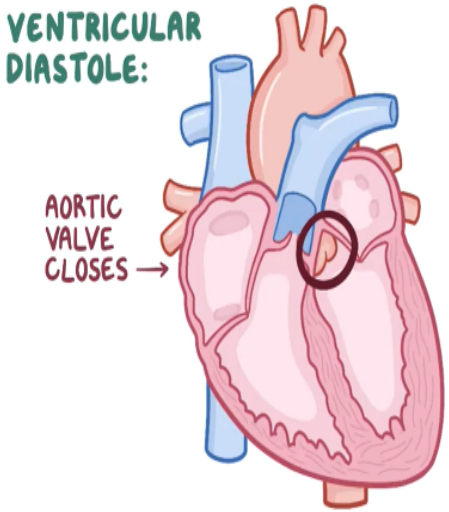
.At end of ventricular systole

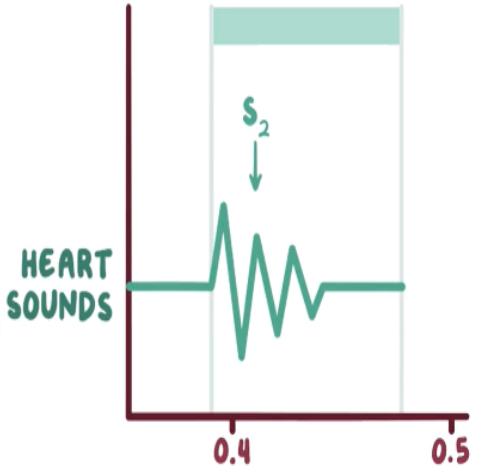
.Heard on left sternal edge

;Has 2 components

aortic component A2) 1

Pulmonic component P2) 2





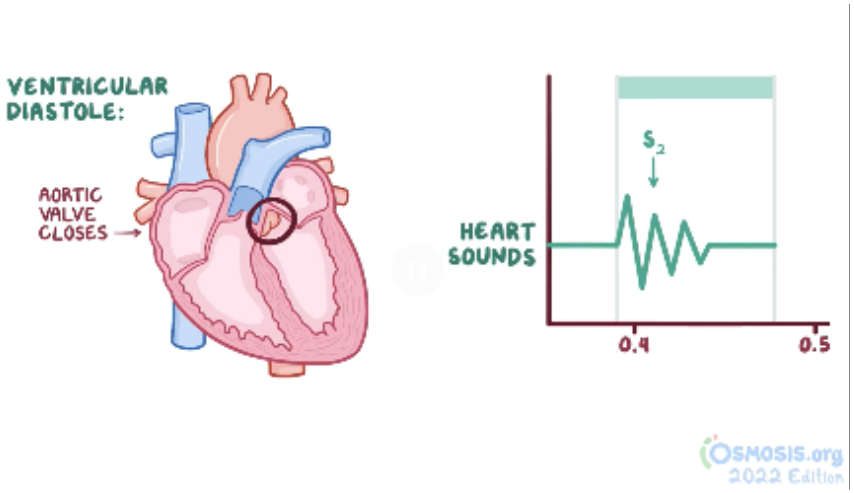
S2 splitting

- Normally A2 is louder than P2.
- Physiological splitting occurs because LV contraction slightly precedes RV contraction.
- This splitting physiologically increases at end-inspiration (RV VR-related), and disappears on expiration.

Abnormal intensity and splitting of S2

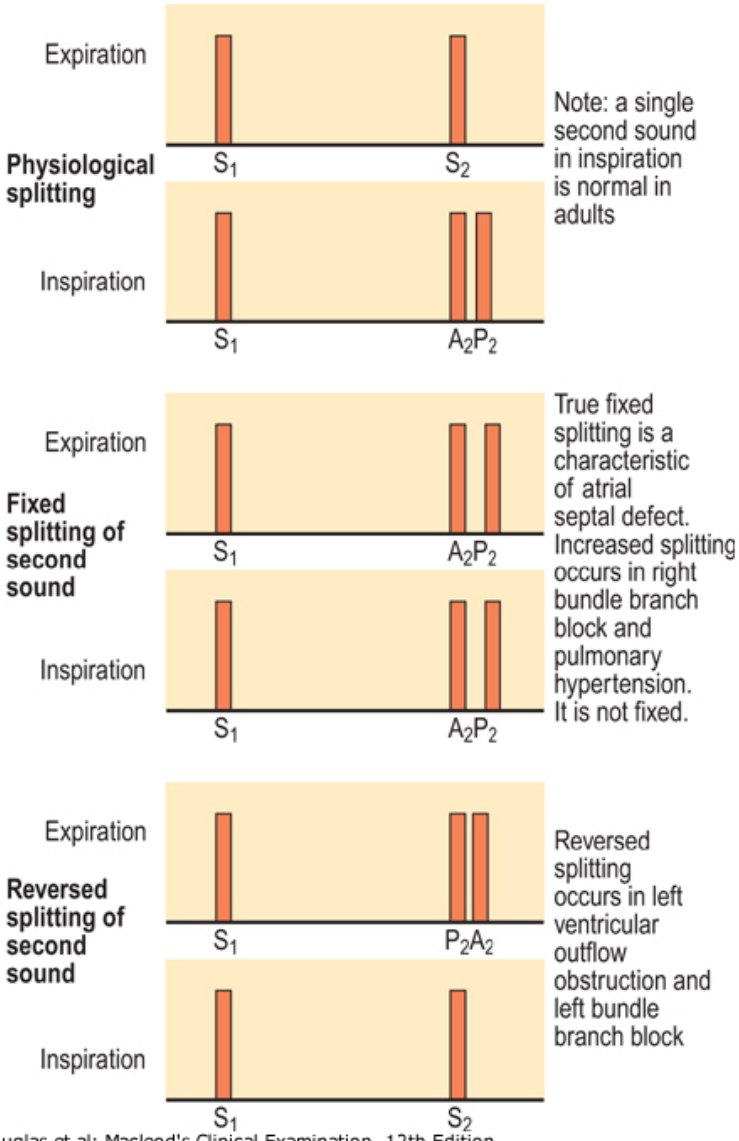
S2

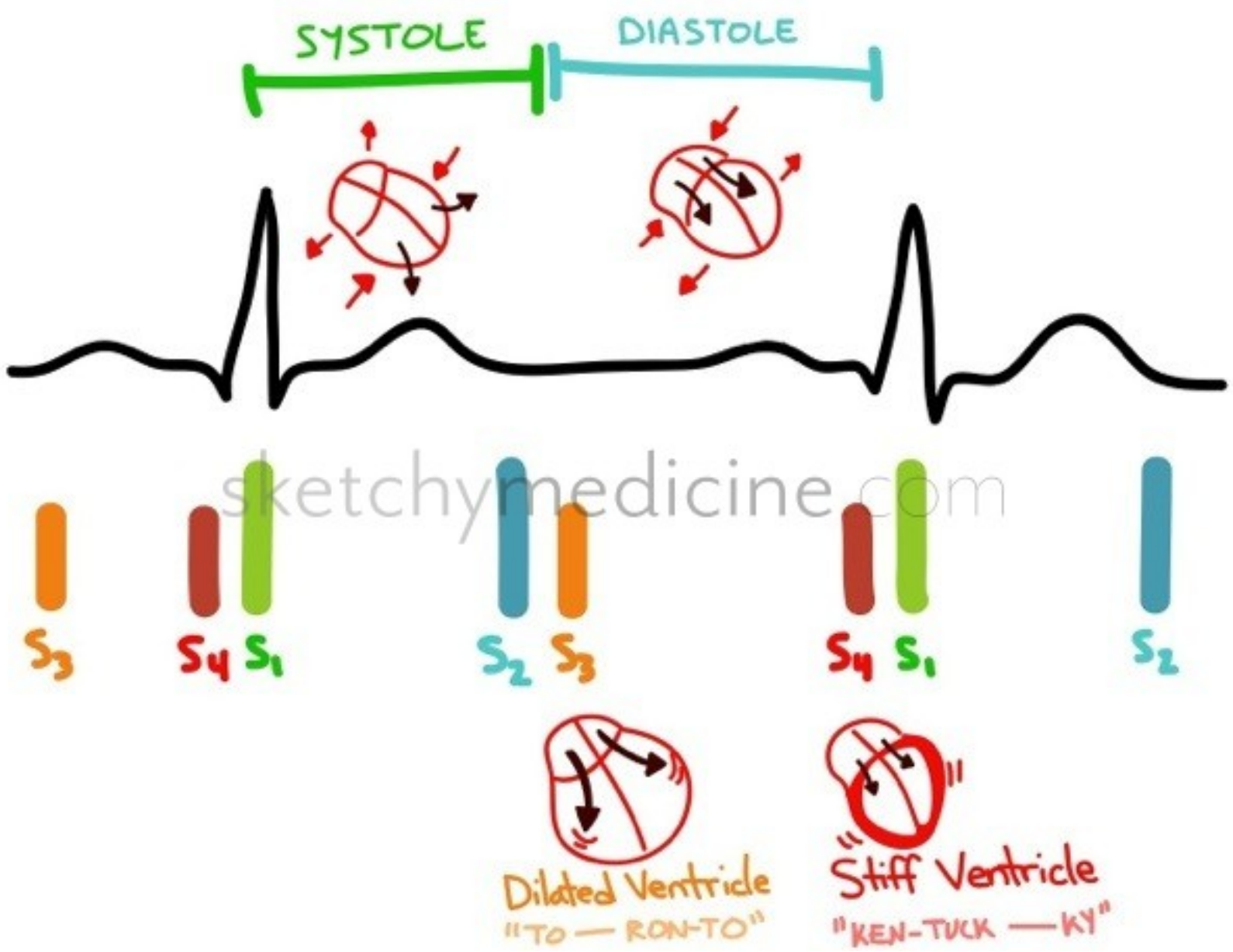
LOUD	QUIET
Systemic HTN, A2 Pulmonary HTN, P2	Low cardiac output Calcific AS AR



SPLIT

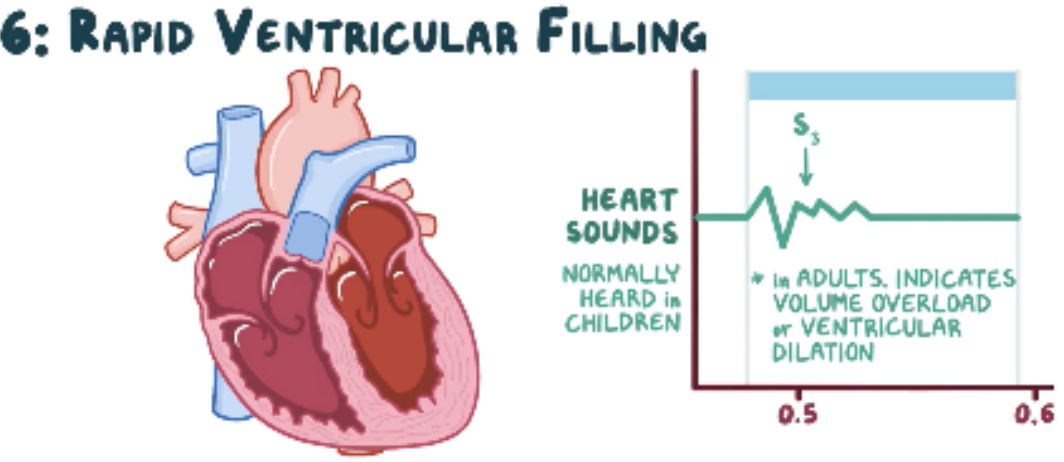
Widens in inspiration	Widens in expiration = reversed splitting	Fixed splitting
RBBB Pulm. stenosis P.HTN VSD	AS HCM LBBB Ventricular pacing	ASD

