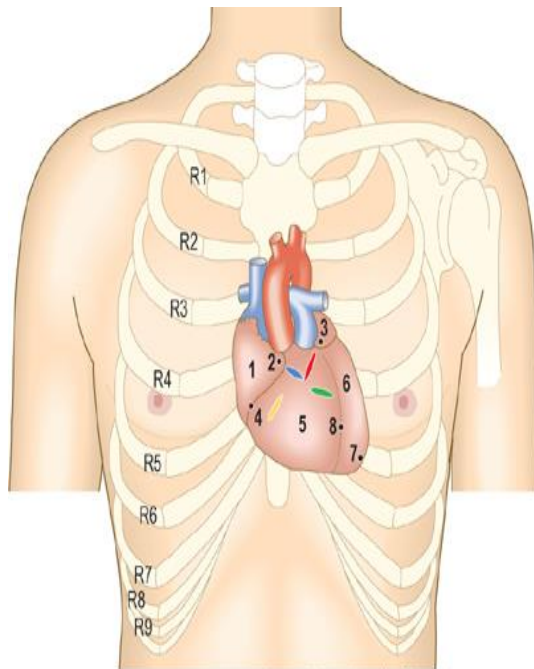


A decorative horizontal bar at the top of the slide, consisting of an orange square on the left and a blue rectangle on the right.

# Examination of the Precordium

# The auscultatory areas do not correspond to the surface markings of the heart valves but where transmitted sounds and murmurs are best heard

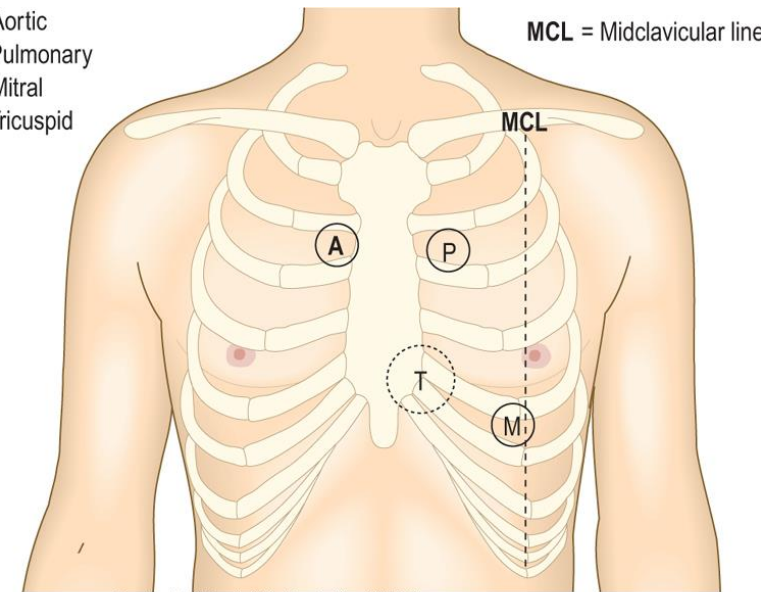


- = Aortic valve
- = Pulmonary valve
- = Mitral valve
- = Tricuspid valve

- 1 Right atrium
- 2 Right atrial appendage
- 3 Left atrial appendage
- 4 Atrioventricular groove
- 5 Right ventricle
- 6 Left ventricle
- 7 Apex of the heart
- 8 Anterior interventricular groove

