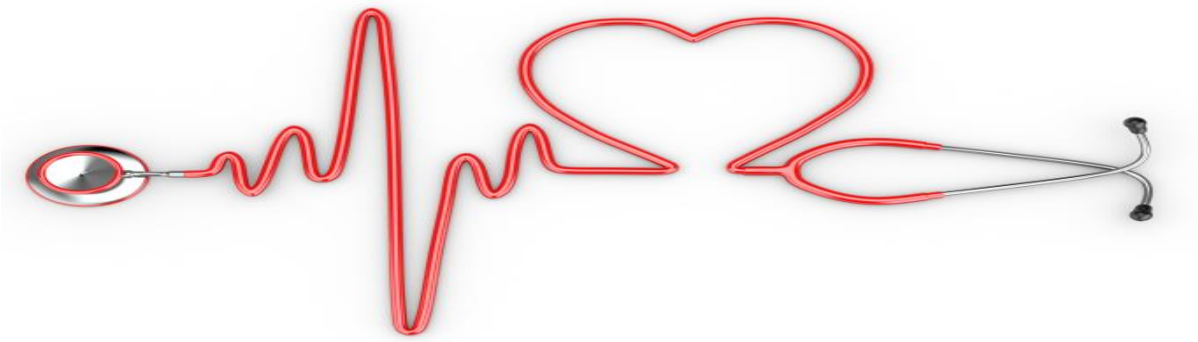
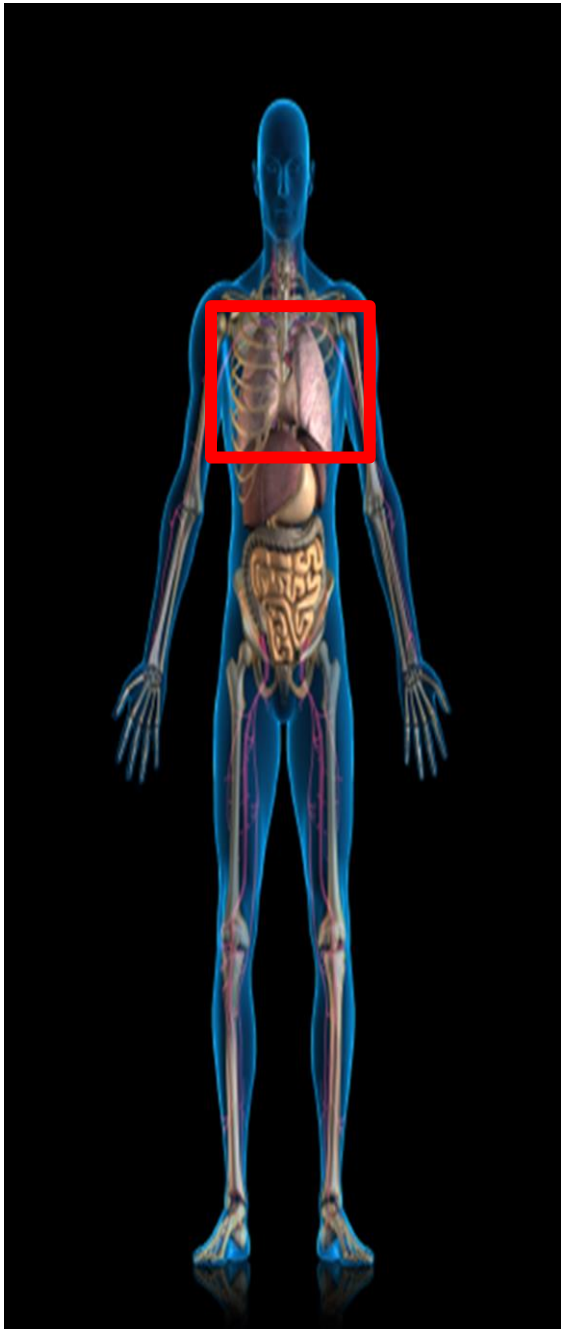
Cardiovascular System Examination

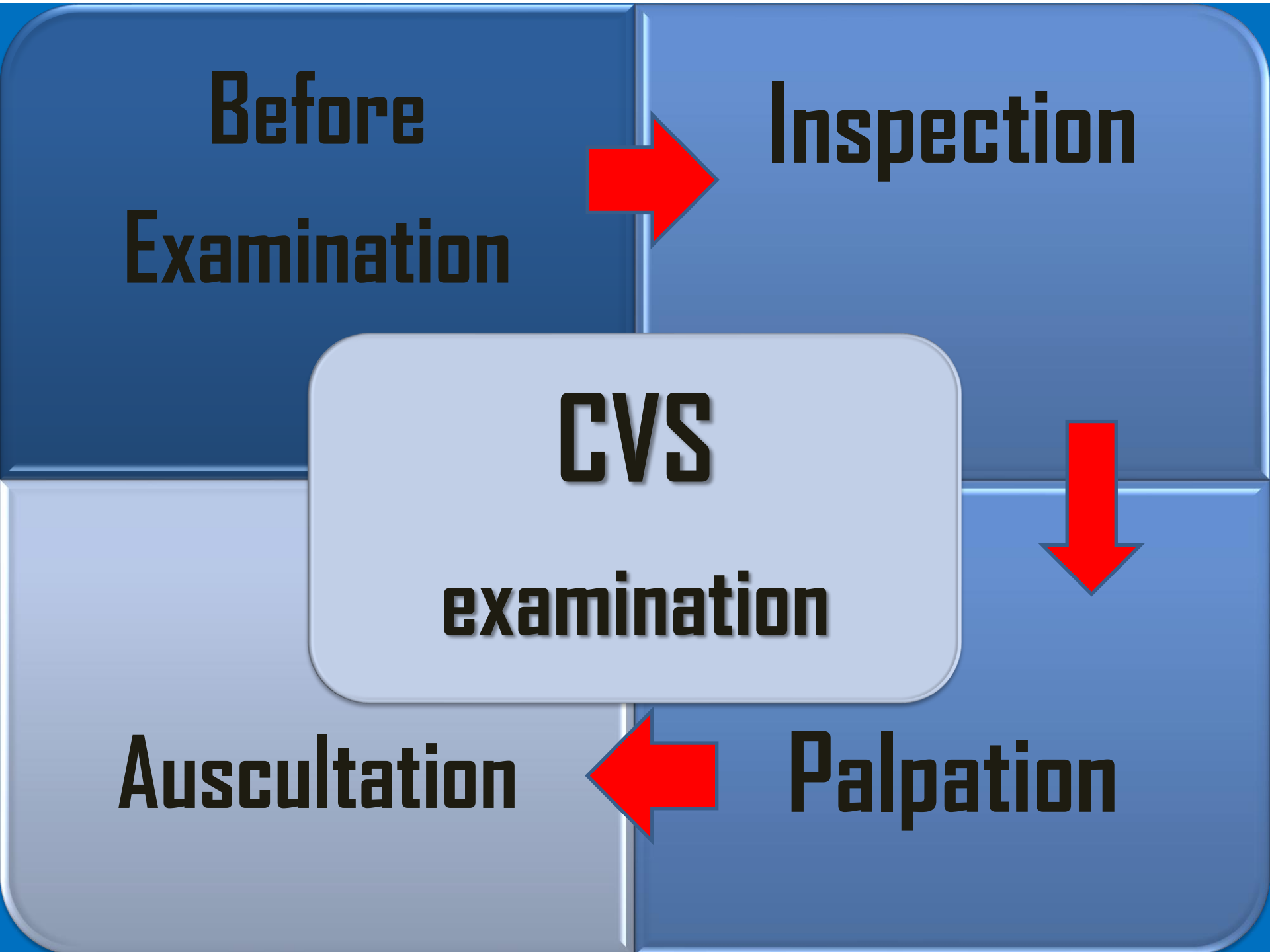
Part 2

Farah Abuazzam





Precordium


Before Examination
Inspection
CVS
examination
Auscultation
Palpation

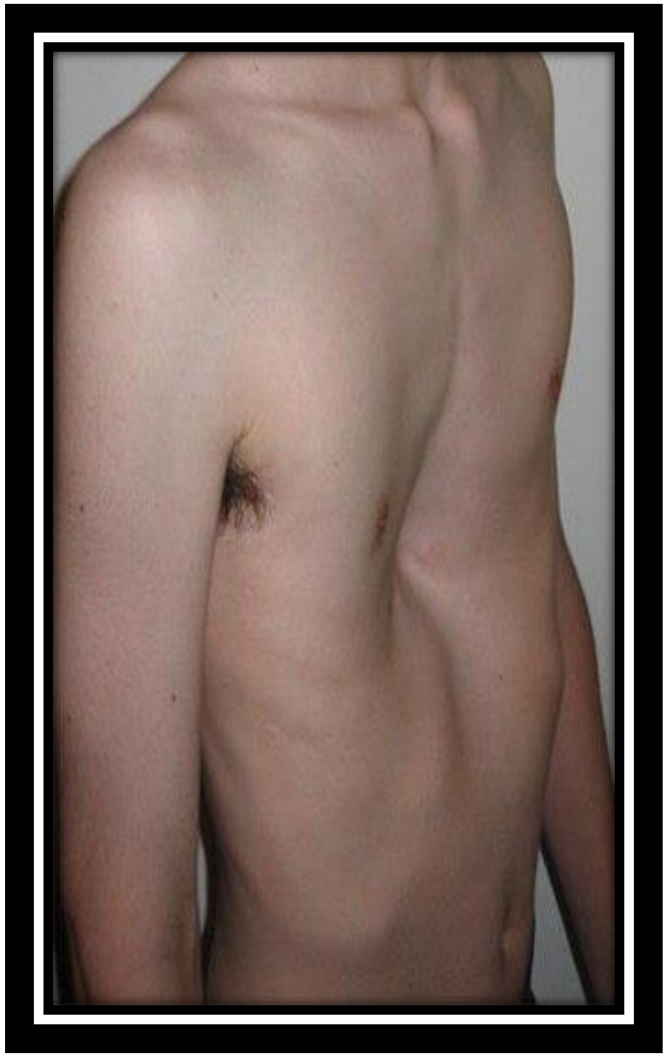
Before Examination

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

Inspection

From the foot of the pt:

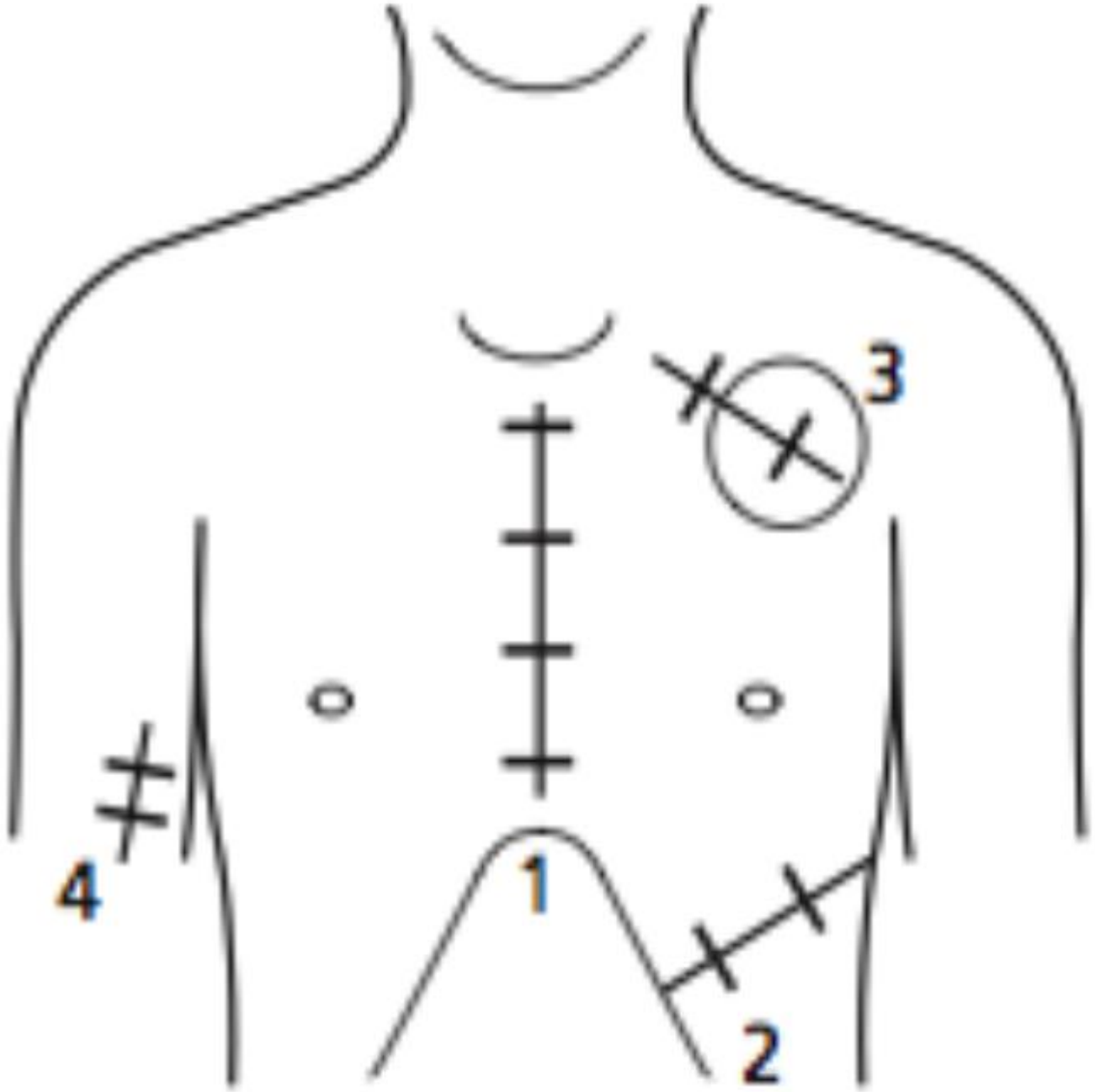
- Symmetry
- Deformity
- Moves with respiration