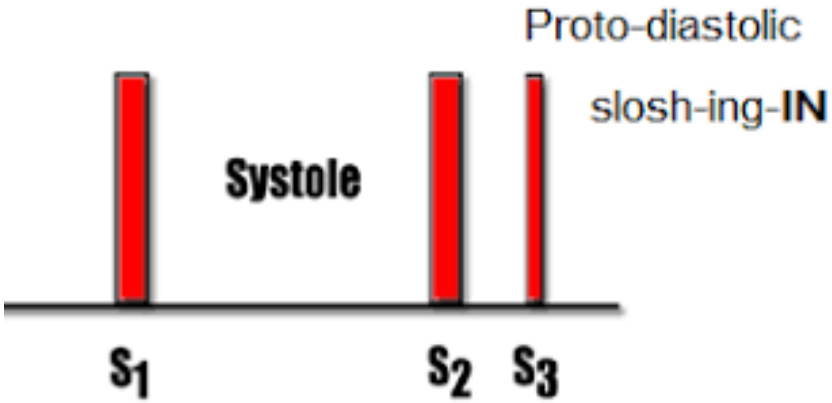


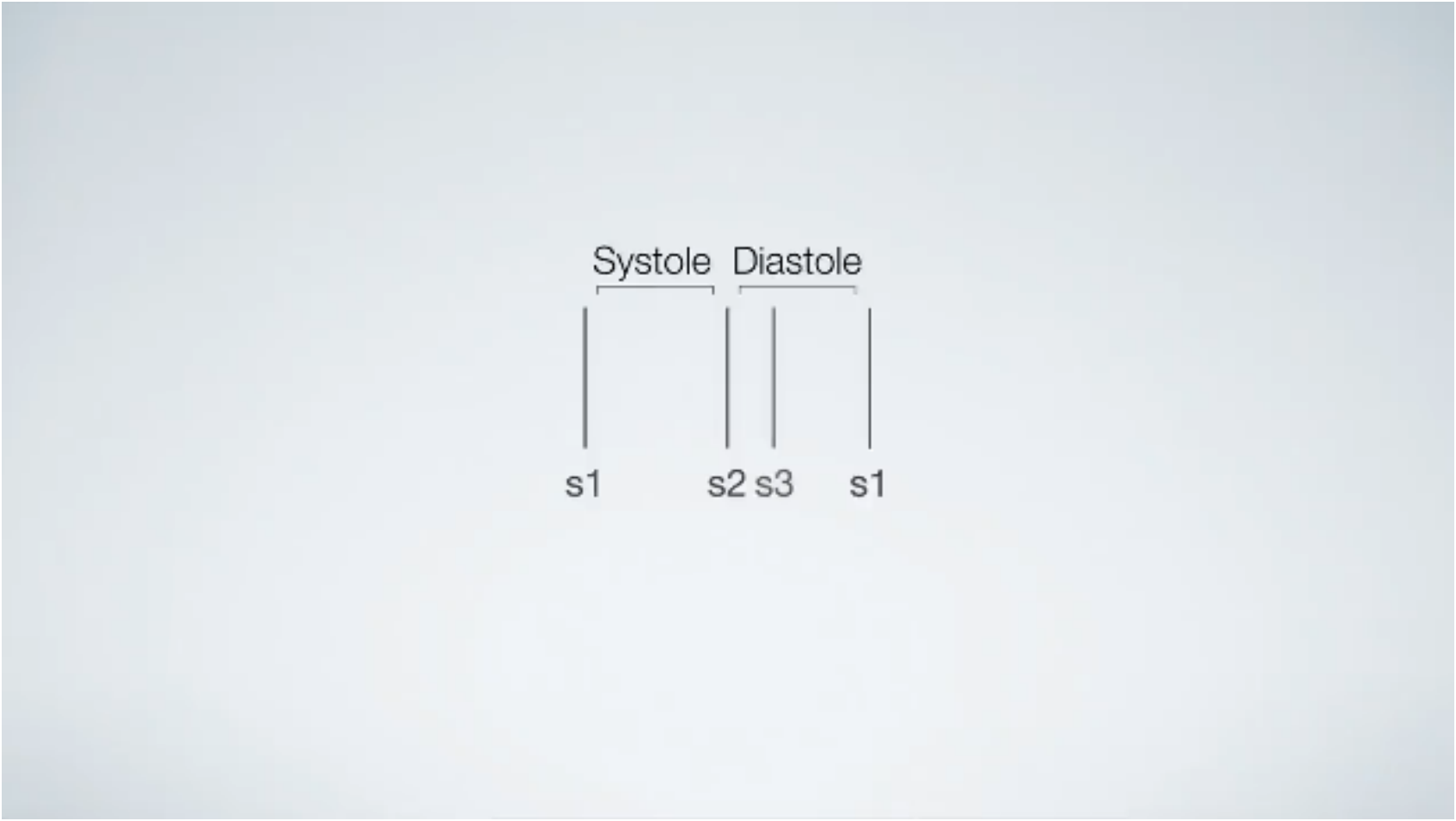

SYSTOLE
DIASTOLE
sketchymedicine.com
S3
S4 S1
S2 S3
S4 S1
S2
Dilated Ventricle
"TO — RON-TO"
Stiff Ventricle
"KEN-TUCK —KY"

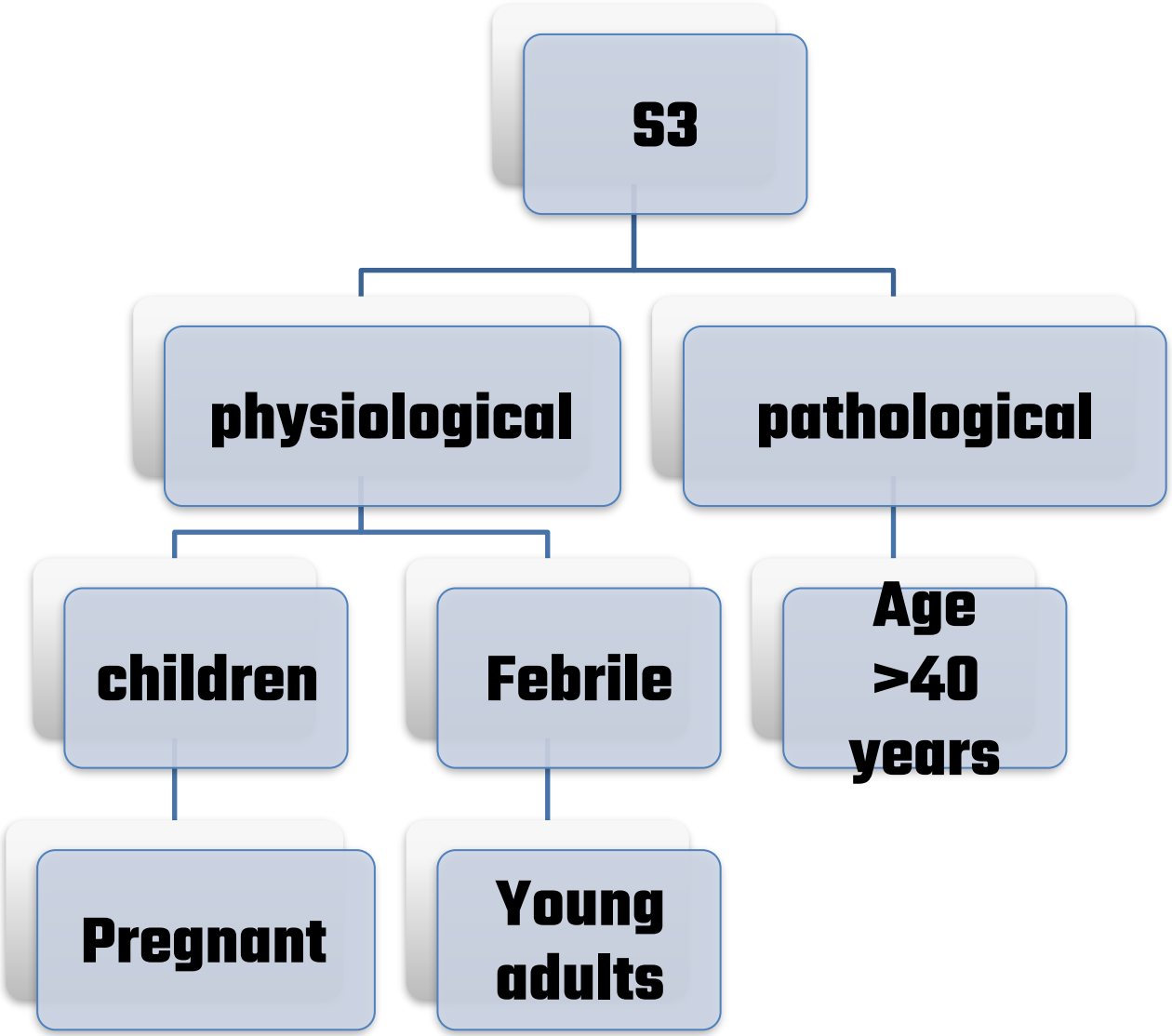
Third heart sound, S3

- **Low-pitched early diastolic sound.**
- **Best heard with the bell at the apex.**
- **Due to rapid ventricular filling immediately after opening the atrioventricular valve**






Systole
Diastole
s1
s2
s3
s1


S3
physiological
pathological
children
Febrile
Age >40 years
Pregnant
Young adults

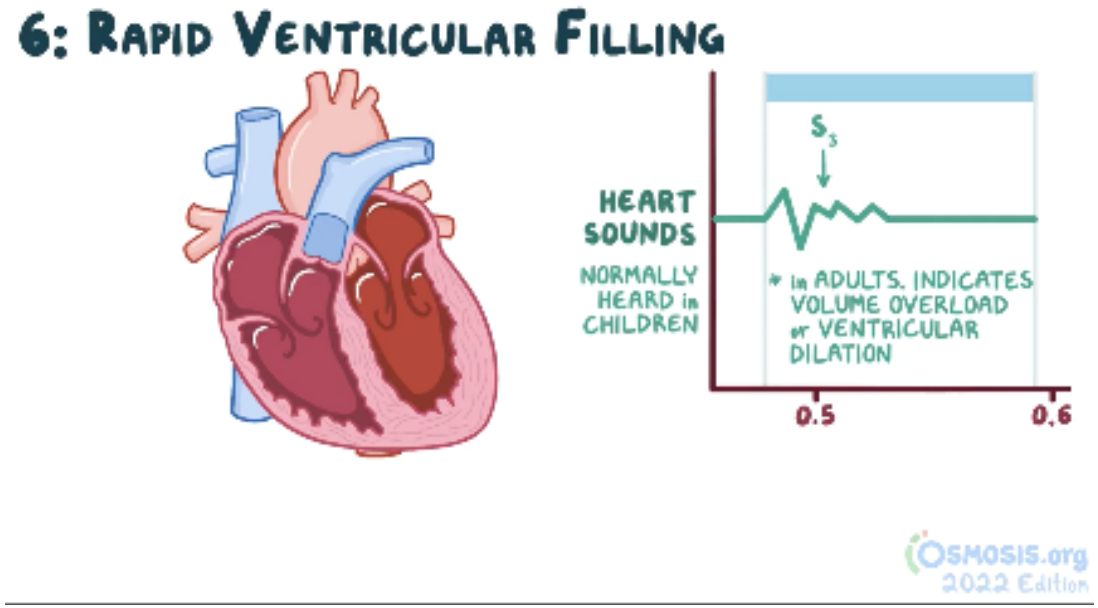
Pathological S3 causes:

1) LV failure

2) MR

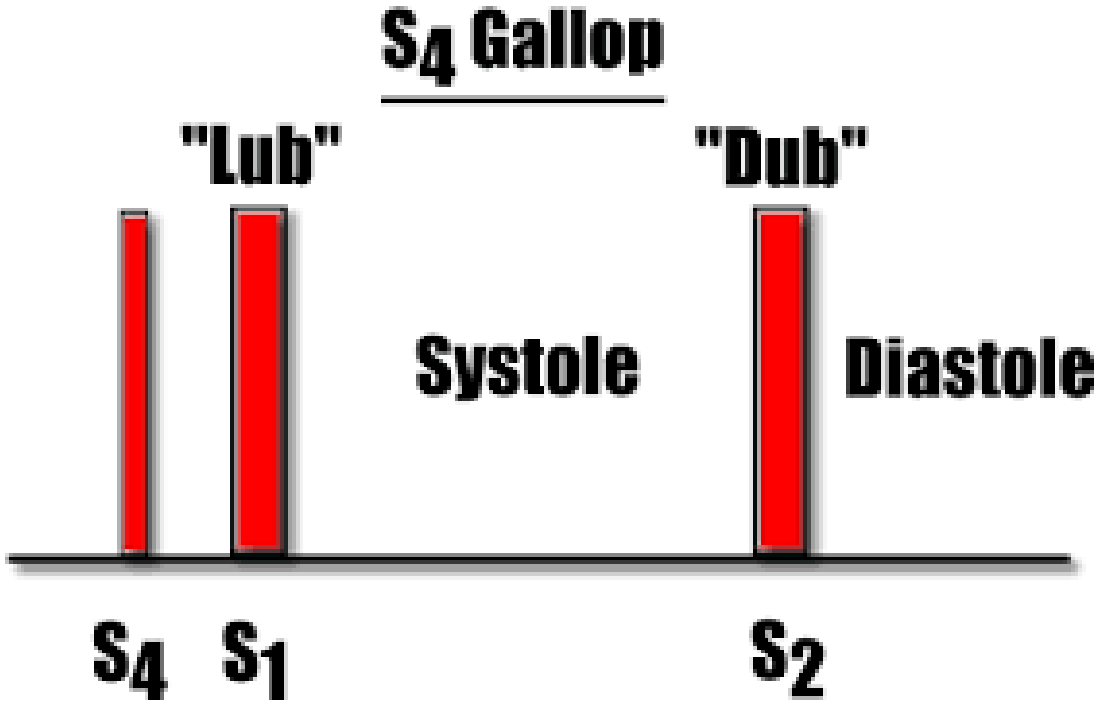
- **Ventricular gallop = S3 gallop= S3+ tachycardia**