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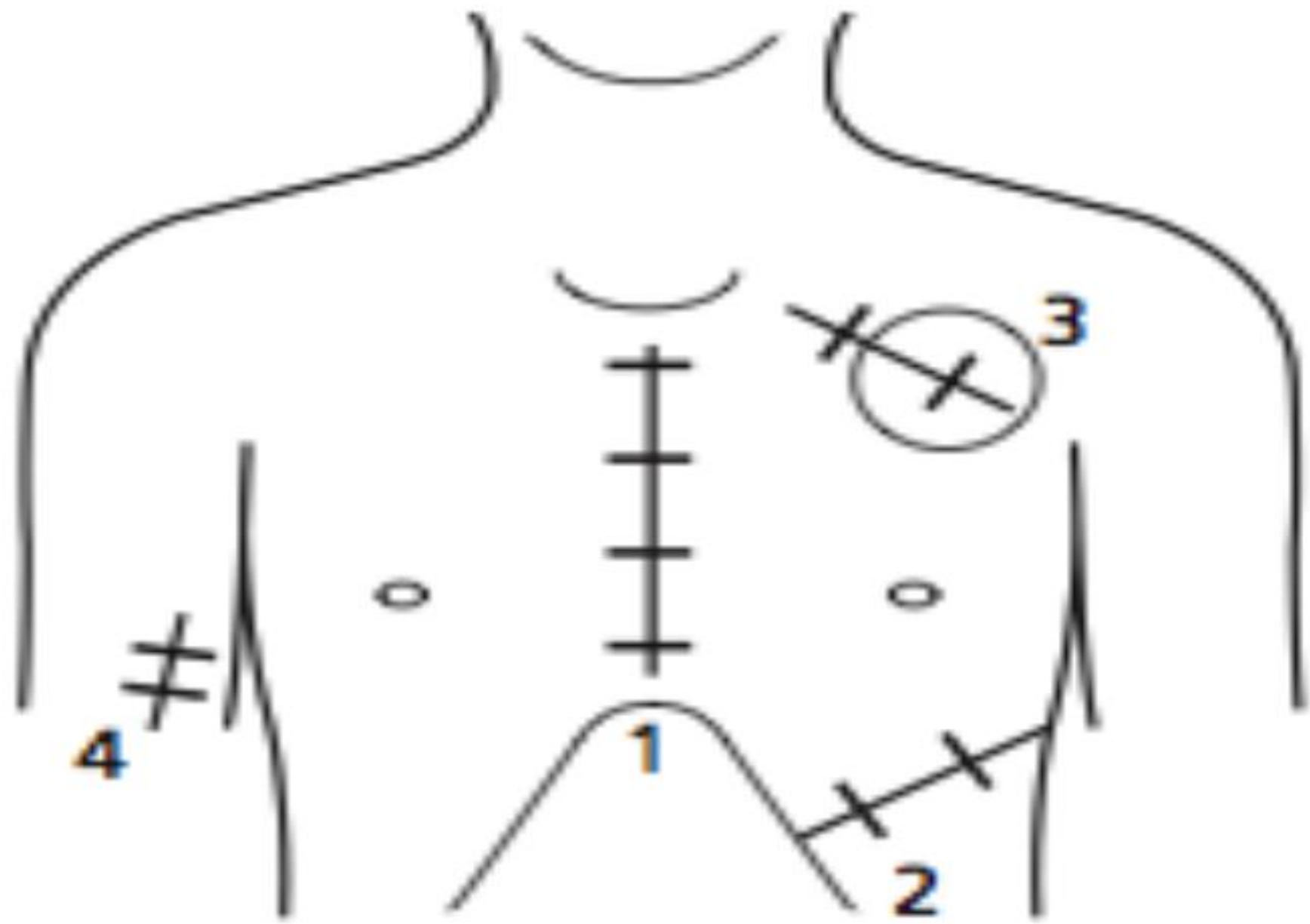
- A = Aortic
- P = Pulmonary
- M = Mitral
- T = Tricuspid



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# Precordium examination

- Introduce yourself, explain to the patient what you are going to examine, exposure is from the waist up
  - Inspection: from foot of the bed then from the right side
- Always inspect the pericordium with the patient sitting at 45° angle with shoulders horizontal.
- ✓ Hair distribution , Skin lesions , dilated veins
- Scars: midline sternotomy scar( CABG or valve rep. it may be accompanied by saphenous vein or radial artery graft harvest scars, It submammary scar, infraclavicular scar( pacemaker , ICD)
- ✓ Chest deformities
  - ✓ Apex beat( torch , lean at the level of the bed)



# Palpation

## □ Palpation: 4

\* eye contact, ask about tender areas

✓ general palpation over precordium for general impression of cardiac impulse

✓ Allocate apex beat with 2 fingers( roll pt to left if not palpable)  
comment on position , & character ( gently tapping apex beat )

✓ Feel for **heave** ( heel of right hand fir,ly over 2 areas

- Left lower parasternal area with holding breath on expiration for rt  
ventricular hypertrophy ( its name is left parasternal heave )

- Apex ( left ventricular hypertrophy = apical heave )

✓ Feel for **thrills**( palpable murmurs ) with palmar base of fingers over 3  
areas :

- The apex

- Both sides of sternum with hands placed vertically



A



B



C

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# Findings

- **Apex beat:**
  - ▣ the most lateral and inferior position where the cardiac impulse can be felt
  - ▣ Normally: localized ,gently tapping, 5<sup>th</sup> It ICS, midclavicular line
- **Heave:** palpable impulse that lifts the examiner hand
- **Thrill:** tactile equivalent of a murmur, a palpable vibration

# Abnormal findings :

- impalpable : muscular, obese, chest hyperinflation (asthma, emphysema)
- left ventricular dilatation, chest deformity : diffusely displaced inferiorly & laterally
- dextrocardia 1/10 000
- Left ventricular hypertrophy : thrusting apical heave (undisplaced)
- Mitral stenosis : tapping apex beat ( palpable 1<sup>st</sup> heart sound, not displaced )
- HOCM : double apical impulse



# Abnormal findings

## Apex beat:

- Tapping apex beat
- Diffuse displaced apex beat
- Forceful apical beat
- Double apical impulse

## Heave:

- Right ventricular hypertrophy: left parasternal heave
- Apical heave: left ventricular hypertrophy

## Thrill:

- Tactile equivalent of a murmur
- Usually systolic e.g with aortic stenosis, VSD

# Auscultation 3

- keep thumb on carotid while auscultating ( s1 s2 timing of murmurs)
- Using the diaphragm:
  - ▣ All 4 valve areas
  - ▣ Axilla for murmur of mitral regurg
  - ▣ Carotid: holding breath
- Using the bell :
  - ▣ At the apex ( ms , s3 ,s4) & LLSB( ts , rt sided s3 in RV failure )