The 7+
ZERO

From the right side:

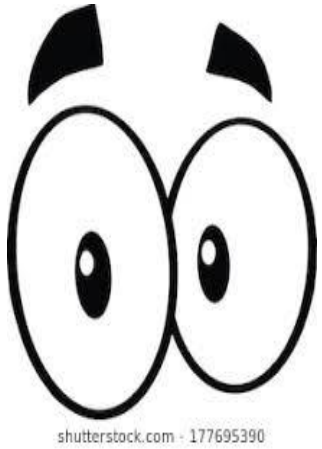
- Hair distribution
- Scars and skin lesions
- Dilated veins
- Visible pulsation and apex beat


3
4
1
2


alamy


CyberLink
by PowerDirector

Palpation



Eye contact

Ask about tender areas

1. Apex beat

position and character

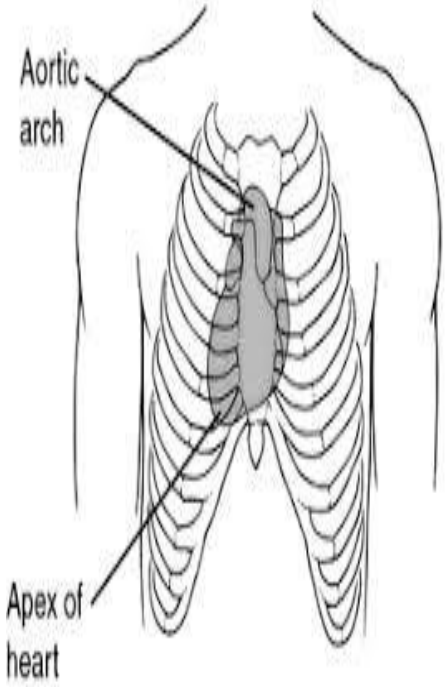
- General palpation using flat of your right hand over the precordium for general impression, then locate it by your fingers lying parallel to ICS then locate with 2 fingers.
- If not palpable, roll the patient to the left side

** **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

2. Heave

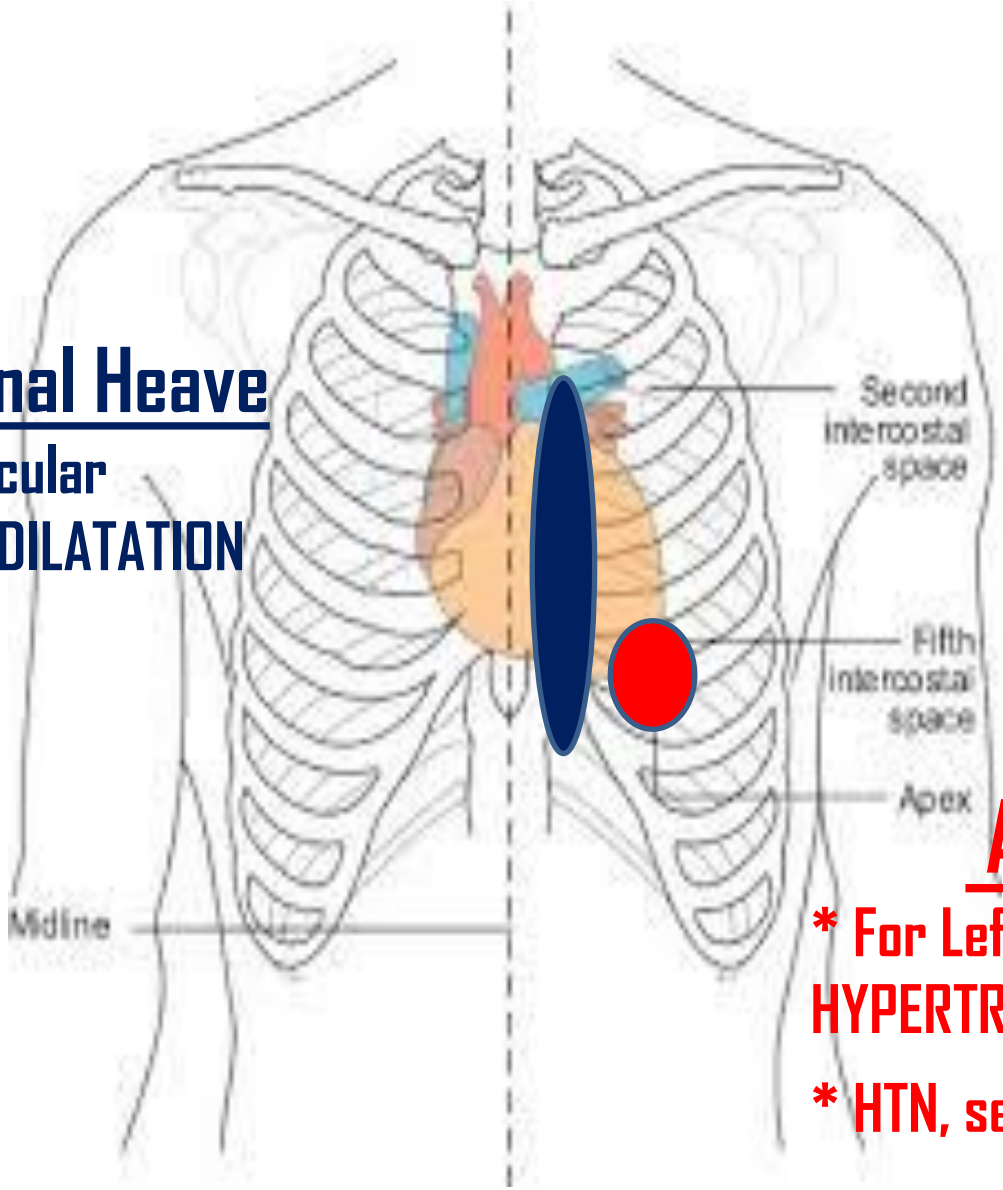
- Abnormal palpable impulse that noticeably lifts your hand

- Palpate with the heel of your right hand firmly over 2 areas:

1) Lt lower parasternal area (hold breath in expiration)
2) Apex area

Left parasternal Heave

* For Right Ventricular HYPERTROPHY or DILATATION
* Pulmonary HTN



Apical Heave

* For Left Ventricular HYPERTROPHY
* HTN, severe aortic stenosis

3. Thrill

– The tactile equivalent of a murmur, palpable vibration

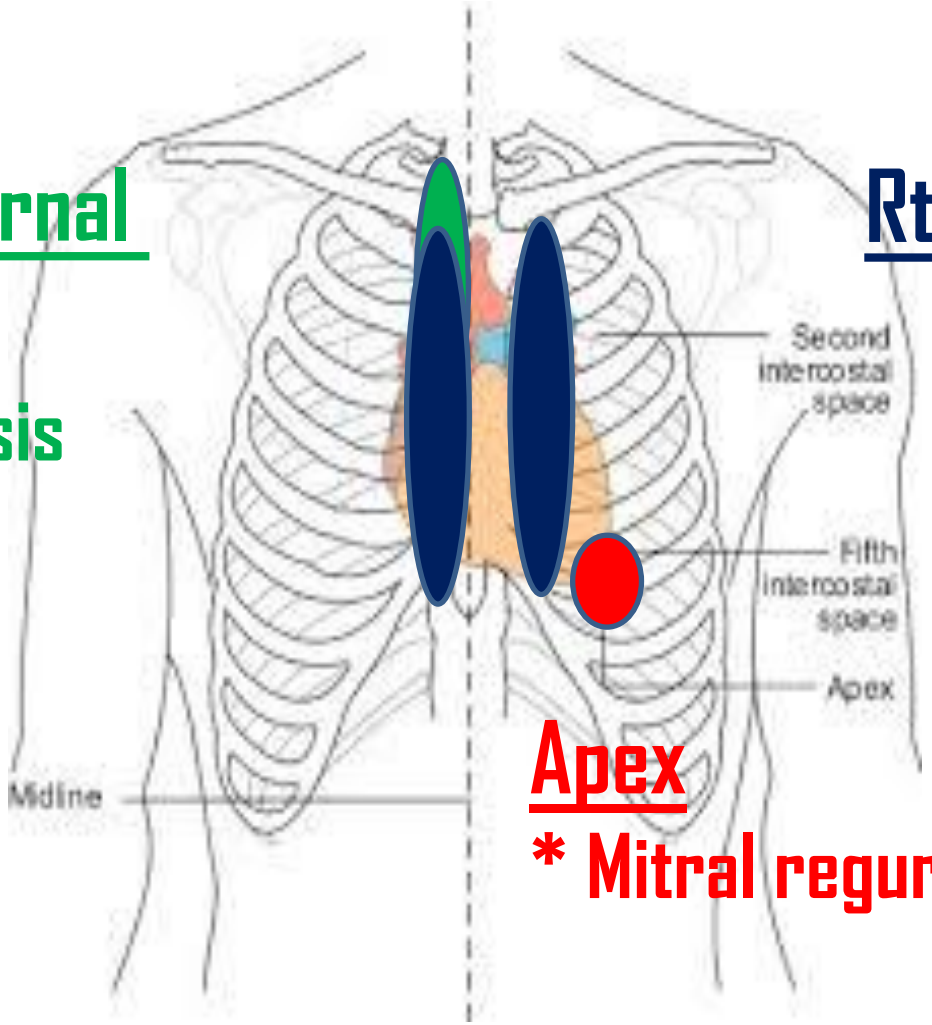
(PALPABLE MURMUR)