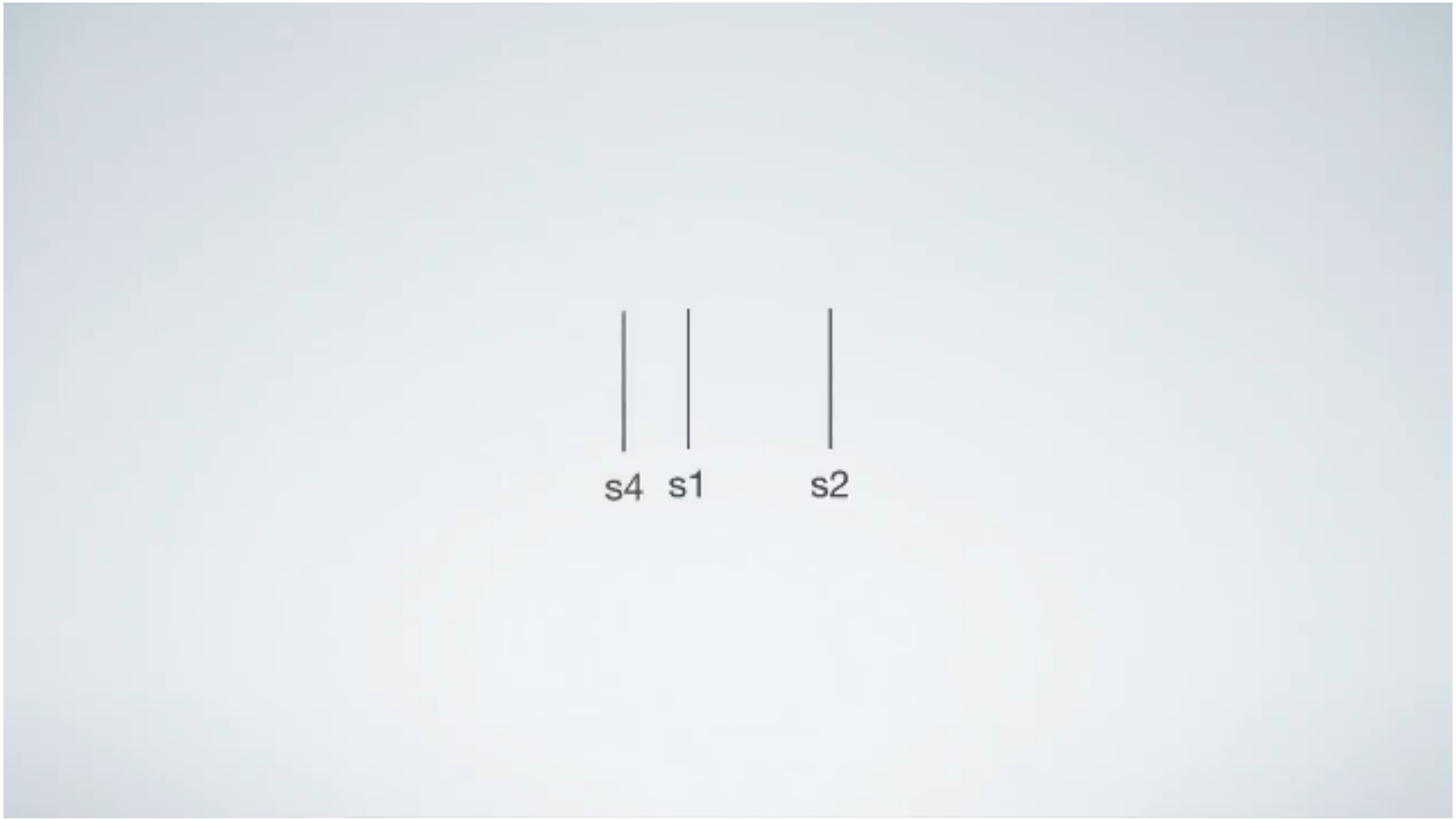
In HF, with quiet S1 and S2



Fourth heart sounds, S4

- ALWAYS PATHOLOGICAL
- Soft low-pitched sound at late diastole.
- Best heard at the apex with the bell.
- It occurs before S1
- Due to forceful atrial contraction against stiff ventricle secondary to LVH.



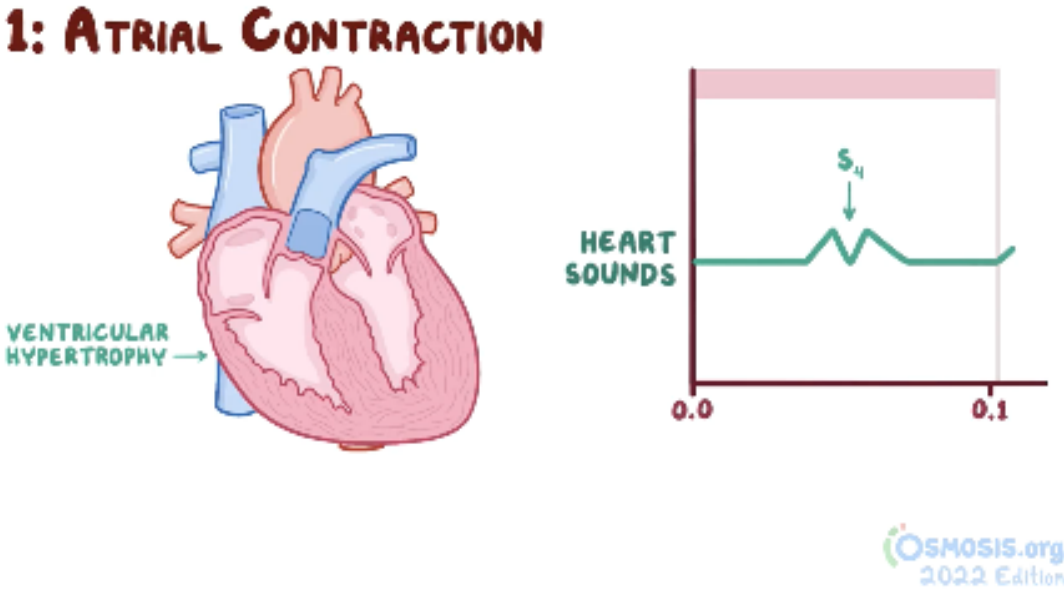

s4
s1
s2

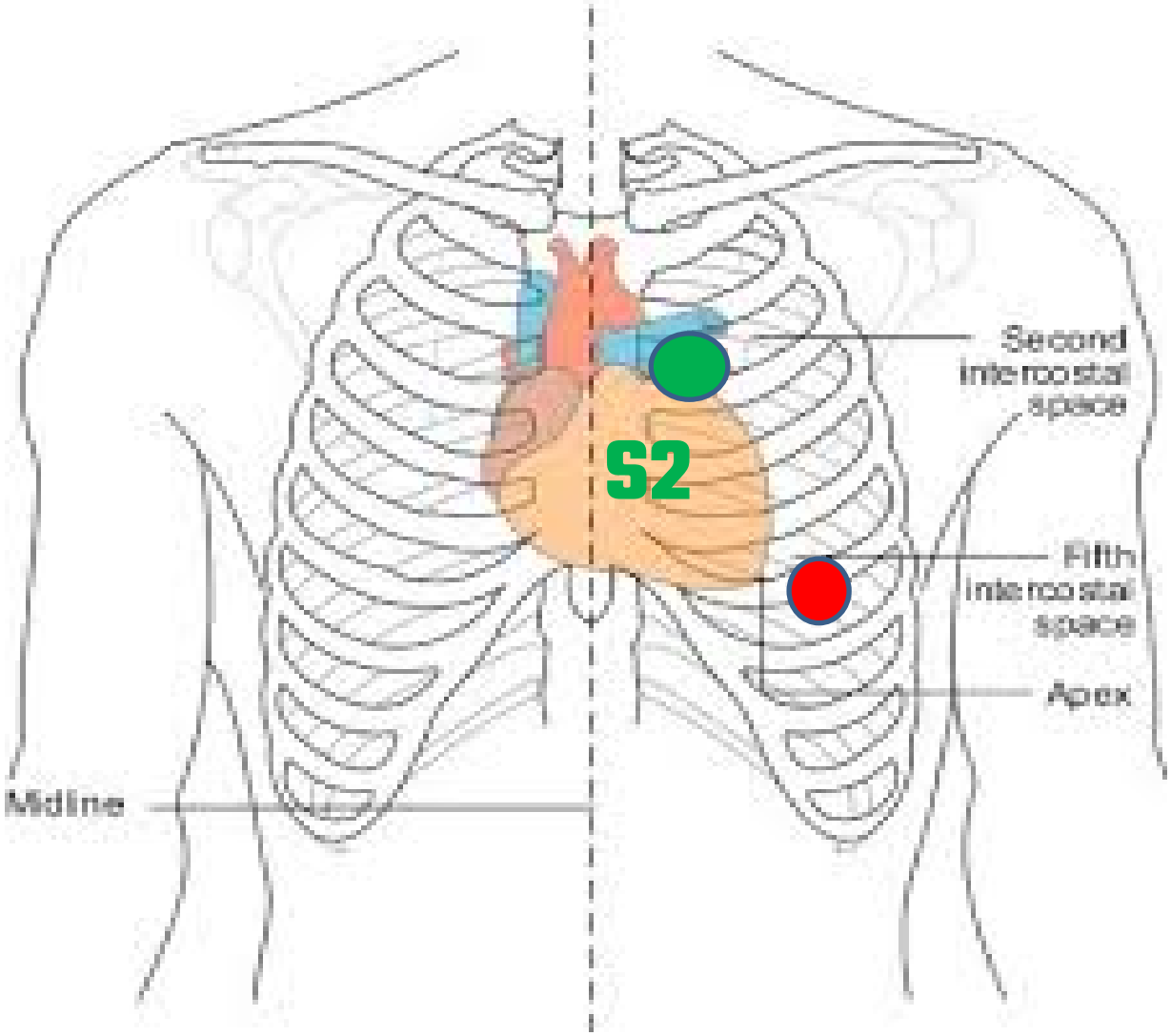
- **Causes of S4:**

1) HTN
2) AS
3) HCM

** **CANNOT** OCCUR IN CASE OF ATRIAL FIBRILLATION.

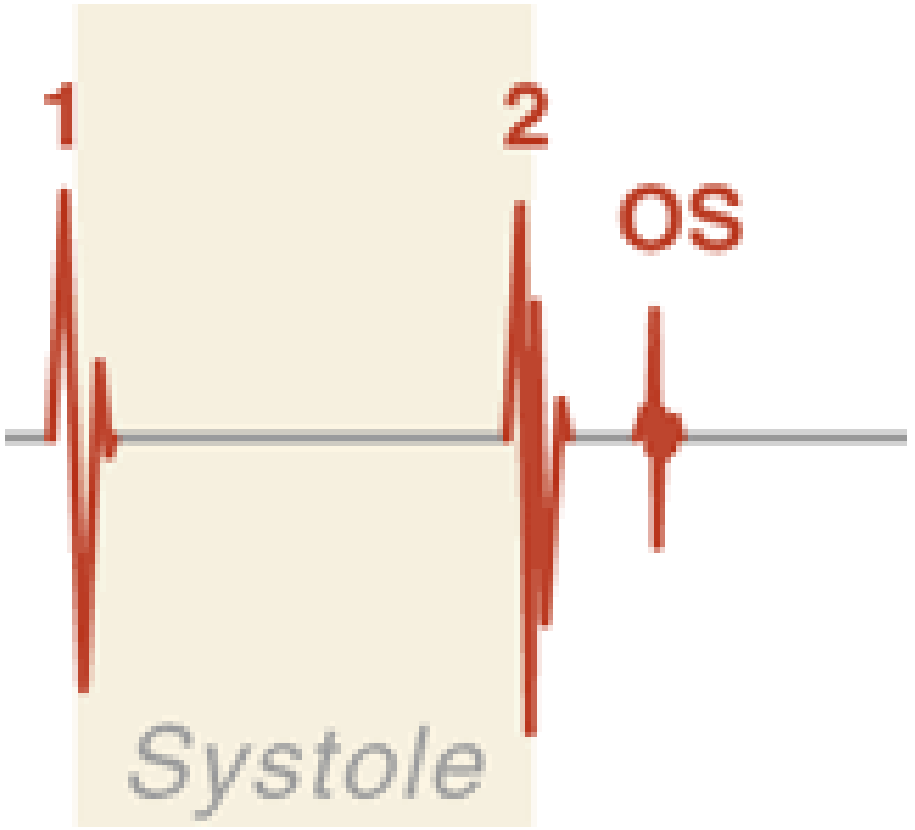
- Atrial gallop= S4 gallop= S4+ tachycardia




Second intercostal space
S2
Fifth intercostal space
Apex
Midline
S1
S3
S4

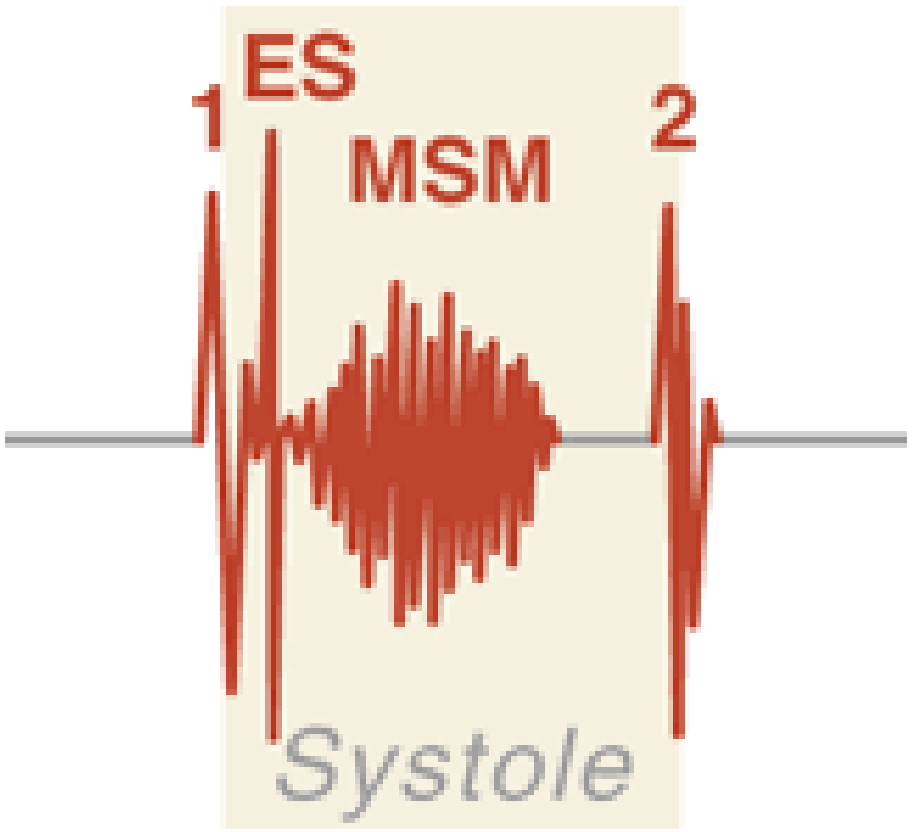
Added Sounds

Opening snap



- **Sudden opening of stenosed valve in DIASTOLE.**
- **MS**
- **High-pitched, medial to apex via the diaphragm.**
- **Just after S2, in early diastole.**

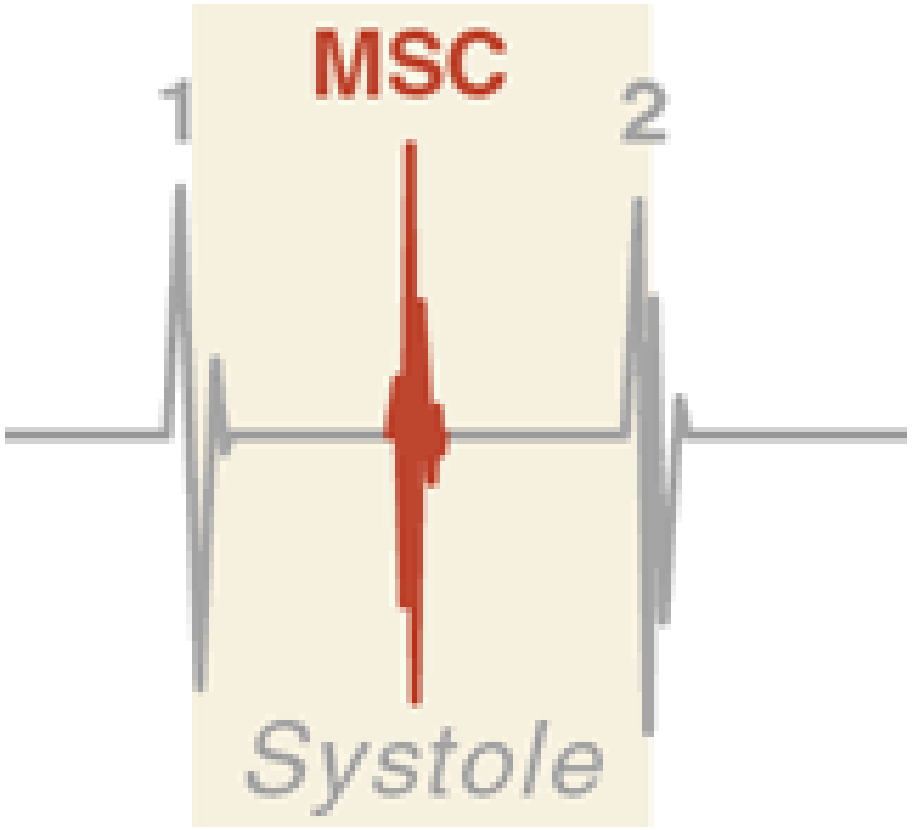
Ejection click



- Opening of stenosed valve in SYSTOLE.
- Congenital pulmonary/ aortic stenosis.
- High-pitched, at the Rt and Lt upper sternal borders via diaphragm
- Just after S1, in early systole.

- ** if calcific valve (rigid cusps)>> absent sound

Mid-systolic click



- **Sudden tensing of prolapsed leaflet during SYSTOLE.**
- **Mitral valve prolapse.**
- **High-pitched, at the apex via diaphragm.**

Mechanical Heart Sounds

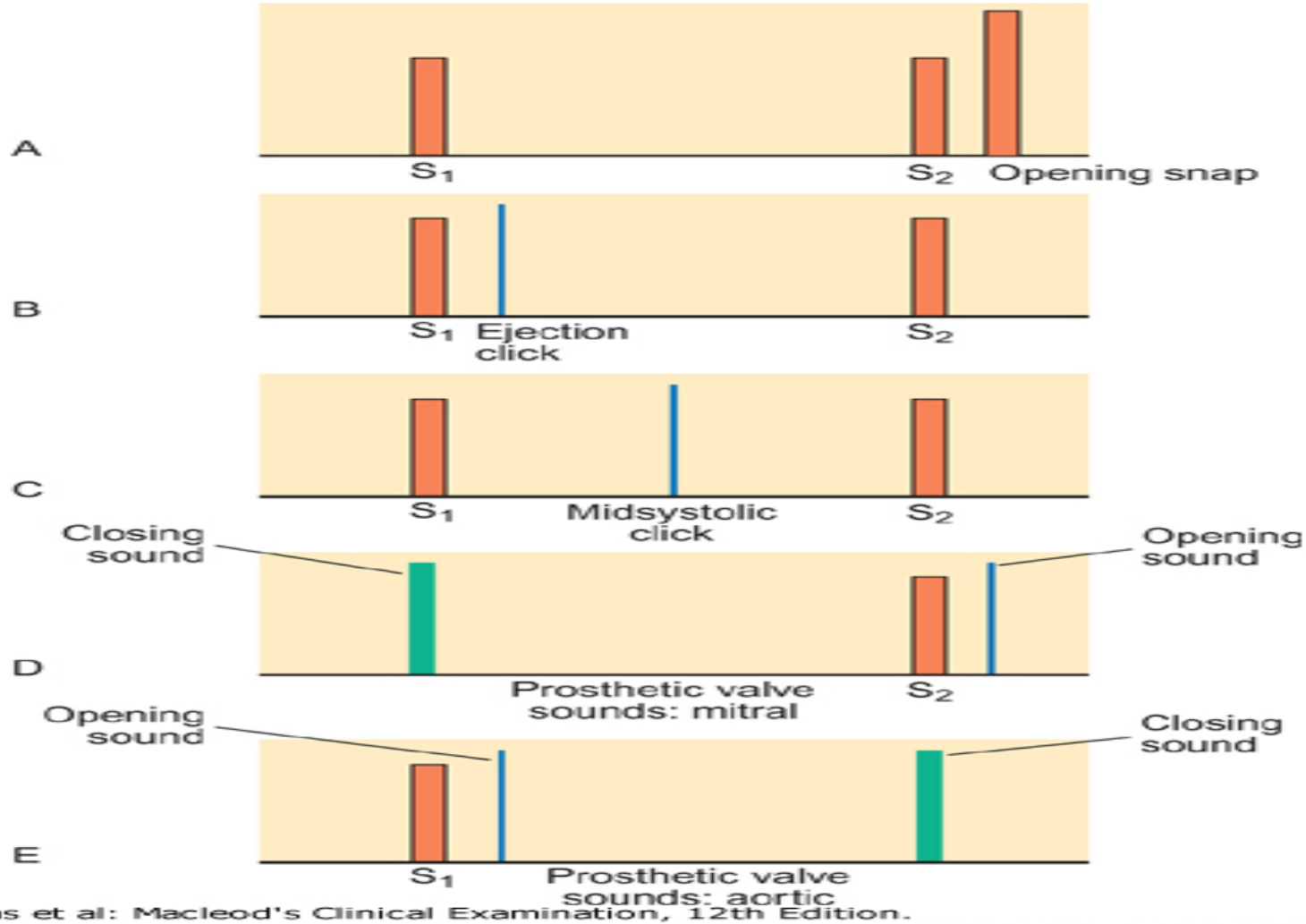
- **High-pitched metallic and often palpable.**

Mechanical mitral valve

- **Closure: metallic S1**
- **Opening: opening snap**

Mechanical aortic valve

- **Closure: metallic S2**
- **Opening: ejection click**



Pericardial Friction Rub

- **Coarse scratching sound.**
- **With the diaphragm, hold breath in expiation and lean forward.**

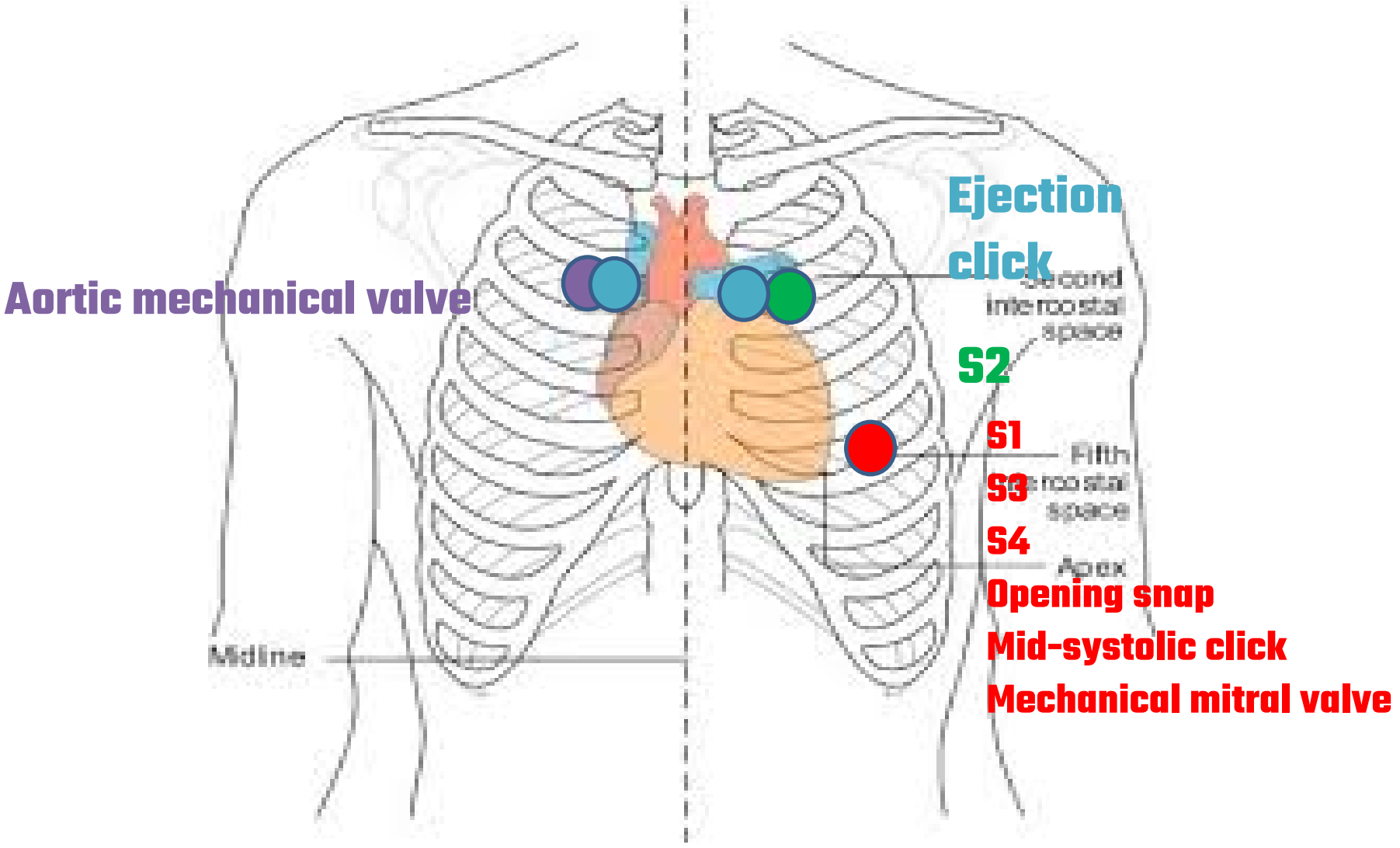
Causes:

1) Acute pericarditis

2) Few days post-extensive myocardial infarction

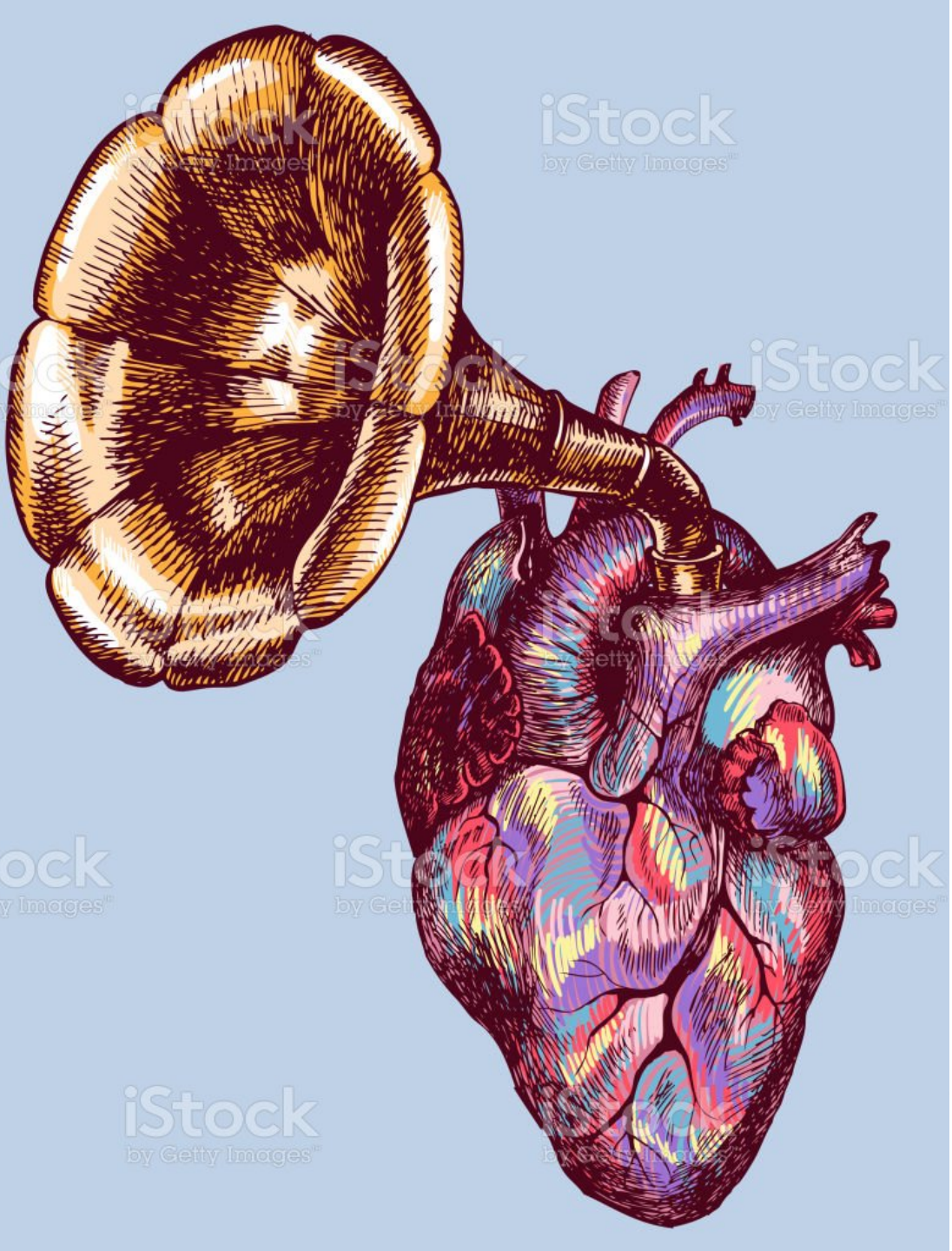
**** Pleuropericardial rub**

**** Pneumopericardium**


Aortic mechanical valve
Ejection click
Second intercostal space
S2
S1
S3
S4
Fifth intercostal space
Apex
Opening snap
Mid-systolic click
Mechanical mitral valve
Midline

Murmurs

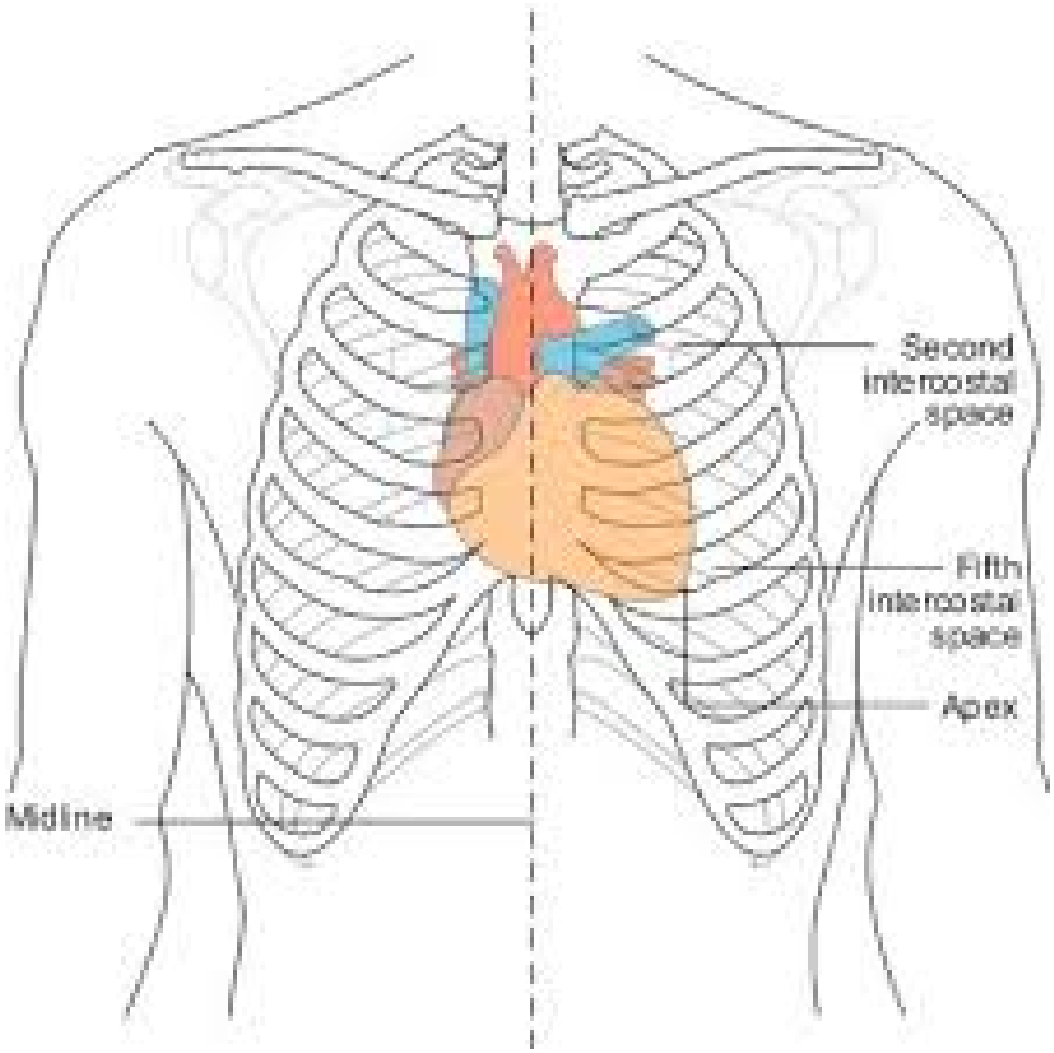
- Heart murmurs produced by:
  - Turbulent flow across an abnormal valve, septal defect or outflow obstruction
  - Increased volume or velocity of flow through a normal valve (innocent murmur)



Murmurs

- **Examination includes:**
  - **Timing and duration**
  - **Character/pitch and intensity**
  - **Location and radiation**