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



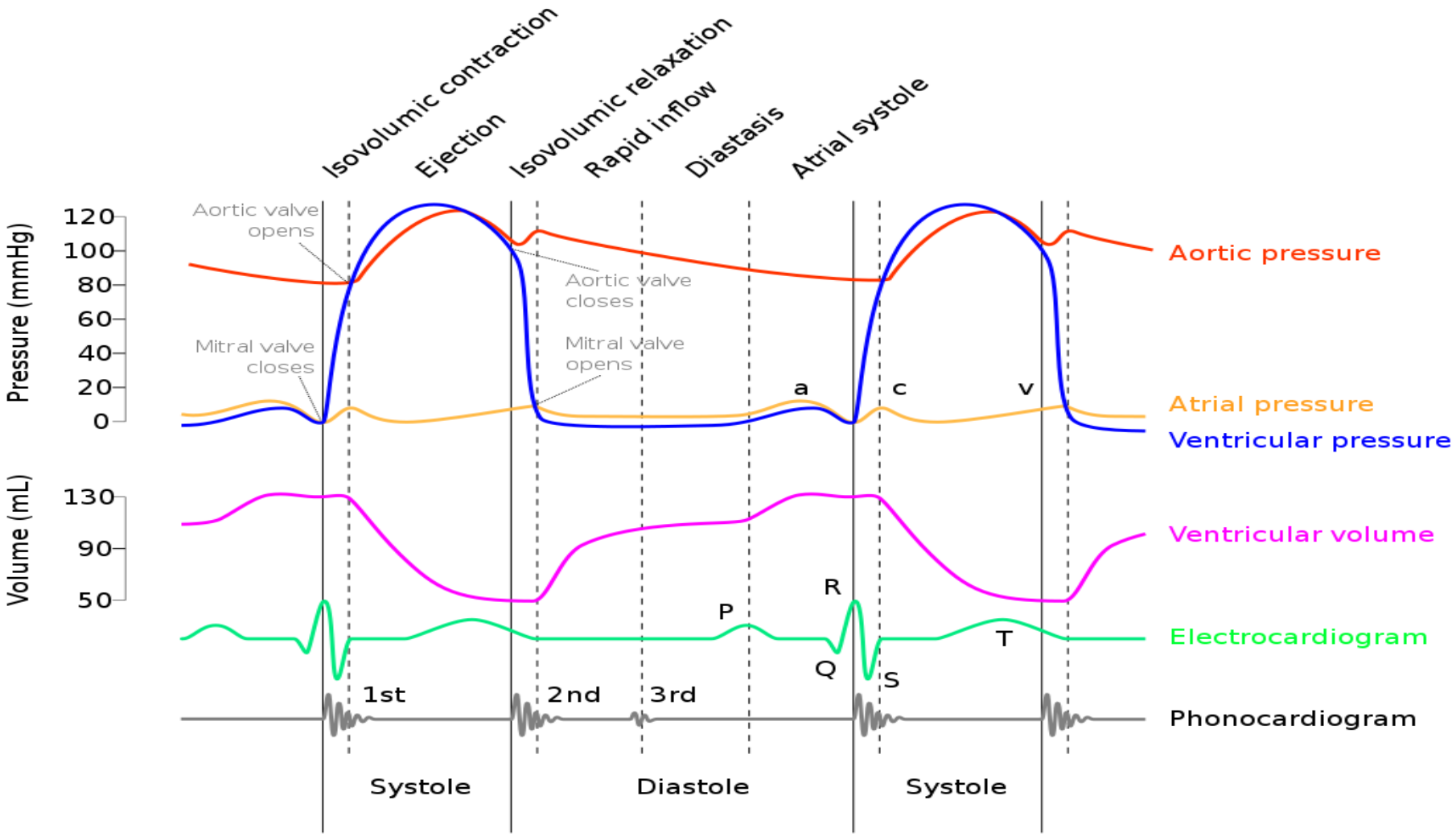
Rt and Lt sternal borders

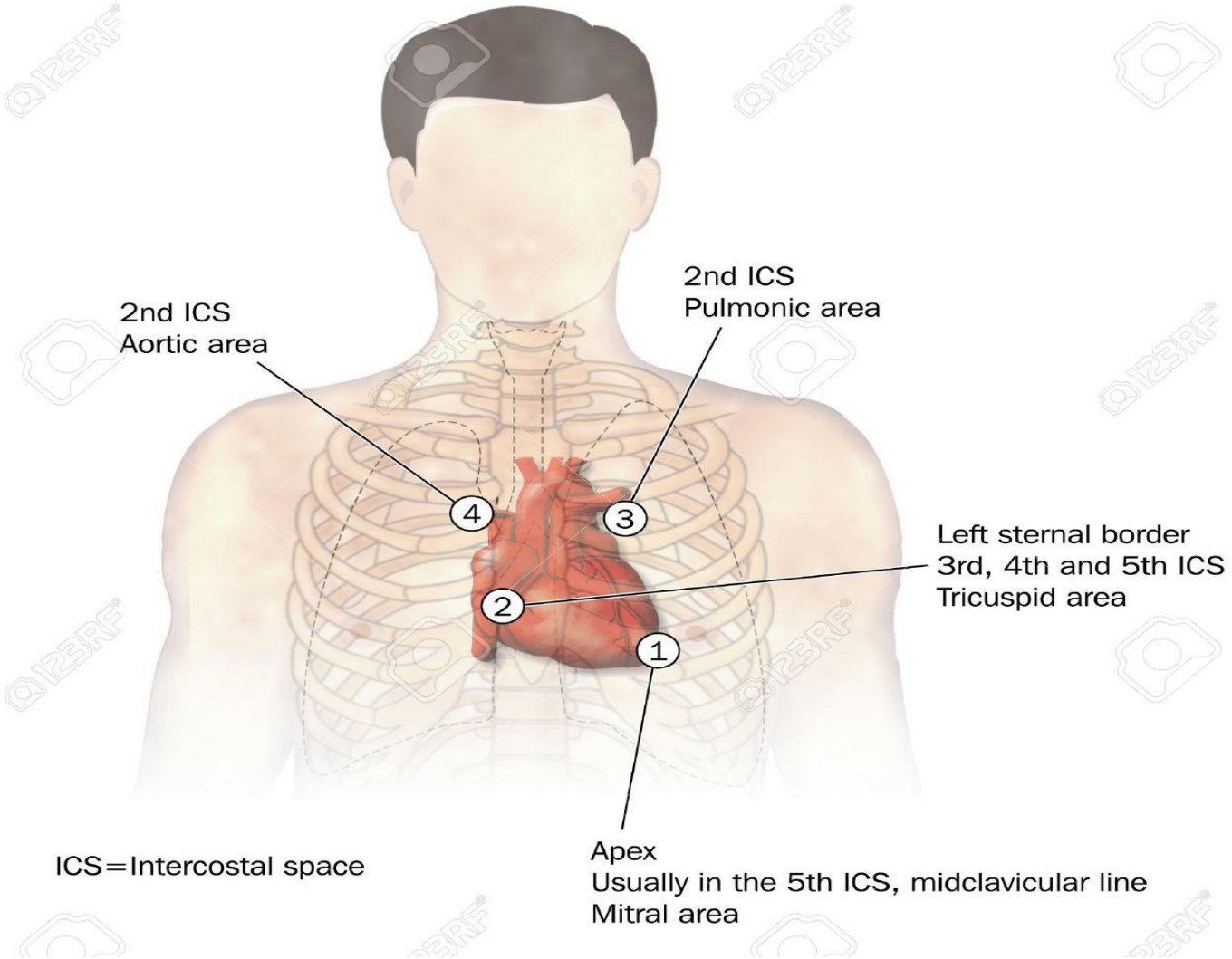
* VSD

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


2nd ICS
Aortic area
2nd ICS
Pulmonic area
4
3
Left sternal border
3rd, 4th and 5th ICS
Tricuspid area
2
1
ICS=Intercostal space
Apex
Usually in the 5th ICS, midclavicular line
Mitral area

Heart sounds

PLEASE,
PUT ON HEADPHONES

First heart sound, S1

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

Abnormal intensity of S1

Quiet

- Low cardiac output
- Poor Lt ventricular function
- Rheumatic mitral regurgitation
- Long PR interval

Loud

- Increased cardiac output
- Large stroke volume
- Mitral stenosis
- Short PR interval
- Atrial myxoma

Variable

- Atrial fibrillation
- Complete heart block
- Extrasysytole

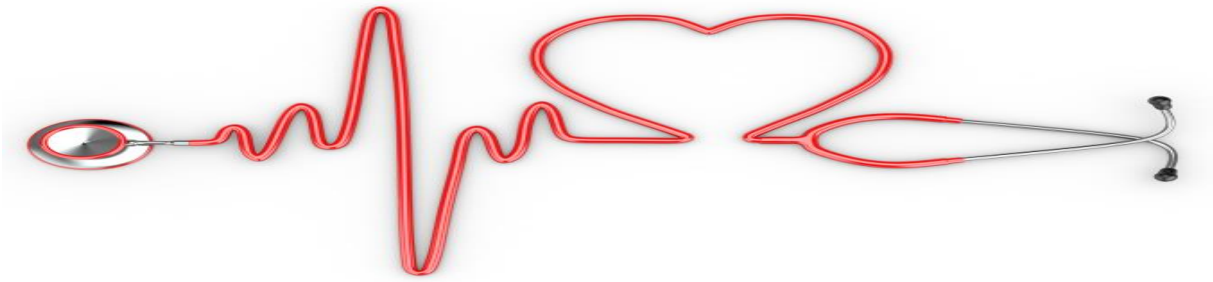
Second heart sound, S2

- Closure of Aortic and pulmonic valves.
- At end of ventricular systole.
- Heard on left sternal edge.

- Has 2 components;