Murmurs/Location, Radiation



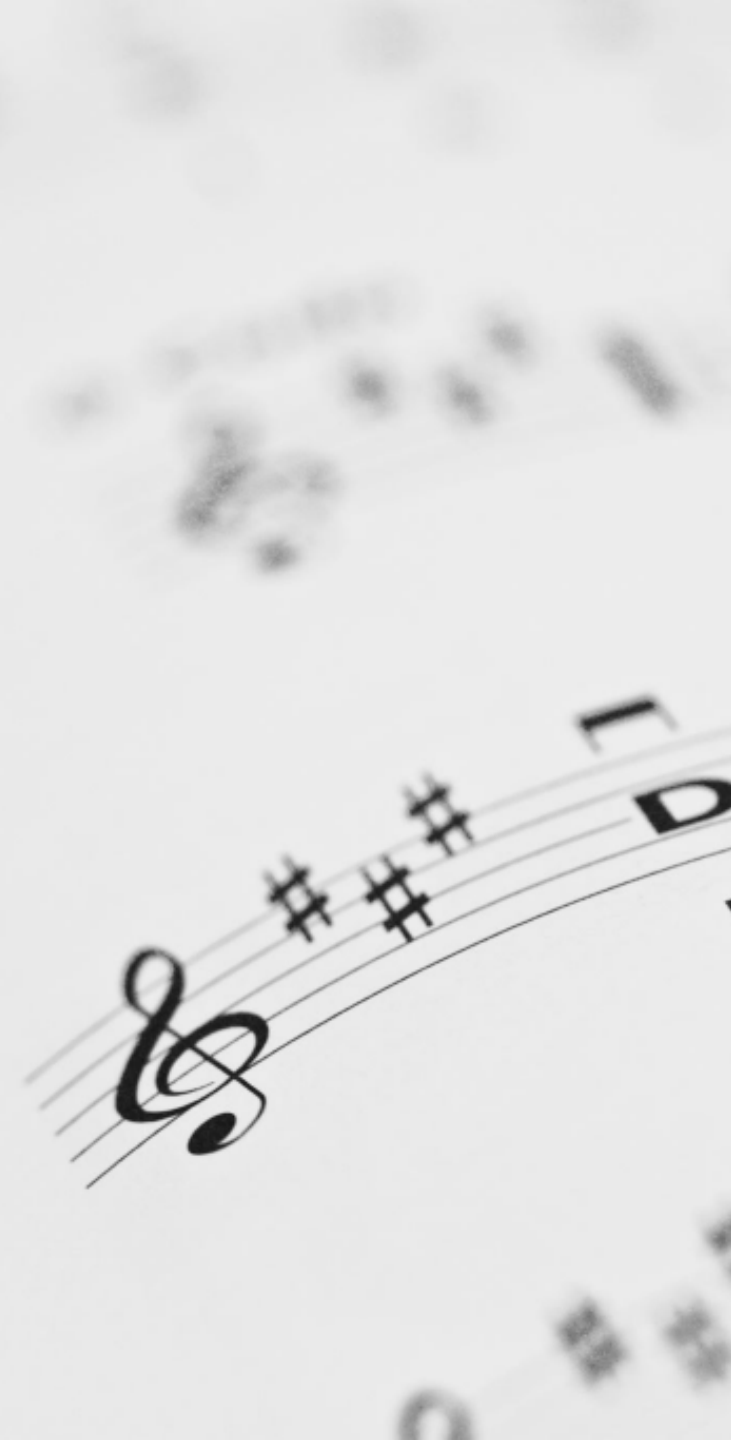
Murmurs/ Timing

- **Systolic** murmurs

The interval between S1 and S2

- **Diastolic** murmurs

The interval between S2 to S1

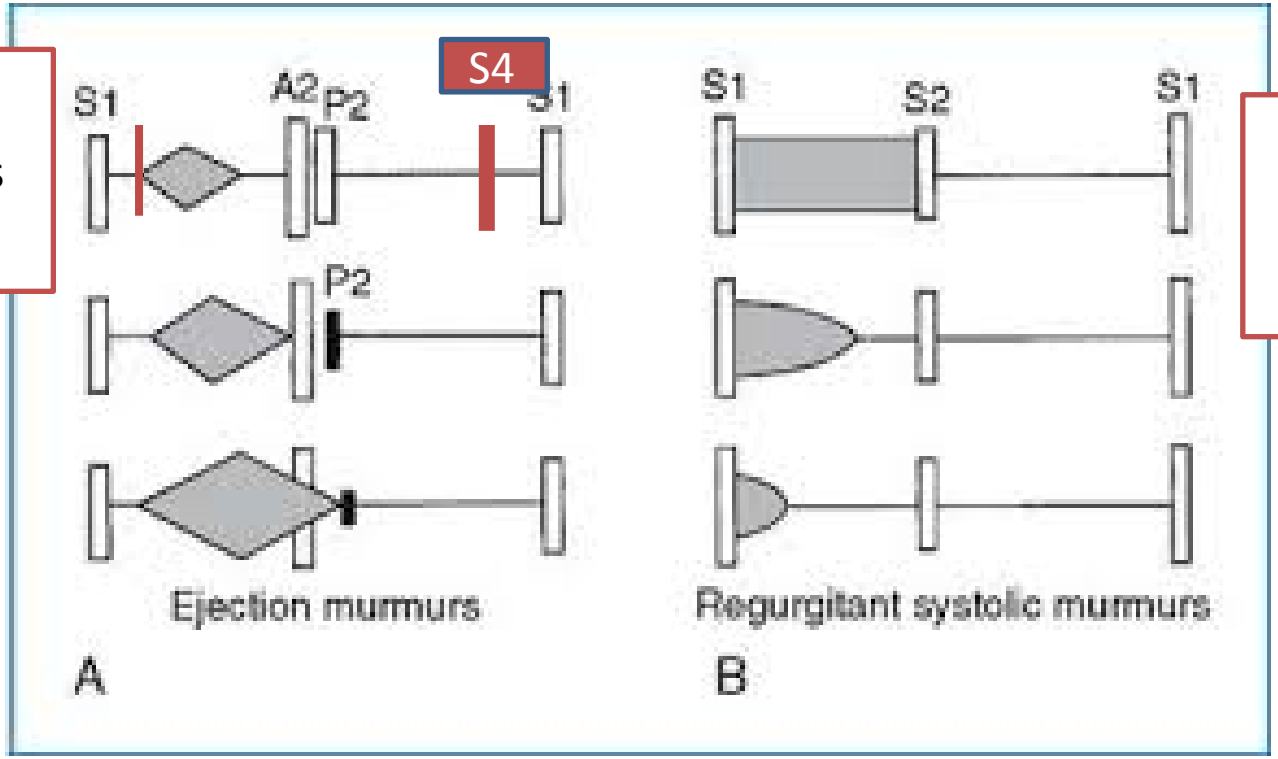


Murmurs
Character and Pitch

- **Harsh: AS**
- **Blowing: MR**
- **Musical: AS in children (still's murmur)**
- **Rumbling: MS**

- **High-pitched: high pressure gradient**
- **Low-pitched: low pressure gradient**

Aortic stenosis



Pansystolic murmur: Mitral regurgitation

Murmurs/Duration

Murmurs/Intensity

- **The intensity of the murmur does not correlate with the severity of the valve of valve dysfunction**
- **Change in intensity with time is important , as they can denote progression of a valve lesion**
- **Rapidly changing murmur can occur with infective endocarditis**

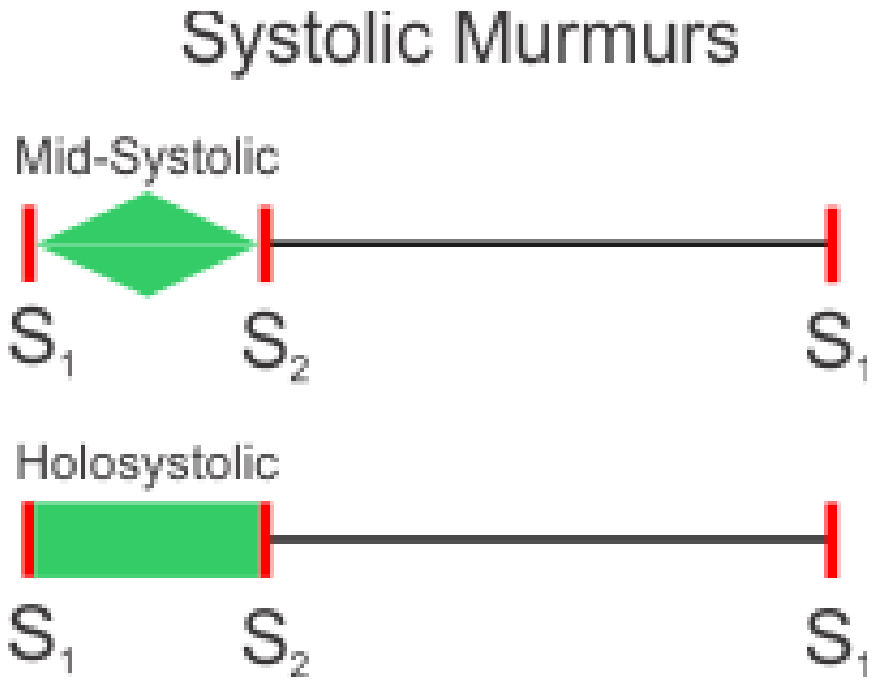
Grades of intensity of murmur	
Grade 1	Heard by an expert in optimum conditions
Grade 2	Heard by non-expert in optimum conditions
Grade 3	Easily heard, no thrill
Grade 4	A loud murmur, with a thrill
Grade 5	Very loud, over large area, with thrill
Grade 6	Extremely loud, heard without stethoscope

Systolic Murmurs

- **Ejection systolic murmurs**

Caused by increased flow through a normal valve (flow or innocent murmur), or by turbulent flow through an abnormal valve.

- **Pansystolic**

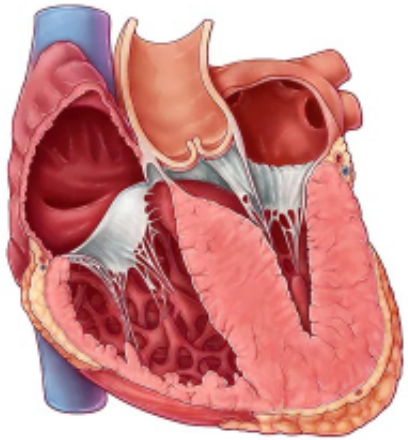


Ejection systolic murmurs

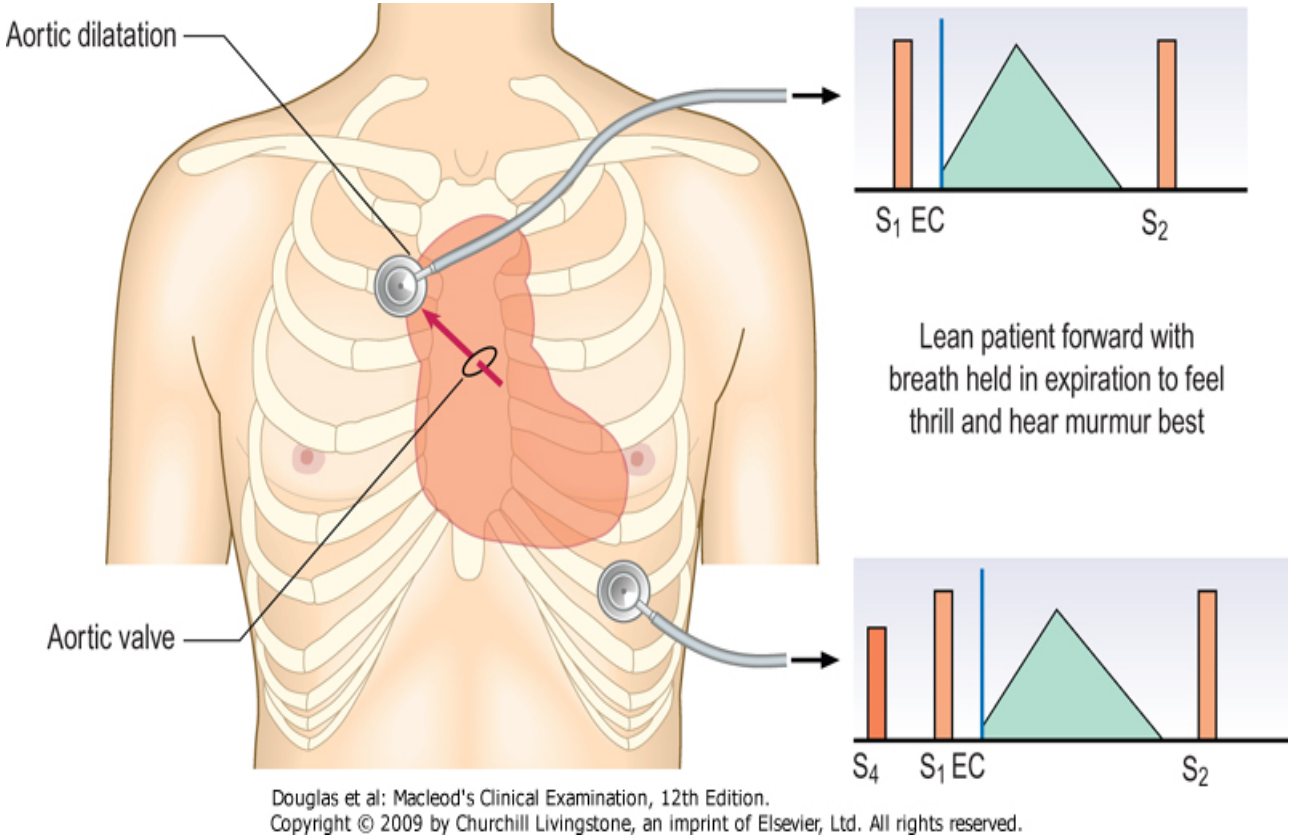
- **Increased flow through a normal valve**
  - Sever anemia/ fever/ athletes/ pregnancy
  - ASD (pulmonary flow murmur)
  - Increased stroke volume (aortic regurgitation)

- **Normal or reduced flow through a stenotic valve**
  - Aortic stenosis
  - Pulmonary stenosis

- **Subvalvular obstruction**
  - HOCM



Aortic stenosis Murmur



- **Timing: systolic**
- **Duration: after S1, peaks mid systolic, decrease before S2 (Crescendo-decrescendo murmur)**
- **Caracter: Harsh, Musical in children**
- **Pitch: high (Audible all over the precordium)**
- **Intensity: May be associated with thrill**

Location: Right 2nd ICS

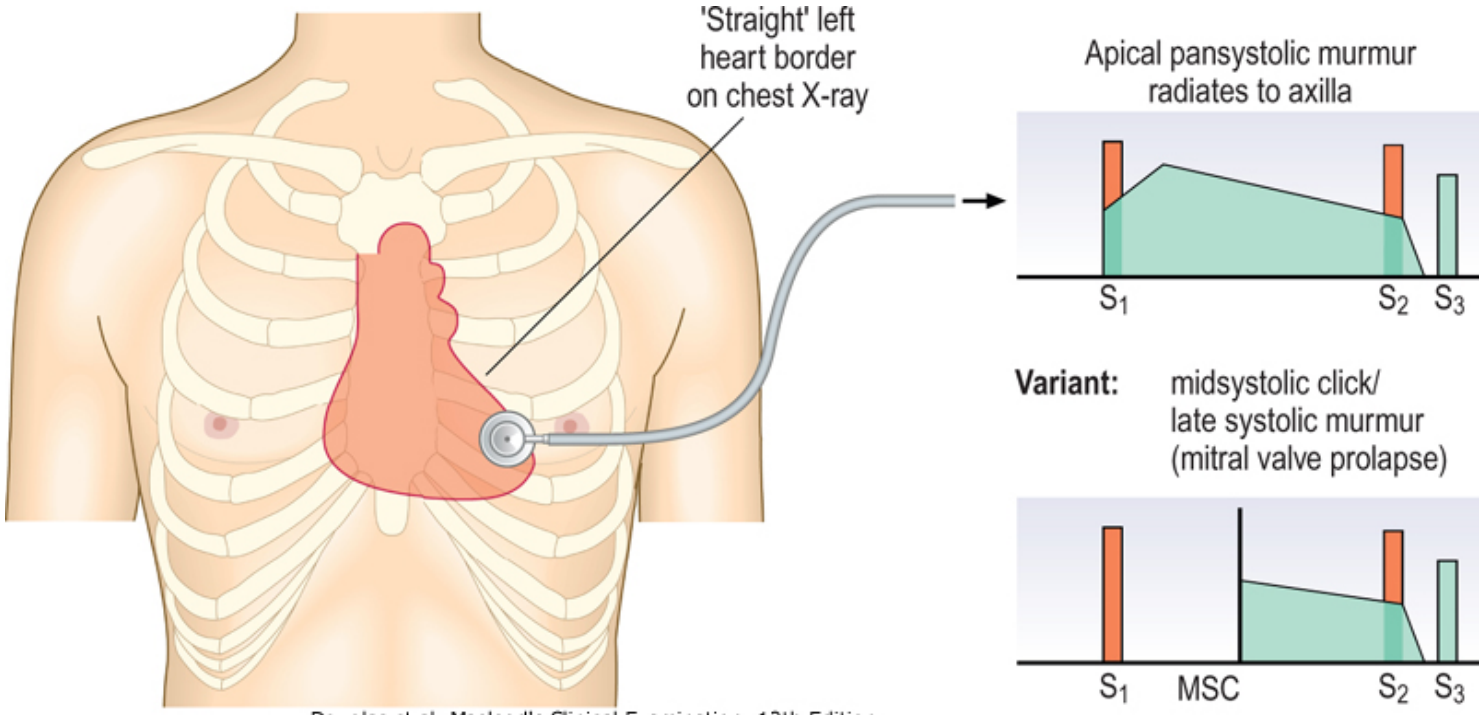
- **Radiation: carotids, suprasternal notch**

❖ **May follow ejection click**

"PULSES PARVUS ET TARDUS"

PERIPHERAL PULSES ARE OFTEN WEAK AND DELAYED

Mitral Regurgitation murmur



Douglas et al: Macleod's Clinical Examination, 12th Edition.

- **Timing: systolic**
- **Duration: pansystolic**
- **Character: blowing**
- **Pitch: high**

Intensity: may feel a thrill

Location: apex

Radiation: Left axilla

In mitral valve prolapse, regurgitation begins in mid-systole producing a late


Systole
Diastole
S_1
S_2

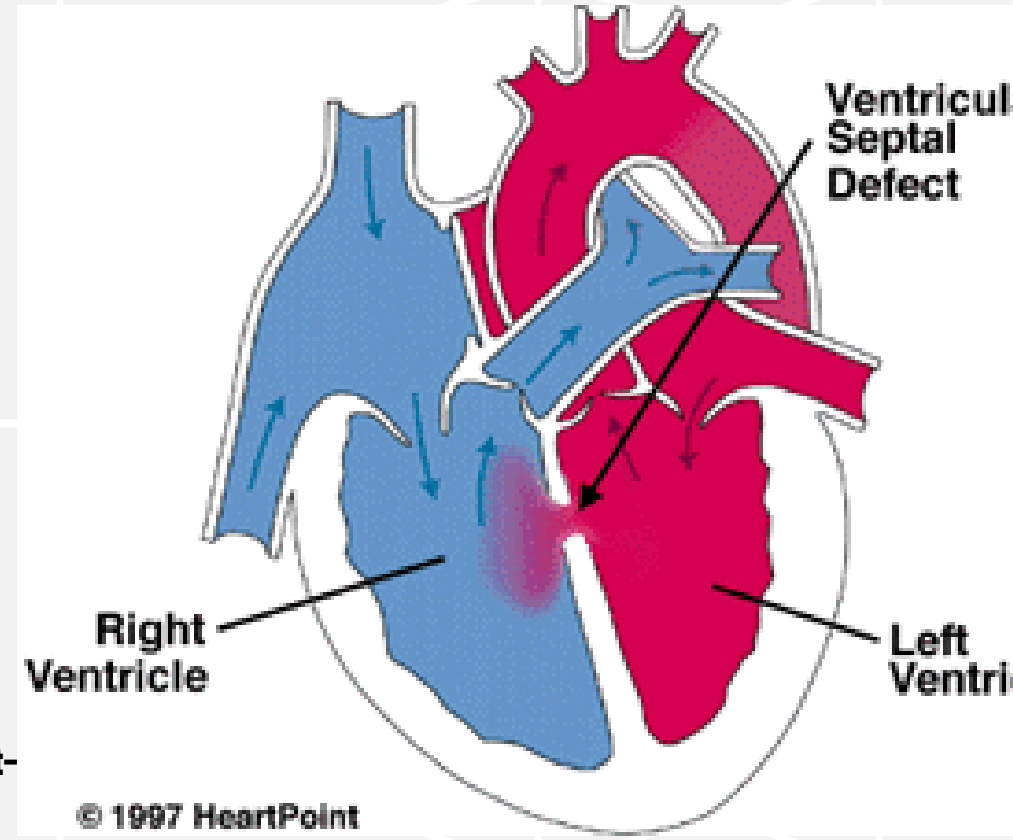
Tricuspid regurgitation

- Heard at the lower left sternal edge
- Prominent V wave in the JVP
- Pulsatile liver

Ventricular Septal Defect

- Loud murmur
- At the left sternal border
- Radiates to the right sternal border
- Associated with thrill
- Pansystolic

- Acquired VSD in septal rupture post-



Diastolic Murmurs

- **Early diastolic murmurs**

Usually lasts throughout the diastole but are loudest in early diastole

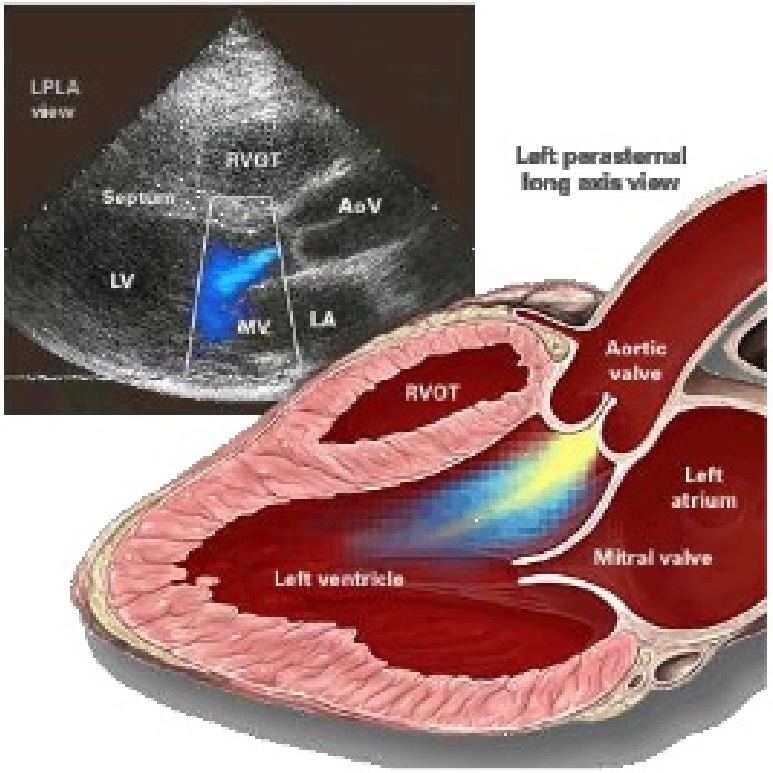
Aortic and pulmonary regurgitation

- **Mid-diastolic murmurs**

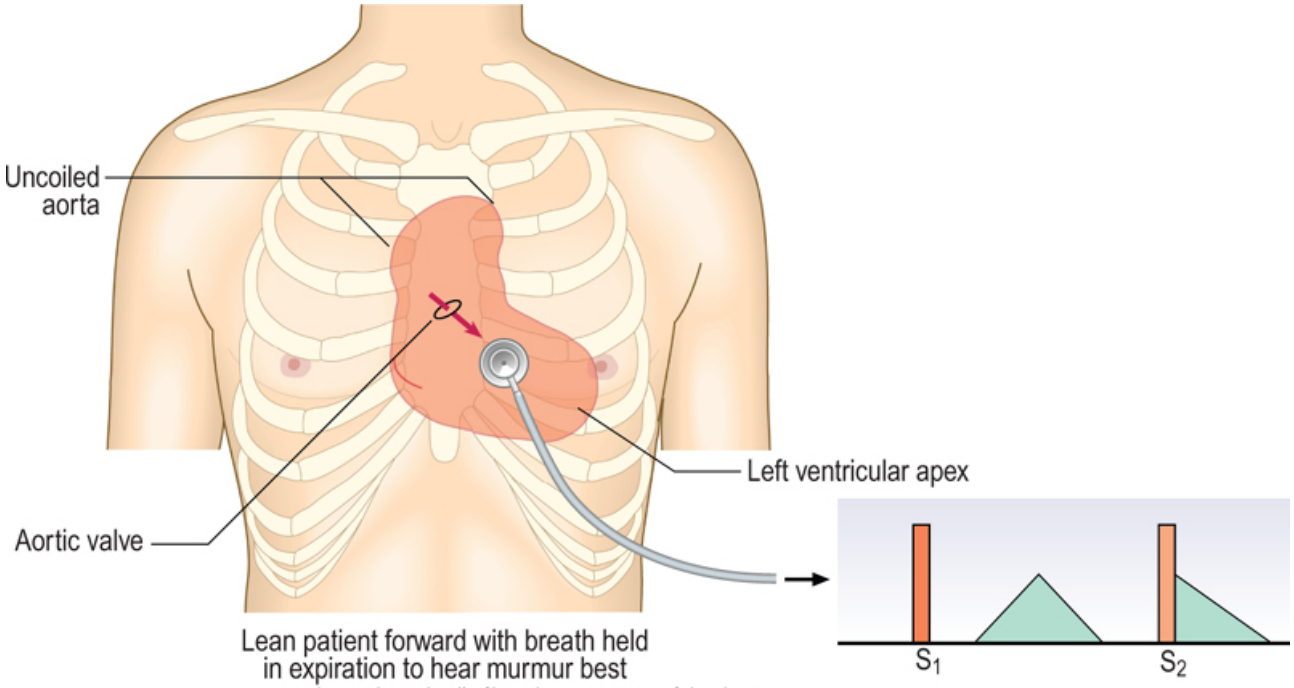
Mitral stenosis and Austin flint murmur

Austin Flint Murmur

- Mid-diastolic murmur that accompanies aortic regurgitation
- Caused by regurgitant jet striking the anterior leaflet of the mitral valve, restricting the inflow to the left ventricle



Aortic Regurgitation



- **Timing: early diastolic**
- **Pitch: low (ask the pt to lean forward and hold his breath in expiration)**
- **Location: 2 areas (Rt 2nd intercostal space, Lt third intercostal space-Erb's area)**

- **The duration of the murmur is inversely proportional to the the severity**
- **Can be associated with systolic flow murmur**

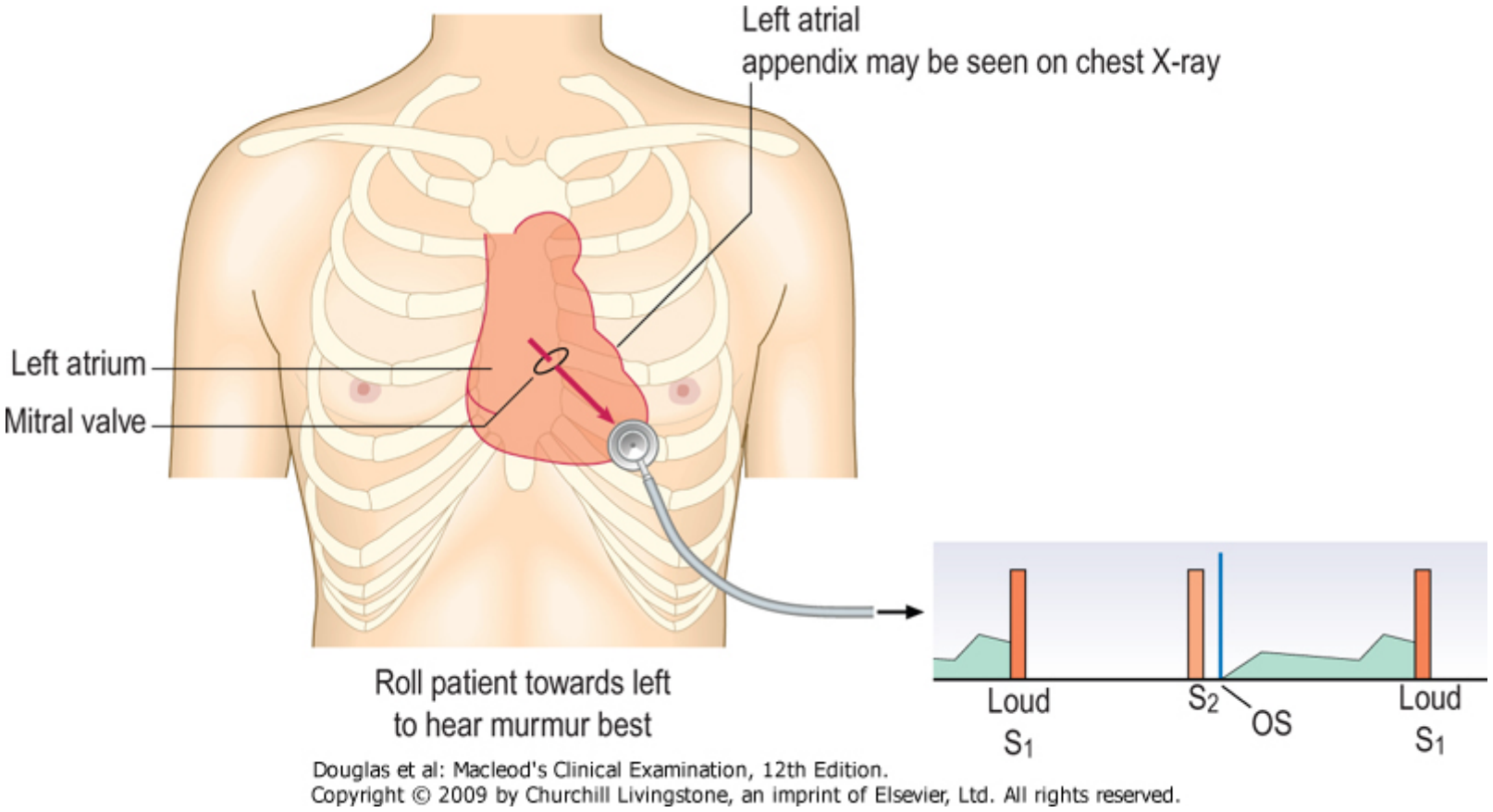
Pulmonary Regurgitation

- Pulmonary regurgitation caused by pulmonary dilatation in pulmonary hypertension