1) aortic component A2

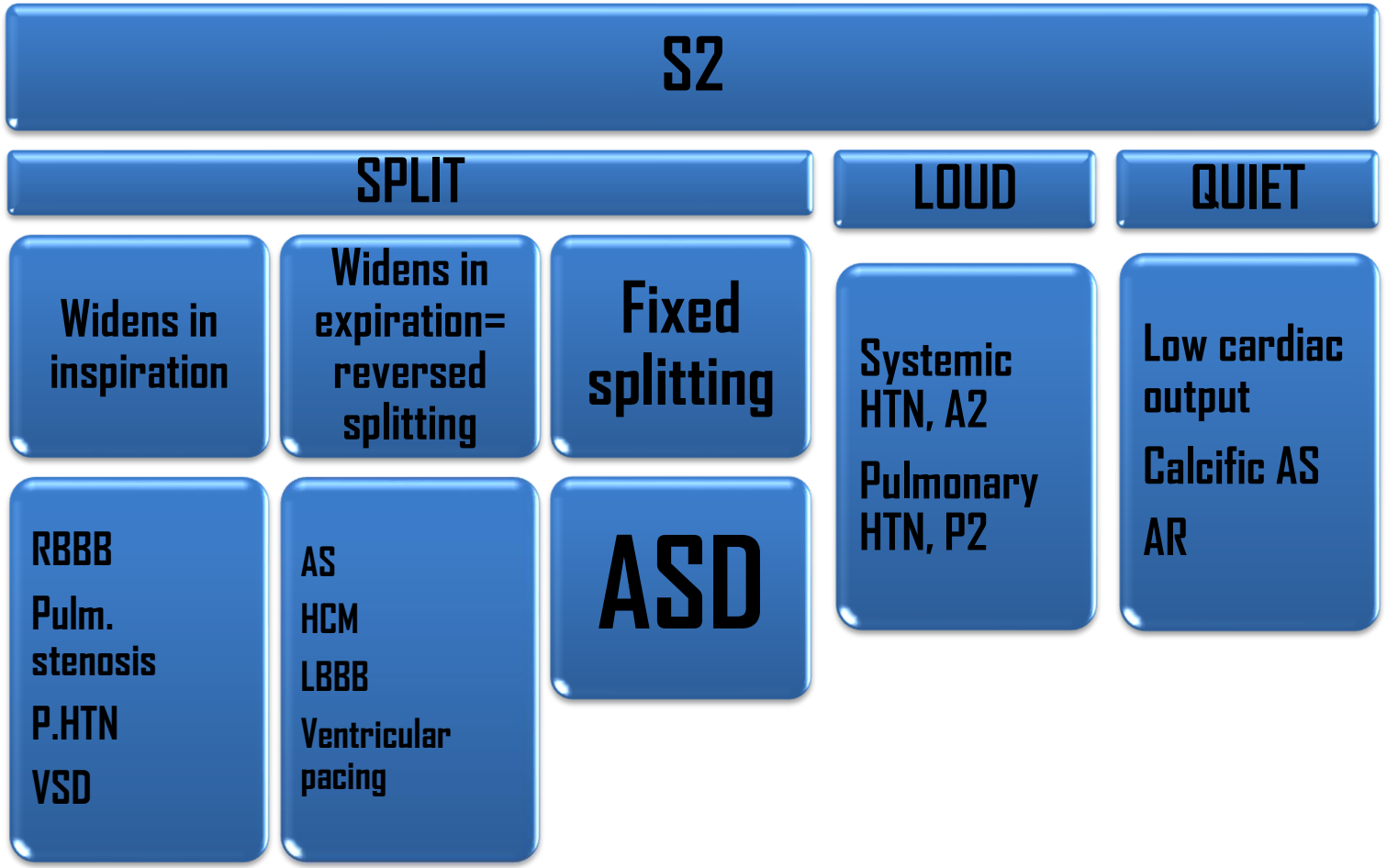
2) Pulmonic component P2

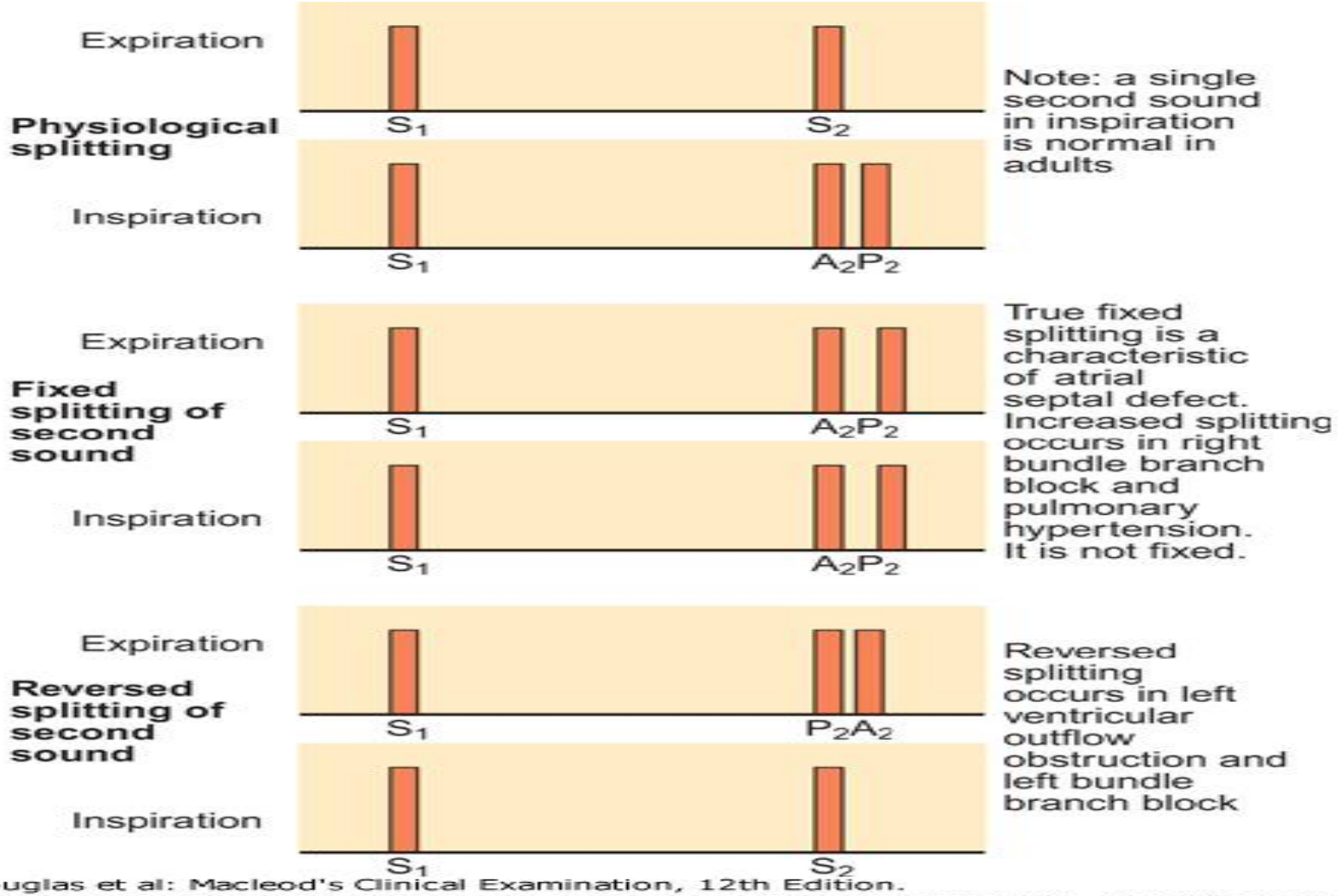


S2 splitting

- 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





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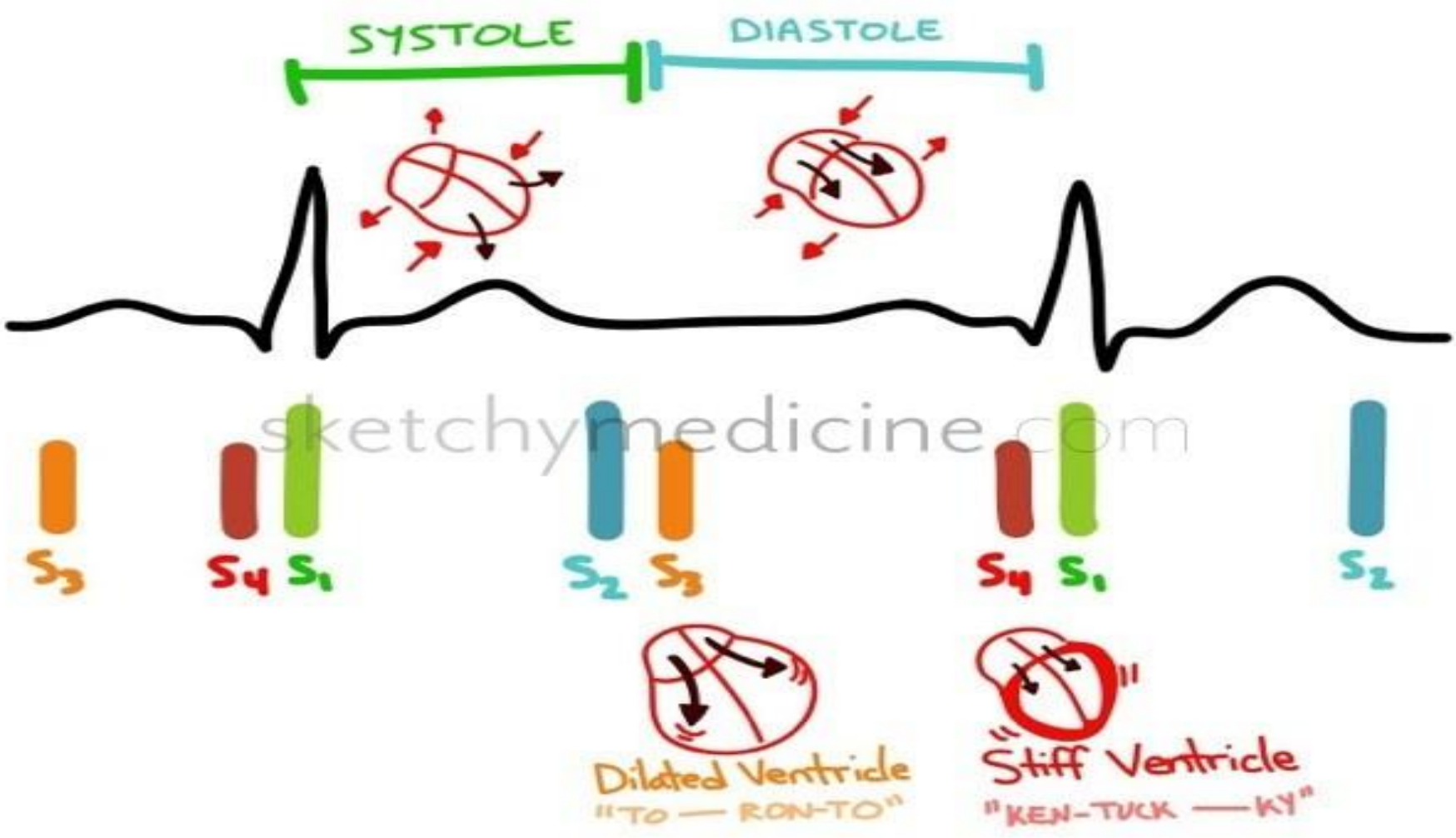
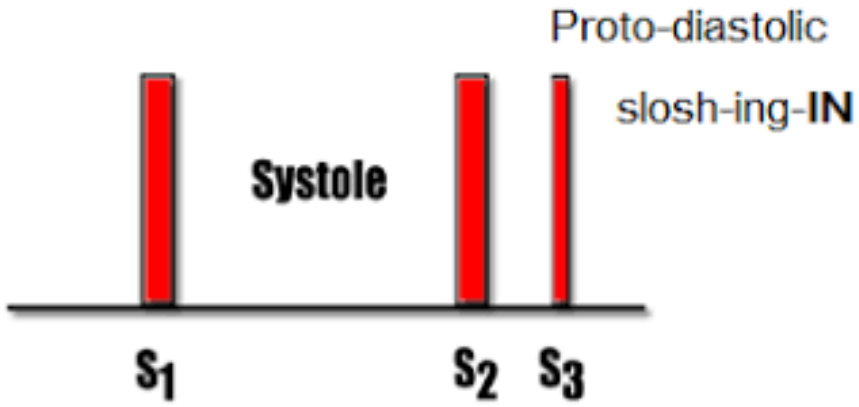
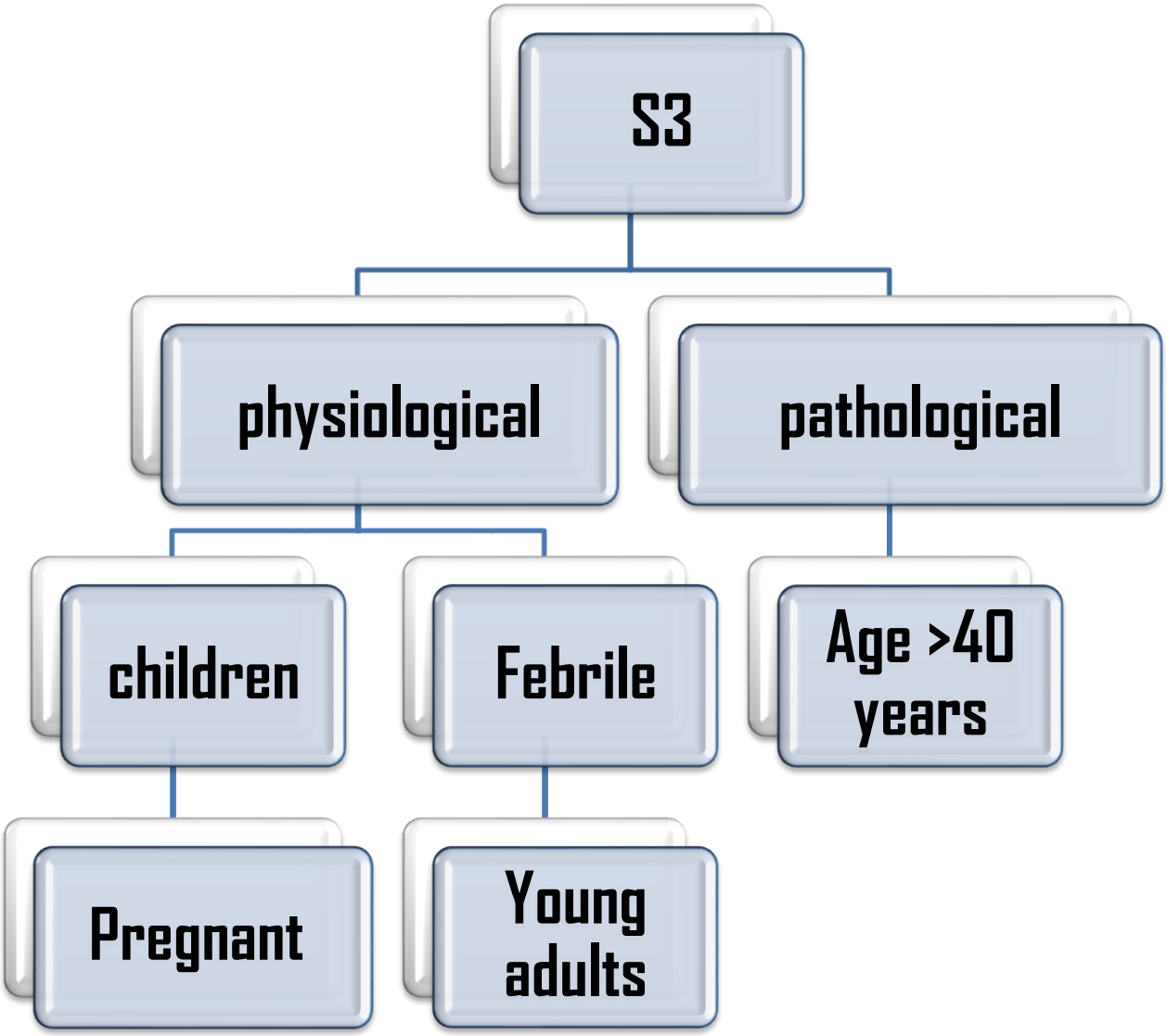

SYSTOLE
DIASTOLE
sketchymedicine.com
S3
S4 S1
S2 S3
S4 S1
S2
Dilated Ventricle
"TO — RON-TO"
Stiff Ventricle
"KEN-TUCK — KY"

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




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

Pathological S3 causes:

1) LV failure

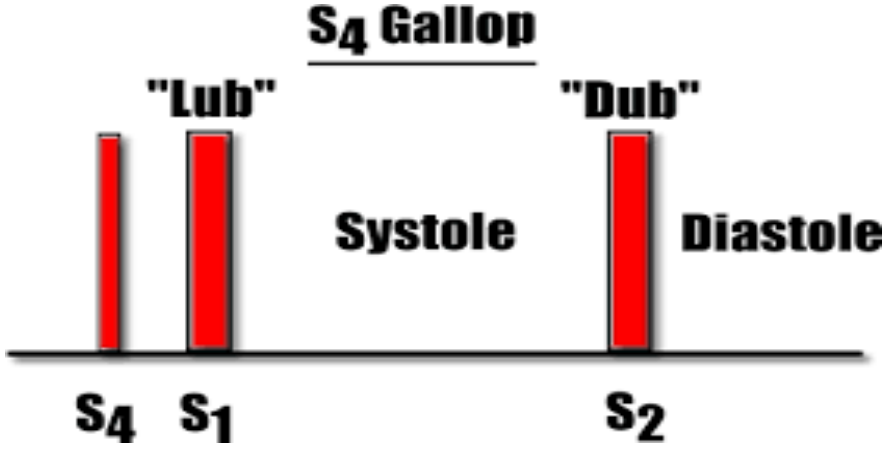
2) MR

- **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.

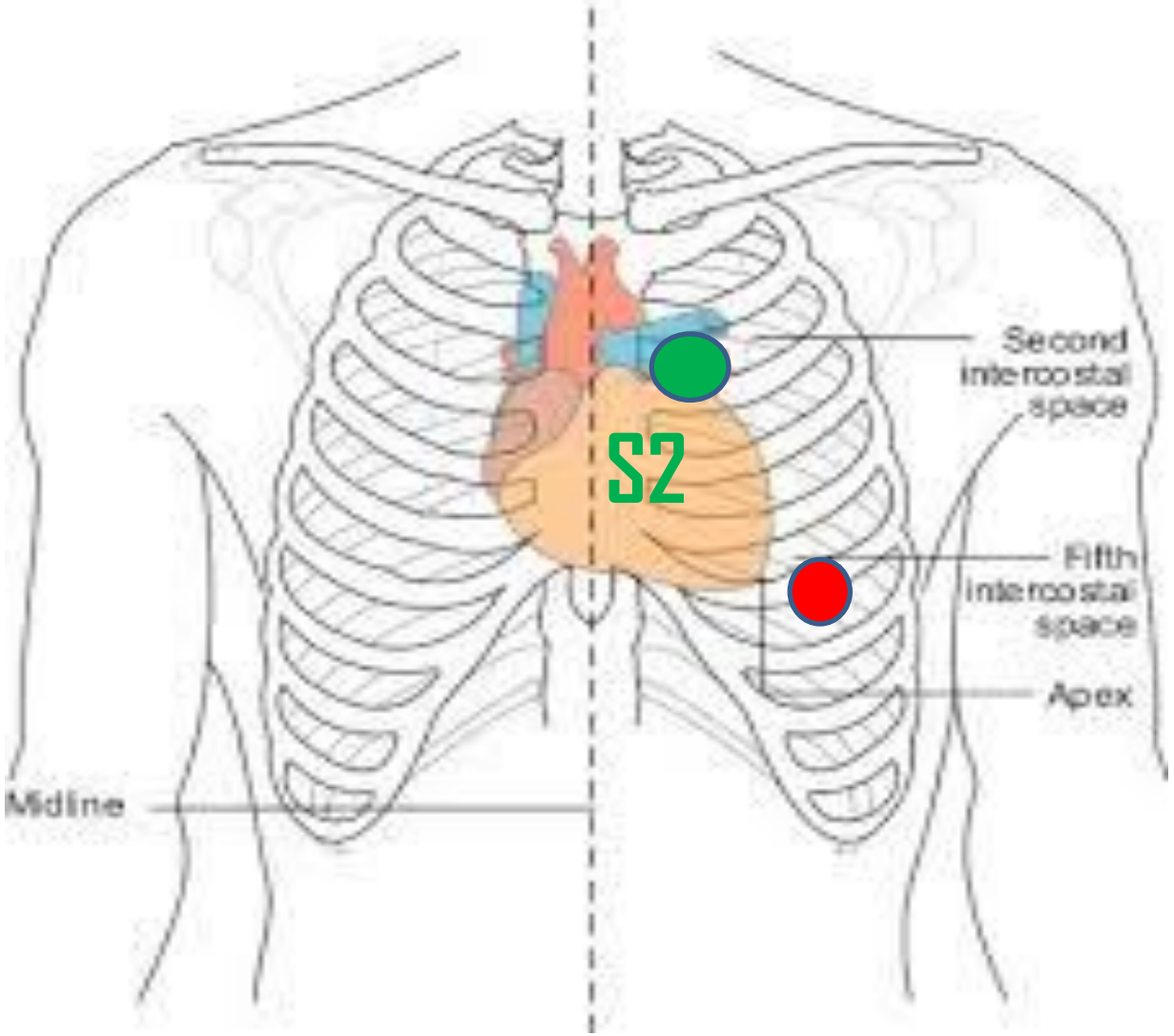


- **Causes of S4:**

1) HTN
2) AS
3) HCM

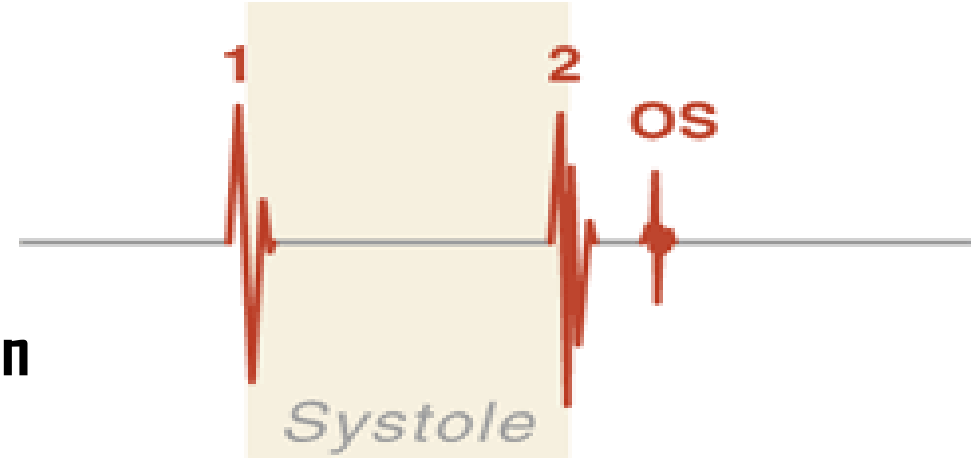
** CANNOT OCCUR IN CASE OF ATRIAL FIBRILLATION.

- Atrial gallop= S4 gallop= S4+ tachycardia


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

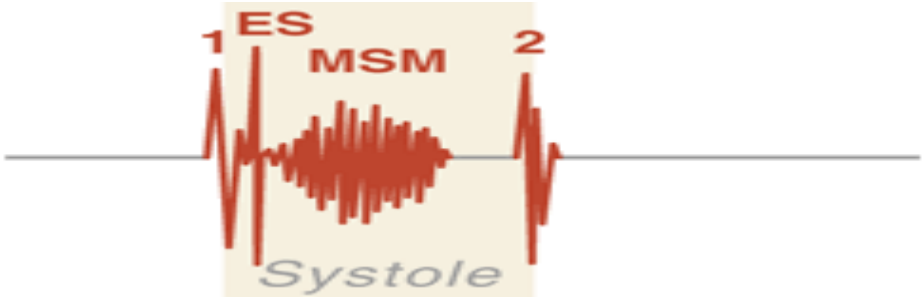
Added Sounds

Opening snap



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

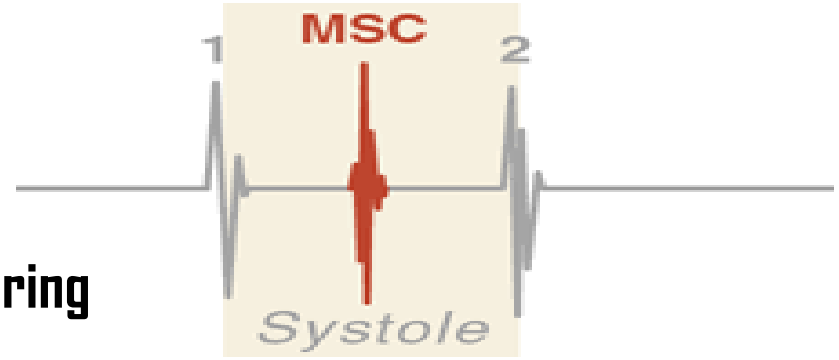
Ejection click



- Opening of stenosed valve in SYSTOLE.
- Congenital pulm./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

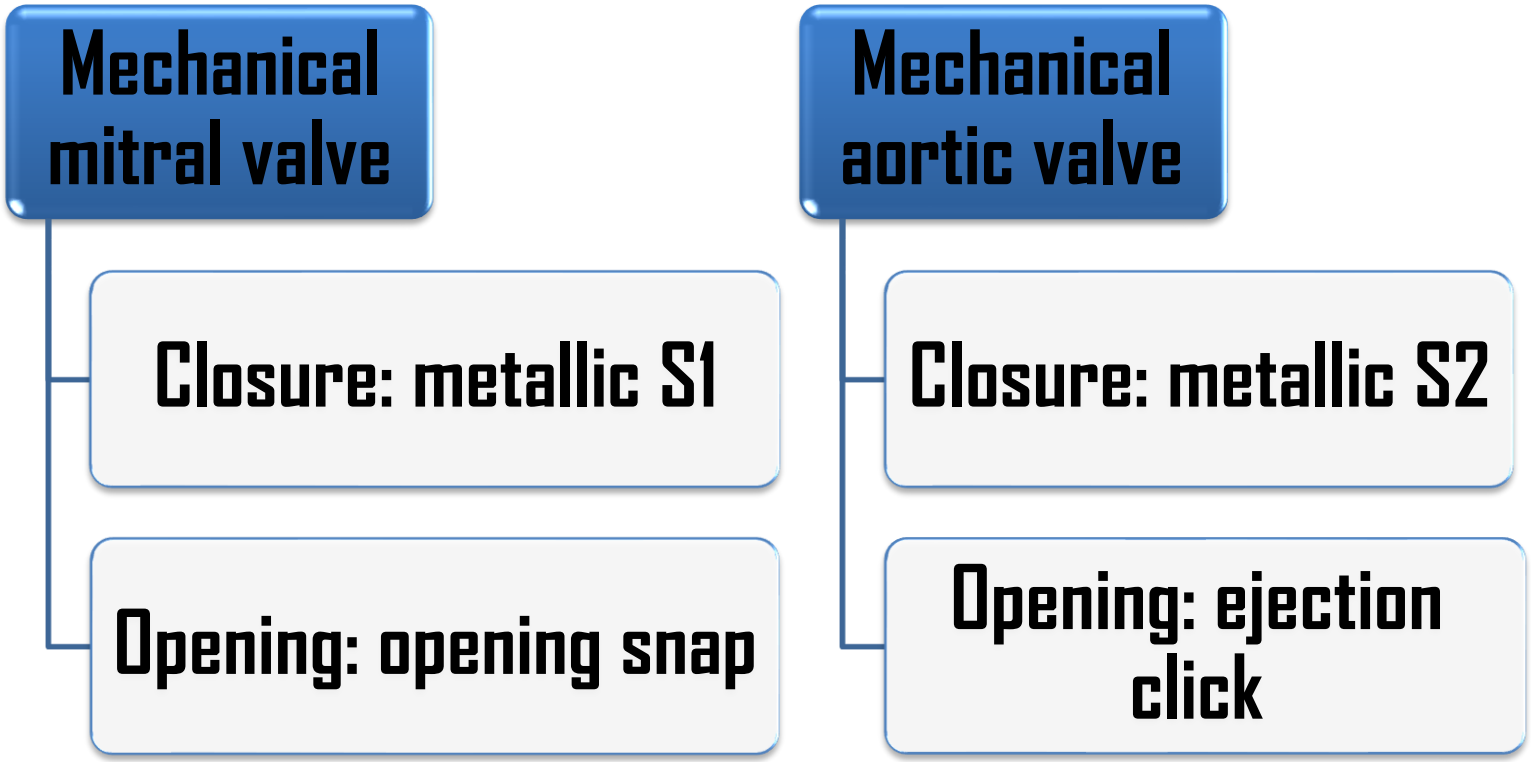
Mid-systolic click

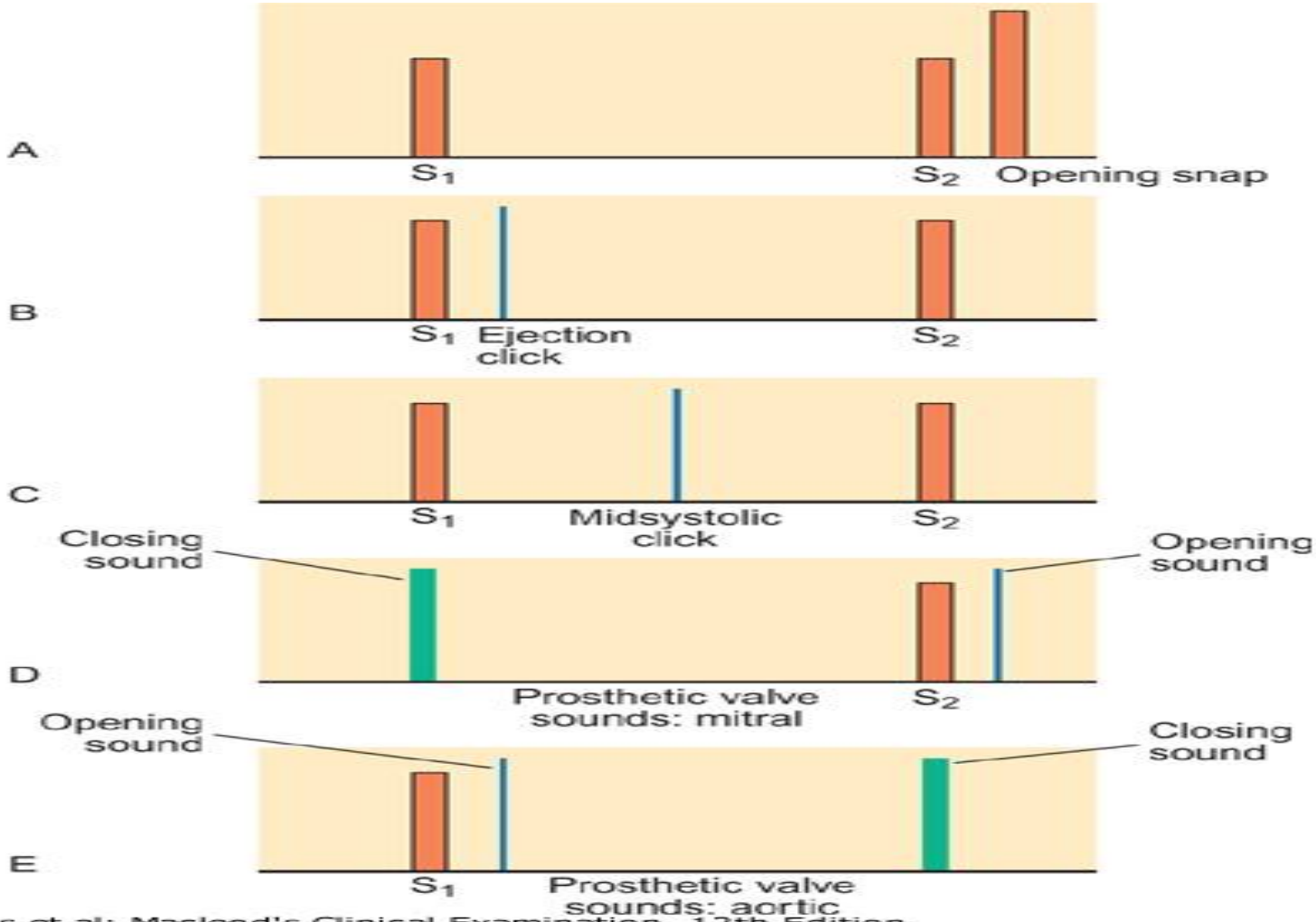


- Sudden tensing of prolapsed leaflet during SYSTOLE.
- Mitral valve prolapse.
- High-pitched, at the apex via diaphragm.

Mechanical Heart Sounds

- High-pitched metallic and often palpable.