Graham Steel murmur

- Congenital defect of the pulmonary valve

Mitral Stenosis



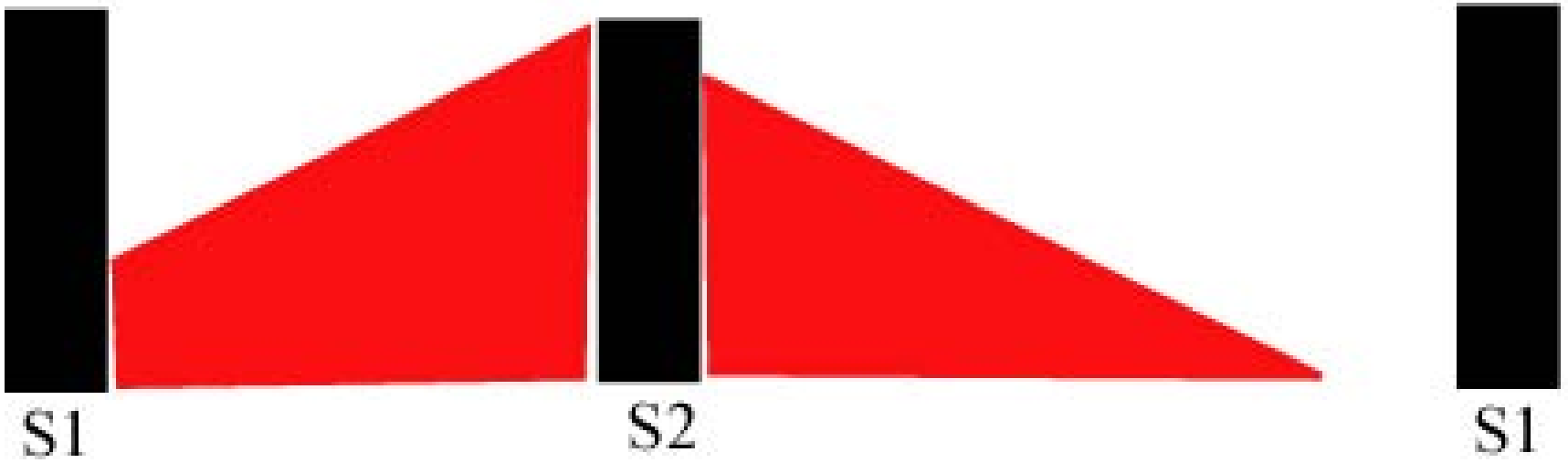
- **Timing: late diastolic**
- **Character: blowing**
- **Pitch: low (ask the pt to turn to the left)**
- **Location: apex**

- ❖ **May follow opening snap**
- ❖ **The murmur is accentuated by exercise**

Continuous Murmurs

- Rare in adults
- Patent ductus arteriosus is the most common cause
- Timing: systolic and diastolic
- Duration: continuous

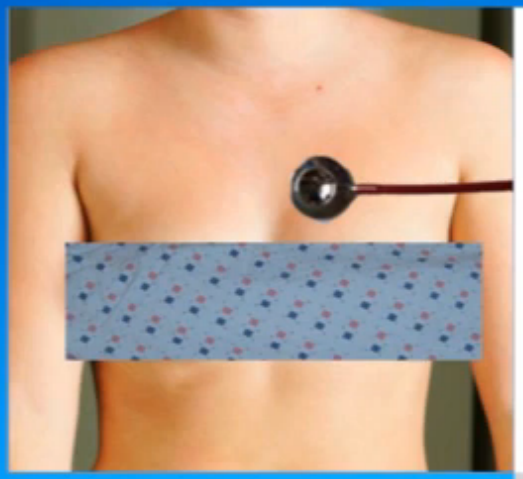
Patent Ductus Arteriosus

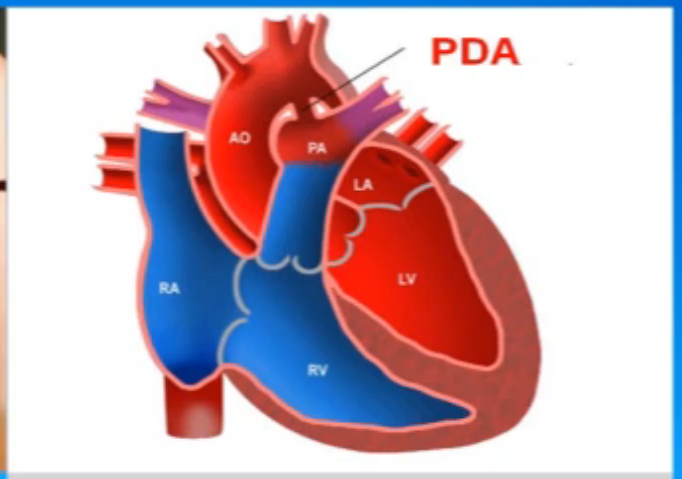


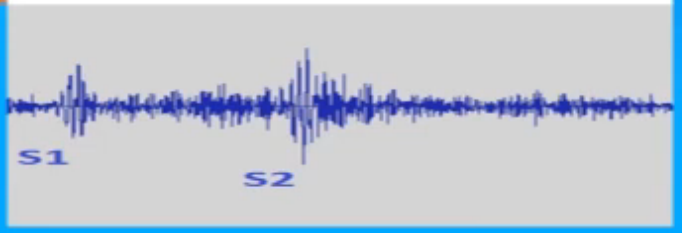
- Character: machinery-like
- Pitch: high pitch, louder in systolic
- Location: left infraclavicular
- Radiation: left scapula

❖ Aortic pressure always exceeds pulmonary pressure , there is continuous ductal flow with the greatest pressure difference in systole resulting in a louder systolic component

PATENT DUCTUS ARTERIOSUS





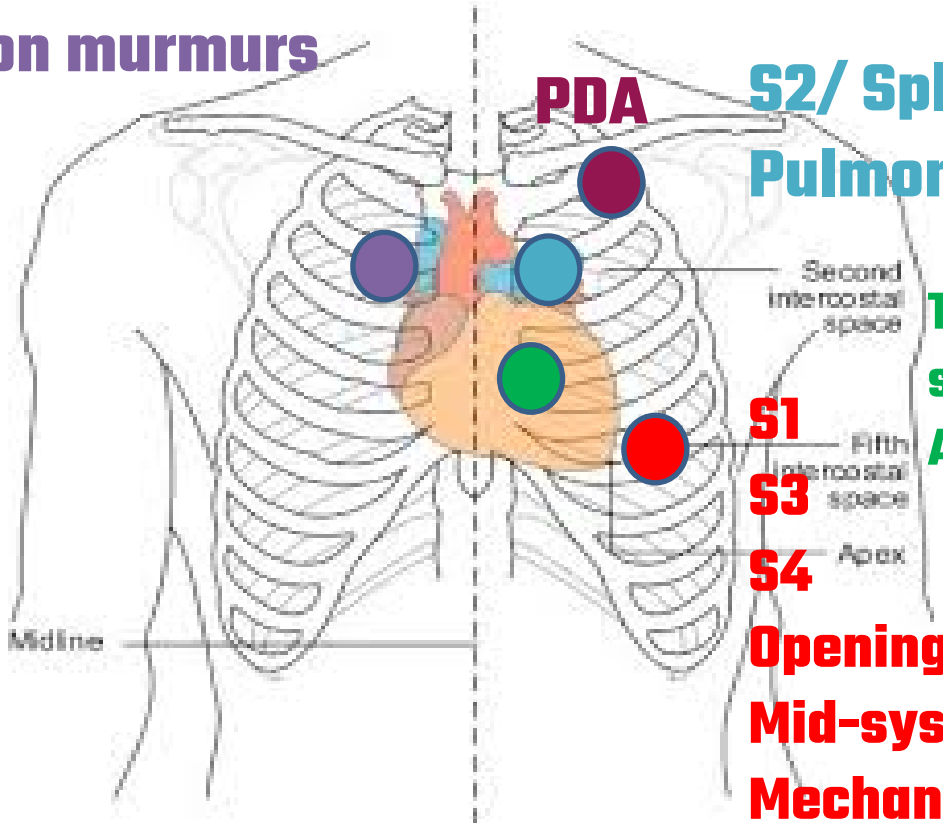


Mechanical aortic valve

Systolic Ejection murmurs

HOCM

Aortic regurg



S2/ Split

Pulmonary murmurs

Tricuspid Regurg/ stenosis

S1

Aortic regurg

S3

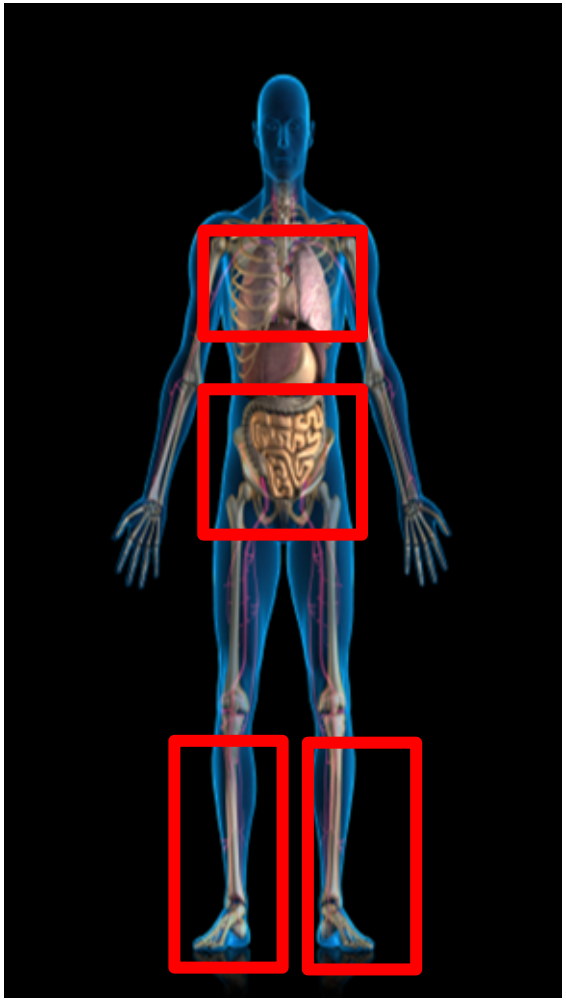
S4

Opening snap

Mid-systolic click

Mechanical mitral valve

Mitral Regurg/Stenosis



Complete your examination

- Auscultate the lung for crackles and pleural effusion
- Examine the abdomen for ascites
- Auscultate for Bruit
- Examine lower limb/ sacrum for edema

Aortic Stenosis

- Slow rising pulse
- Displaced apex beat, S4
- Apical heave
- Thrill over the apex and right upper sternal boarder
- Ejection systolic murmur right upper sternal boarder radiating to the carotids
- Ejection click
- Reversed splitting S2

Mitral stenosis

- Tapping apex beat
- Opening snap
- Mid-diastolic murmur at the apex
- Loud S1

HOCM

- Bisferiens pulse
- Double apical impulse
- Ejection systolic murmur
- Reversed splitting S2

VSD

- Right and left sternal border thrill
- Pansystolic murmur left sternal border
- Wide splitting S2

Tricuspid Regurgitation 2nd to pulmonary HTN

- Giant V wave in JVP
- Left parasternal heave
- Wide splitting/ loud S2
- Graham steel murmur (if pulmonary artery dilates)