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Pericardial Friction Rub

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

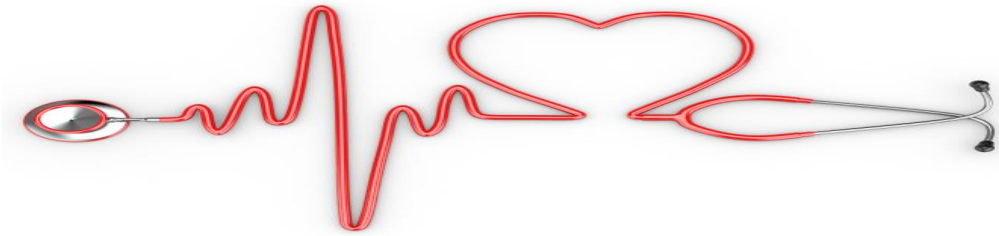
- Causes:

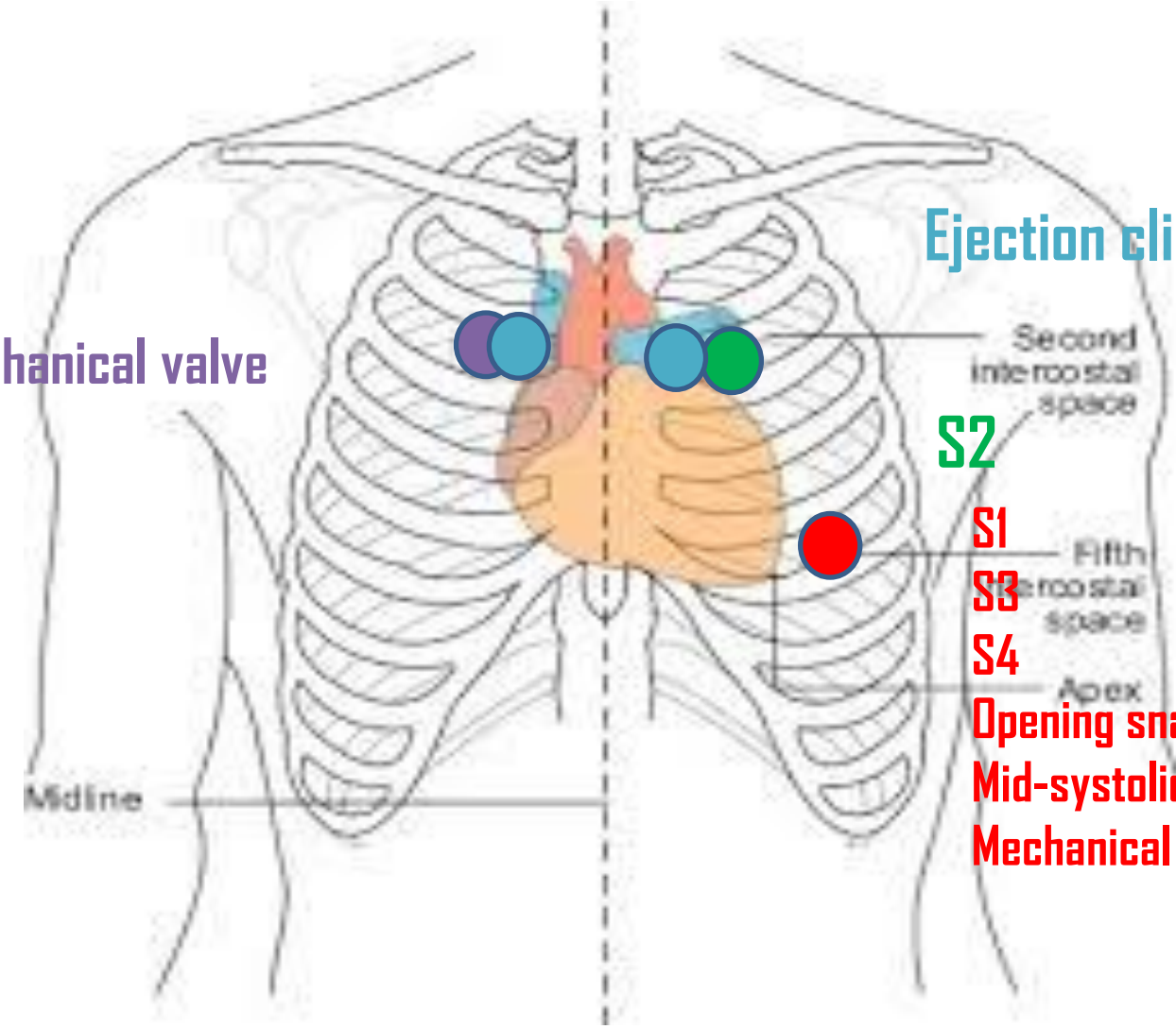
1) Acute pericarditis

2) Few days post-extensive myocardial infarction

** Pleuropericardial rub

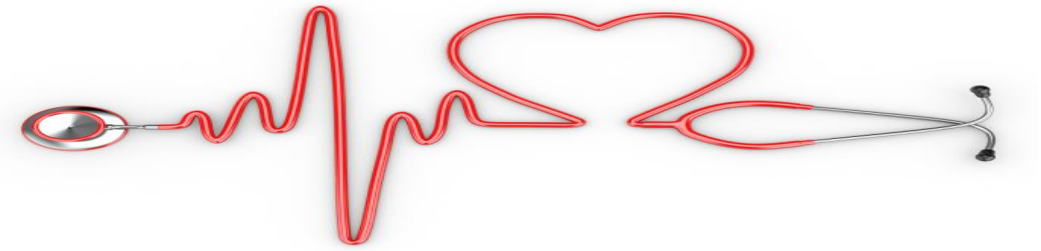
** Pneumopericardium




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

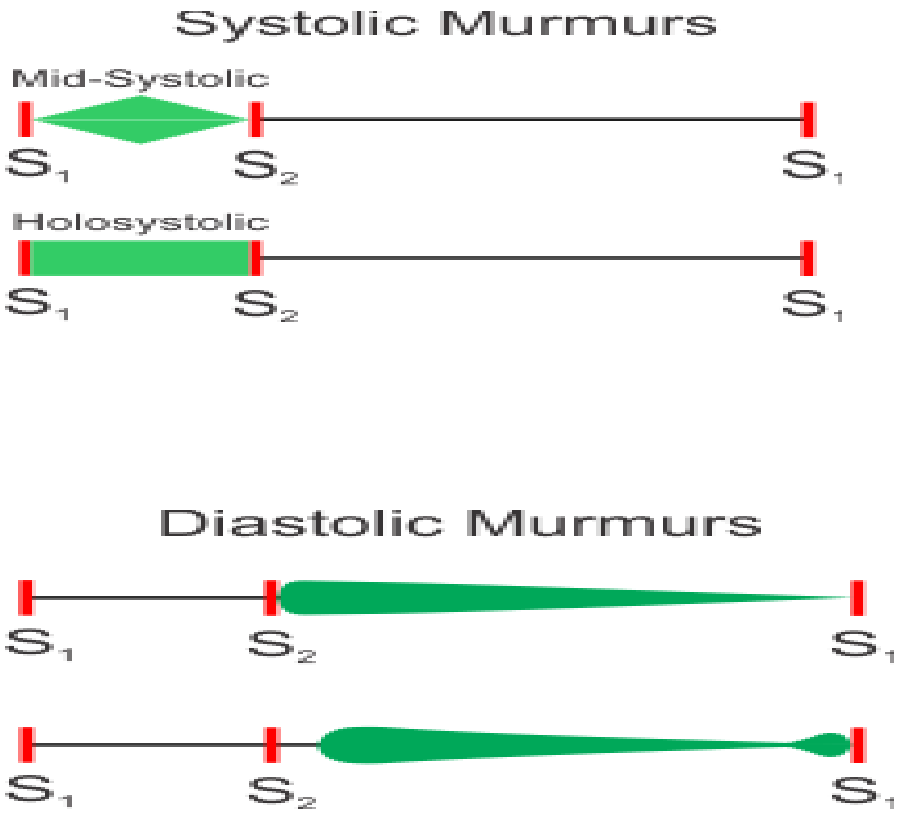
Murmurs/Timing

- **Systolic** murmurs

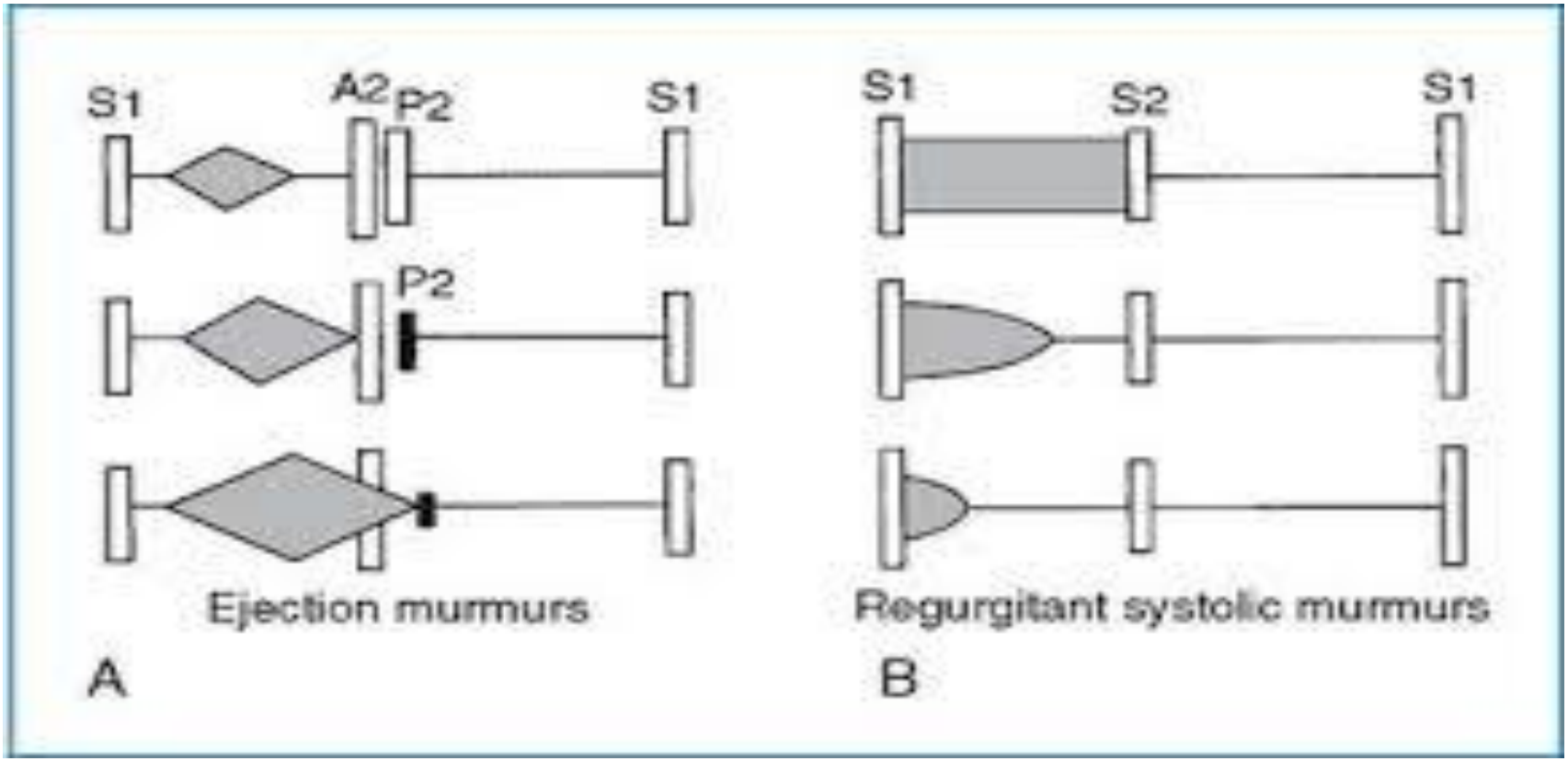
The interval between S1 and S2

- **Diastolic** murmurs

The interval between S2 to S1



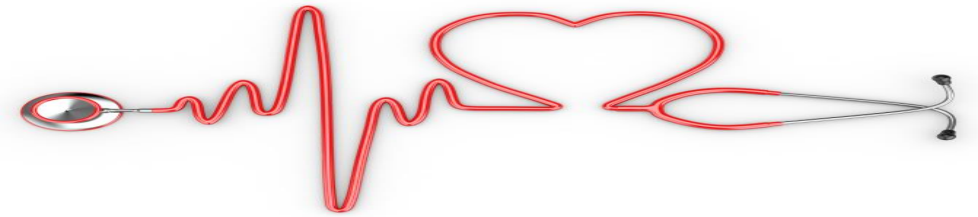
Murmurs/Duration



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

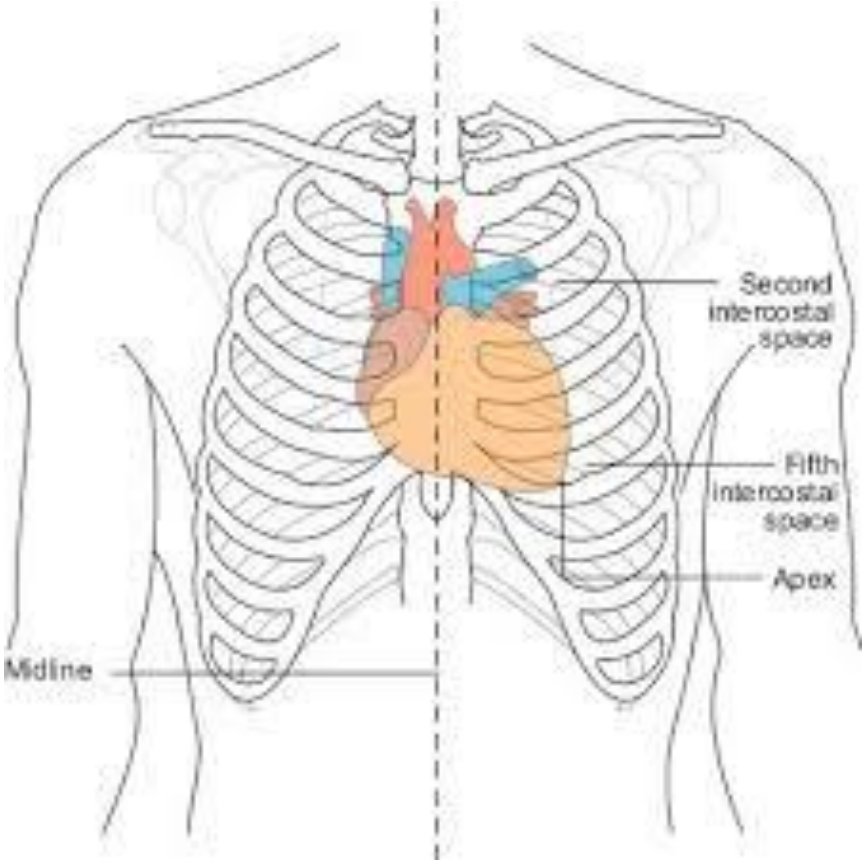


Murmurs/Intensity

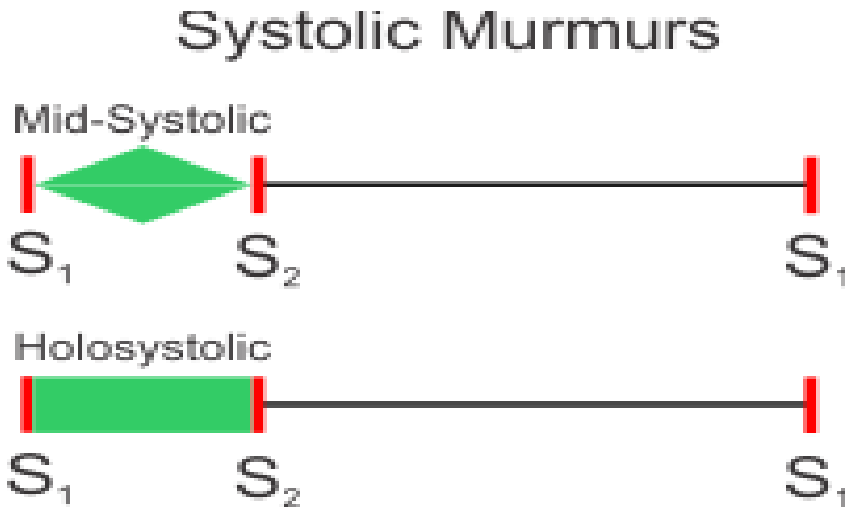
- The intensity of the murmur does not correlate with the severity of the valve of valve dysfunction
- Change in intensity with time is important , as they can denote progression of a valve lesion
- Rapidly changing murmur can occur with infective endocarditis

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

Murmurs/Location, Radiation



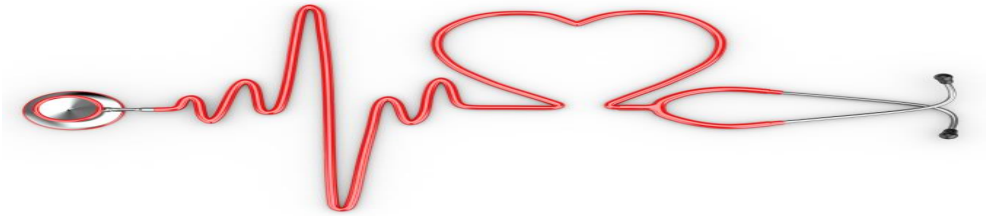
Systolic Murmurs



- 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

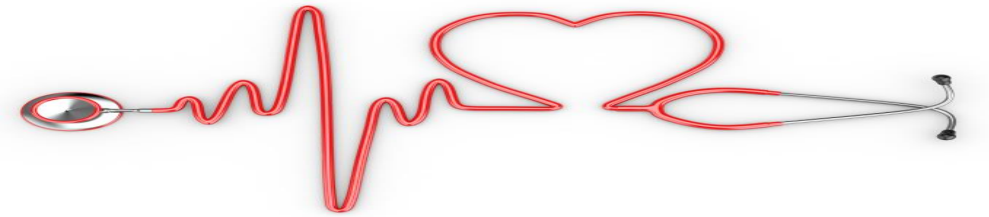
Sever anemia/ fever/ athletes/ pregnancy
ASD (pulmonary flow murmur)
Increased stroke volume (aortic regurgitation)

- Normal or reduced flow through a stenotic valve

Aortic stenosis
Pulmonary stenosis

- Subvalvular obstruction

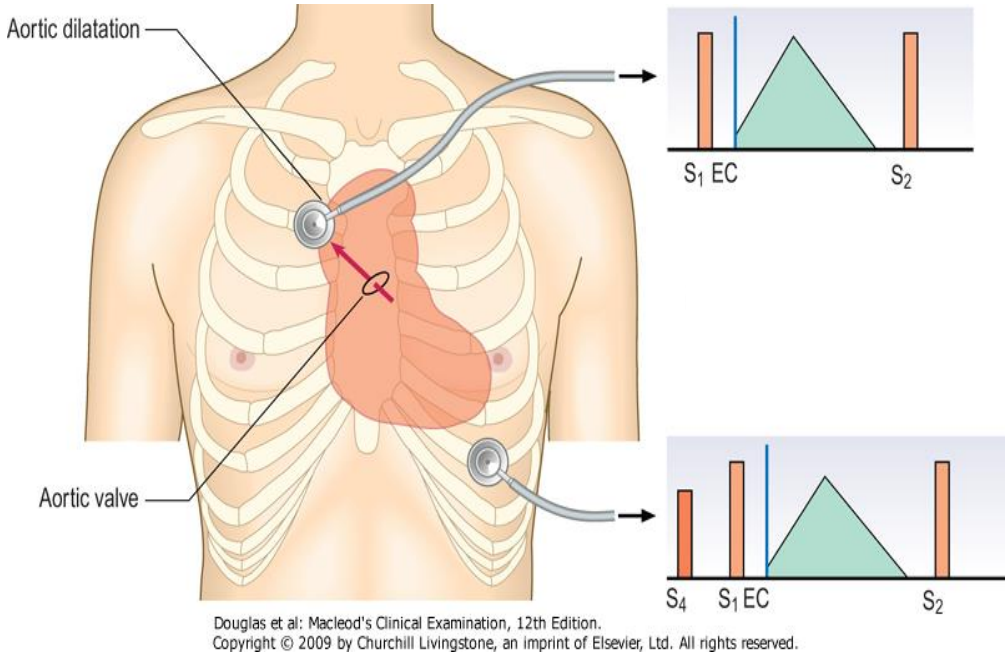
HOCM



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

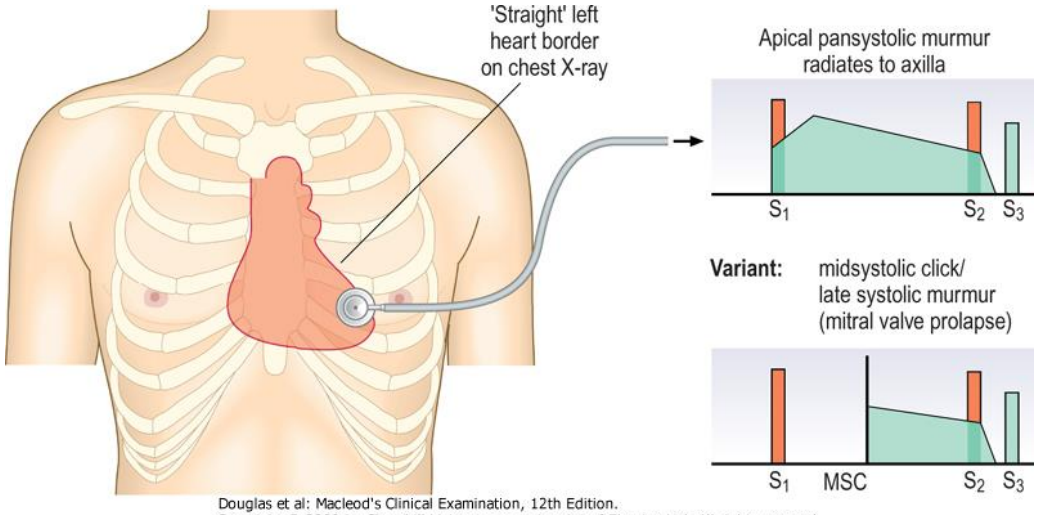
❖ May follow ejection click



Mitral Regurgitation murmur

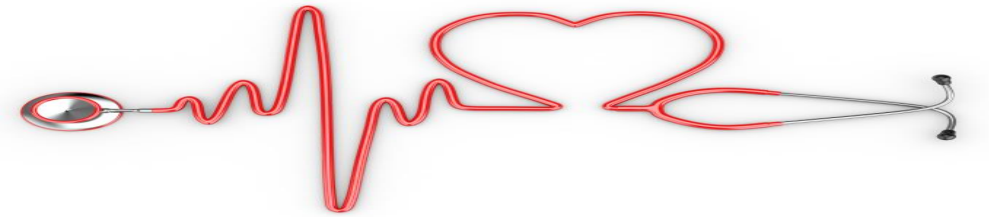
- Timing: systolic
- Duration: pansystolic
- Character: blowing
- Pitch: high
- Intensity: may feel a thrill
- Location: apex
- Radiation: Left axilla

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



Tricuspid regurgitation

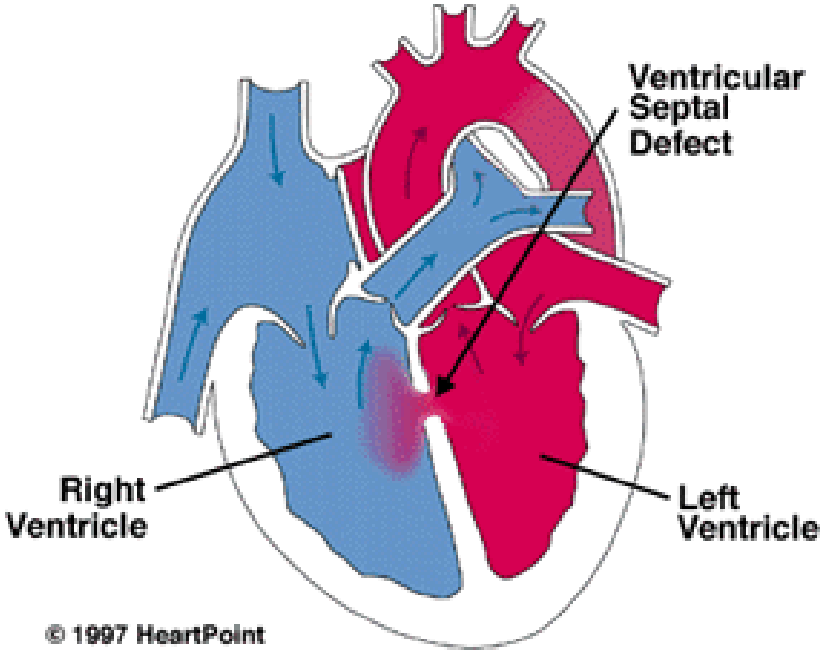
- Heard at the lower left sternal edge
- Prominent V wave in the JVP
- Pulsatile liver



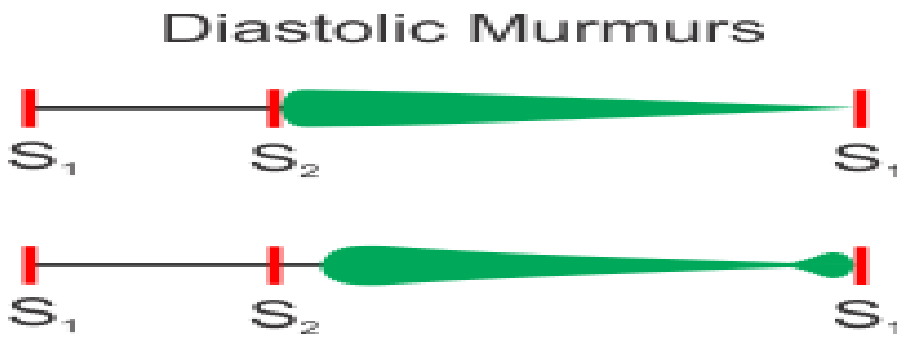
Ventricular Septal Defect

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

- Acquired VSD in septal rupture post-MI



Diastolic Murmurs



- Early diastolic murmurs

Usually lasts throughout the diastole but are loudest in early diastole

Aortic and pulmonary regurgitation

- Mid-diastolic murmurs

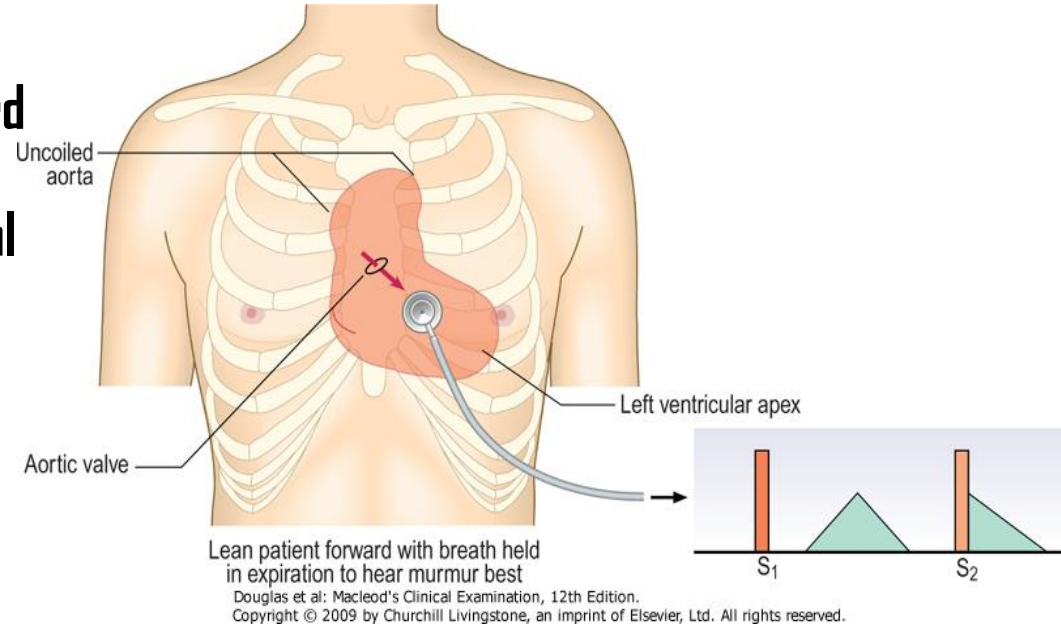
Mitral stenosis and Austin flint murmur

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



Lean patient forward with breath held in expiration to hear murmur best

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

Pulmonary Regurgitation

- Pulmonary regurgitation caused by pulmonary dilatation in pulmonary hypertension

Graham Steel murmur

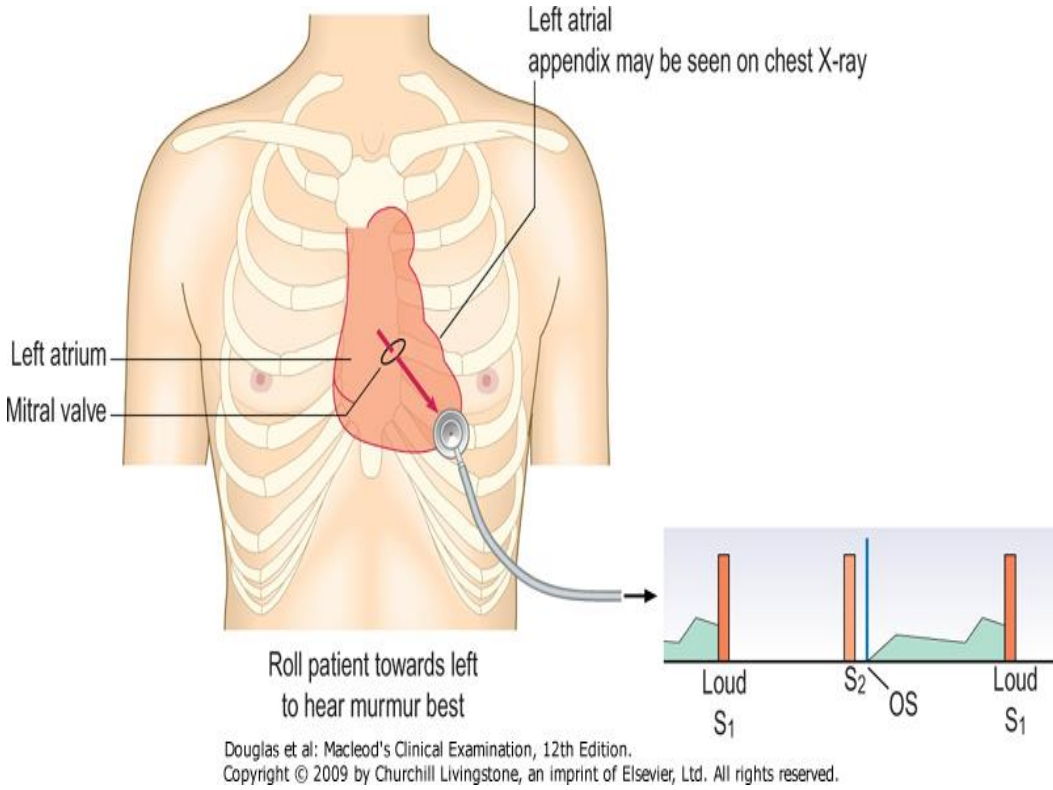
- Congenital defect of the pulmonary valve

Mitral Stenosis

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

❖ May follow opening snap

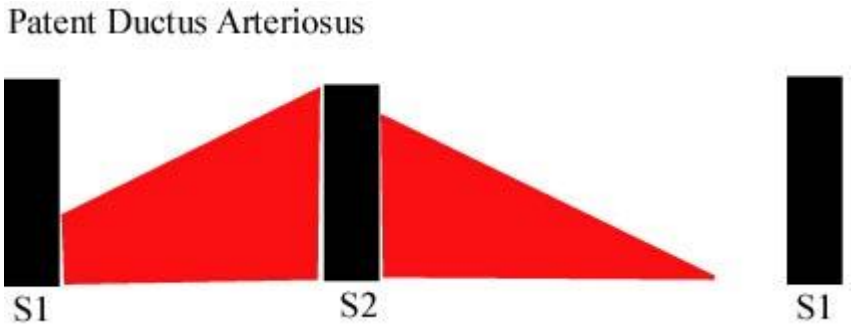
❖ The murmur is accentuated by exercise



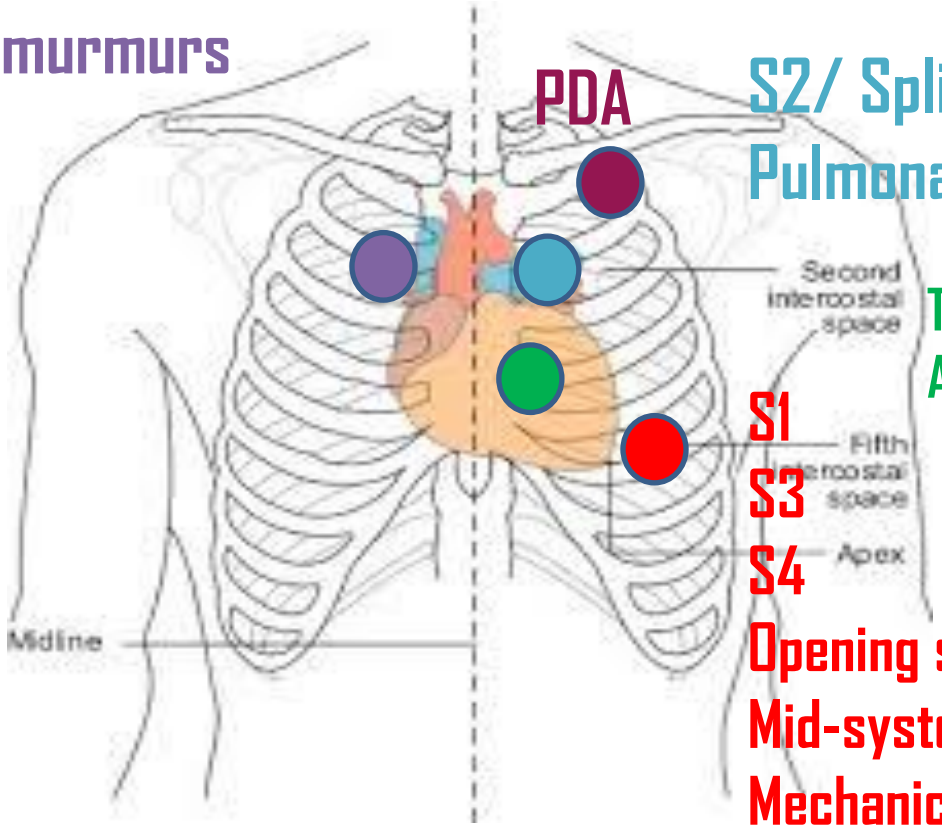
Continuous Murmurs

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



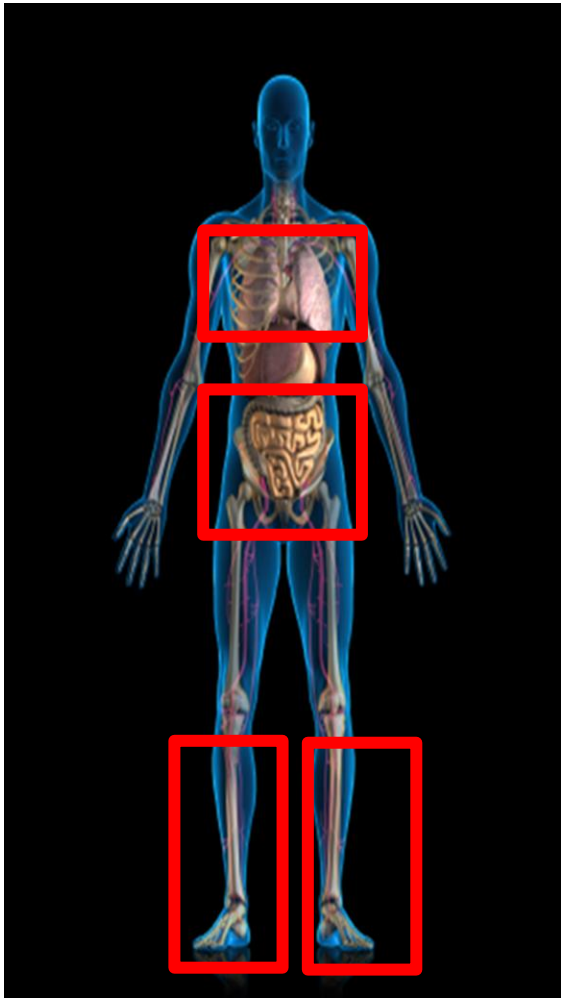
Mechanical aortic valve
Systolic Ejection murmurs
HOCM
Aortic regurg



S2/ Split
Pulmonary murmurs

Tricuspid Regurg/stenosis
Aortic regurg

S1
S3
S4
Opening snap
Mid-systolic click
Mechanical mitral valve
Mitral Regurg/Stenosis

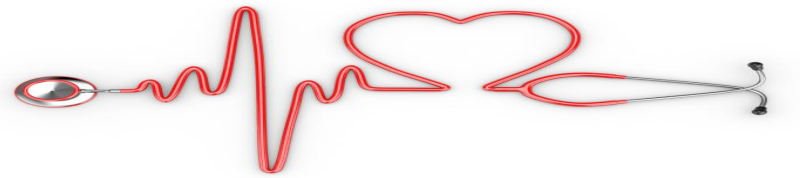


Complete your examination

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

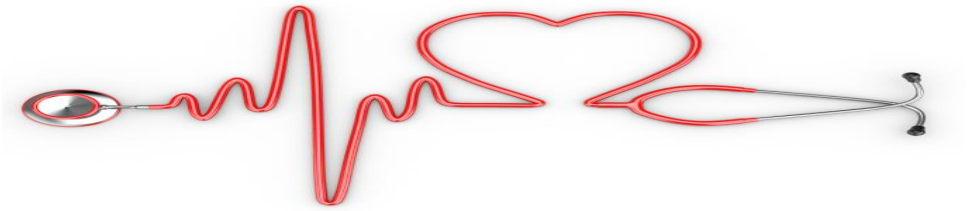
Aortic Stenosis

- 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



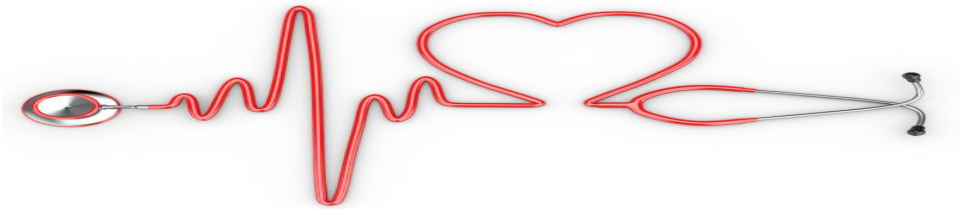
Mitral stenosis

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



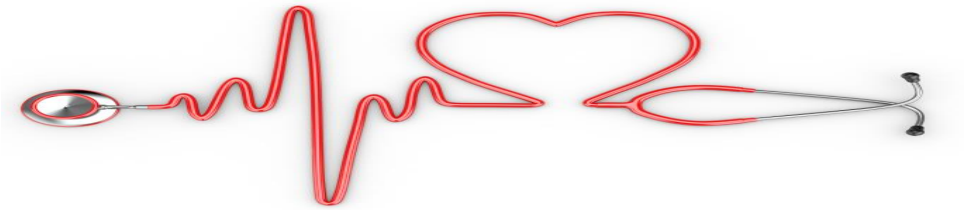
HOCM

- 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)