A



B

□ Special maneuvers:

- Roll the pt to left side to accentuate murmur of mitral stenosis ( BELL )
- ask the pt to sit & lean forward, holding breath on expiration , use DIAPHRAGM over 1<sup>st</sup> aortic area & 2<sup>nd</sup> aortic area ( erb's point, LSB 3<sup>rd</sup> ICS ) for murmur of aortic regurg.
- Murmurs at RIG<sup>H</sup>T side of the heart are accentuated by I<sup>n</sup>spiration ,while LE<sup>F</sup>T side by E<sup>x</sup>piration



□ Comment on :

- s1,s2 , added sounds
- If u heard a murmur , you should comment on location, radiation , timing , character , pitch

# First heart sound

- S1 is produced by closure of tricuspid and mitral valves
- Best heard at the apex
- Intensity depends on:
  - ▣ The position of mitral leaflets at the onset of ventricular systole
  - ▣ The rate of rise of the left ventricular pressure pulse
  - ▣ The presence or absence of structural disease of mitral valve
  - ▣ The amount of tissue, air, or fluid between the heart and stethoscope

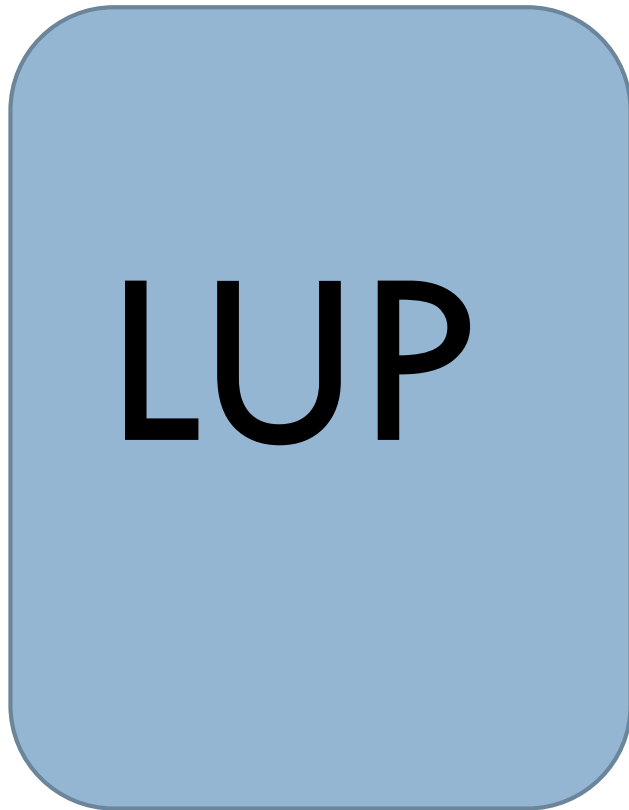
# Second heart sound

- S2 is produced by closure of aortic and pulmonary valves
- Best heard at the left sternal edge
- Physiological splitting during inspiration

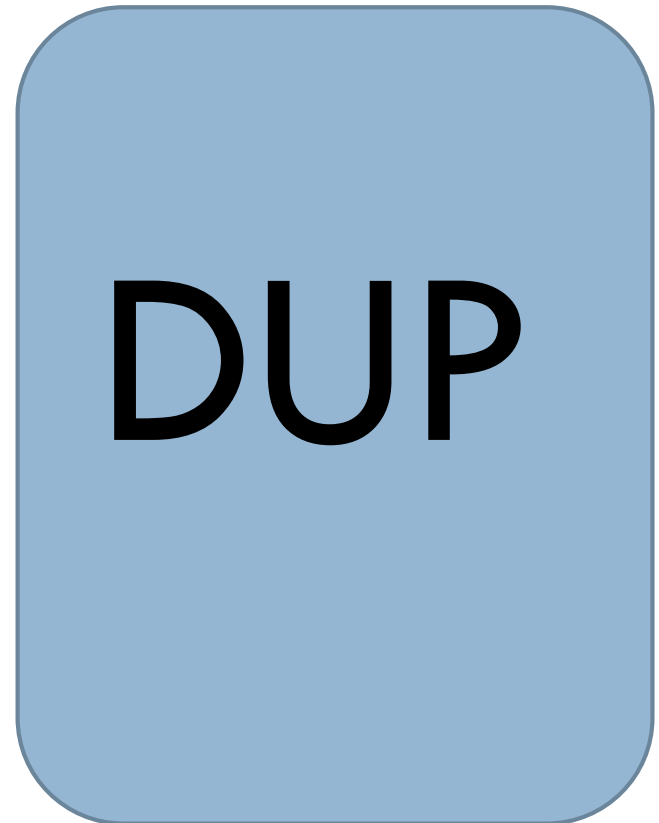
# Normal heart sounds

---

S1



S2



# First & Second heart sounds

---

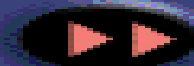
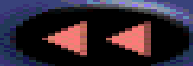






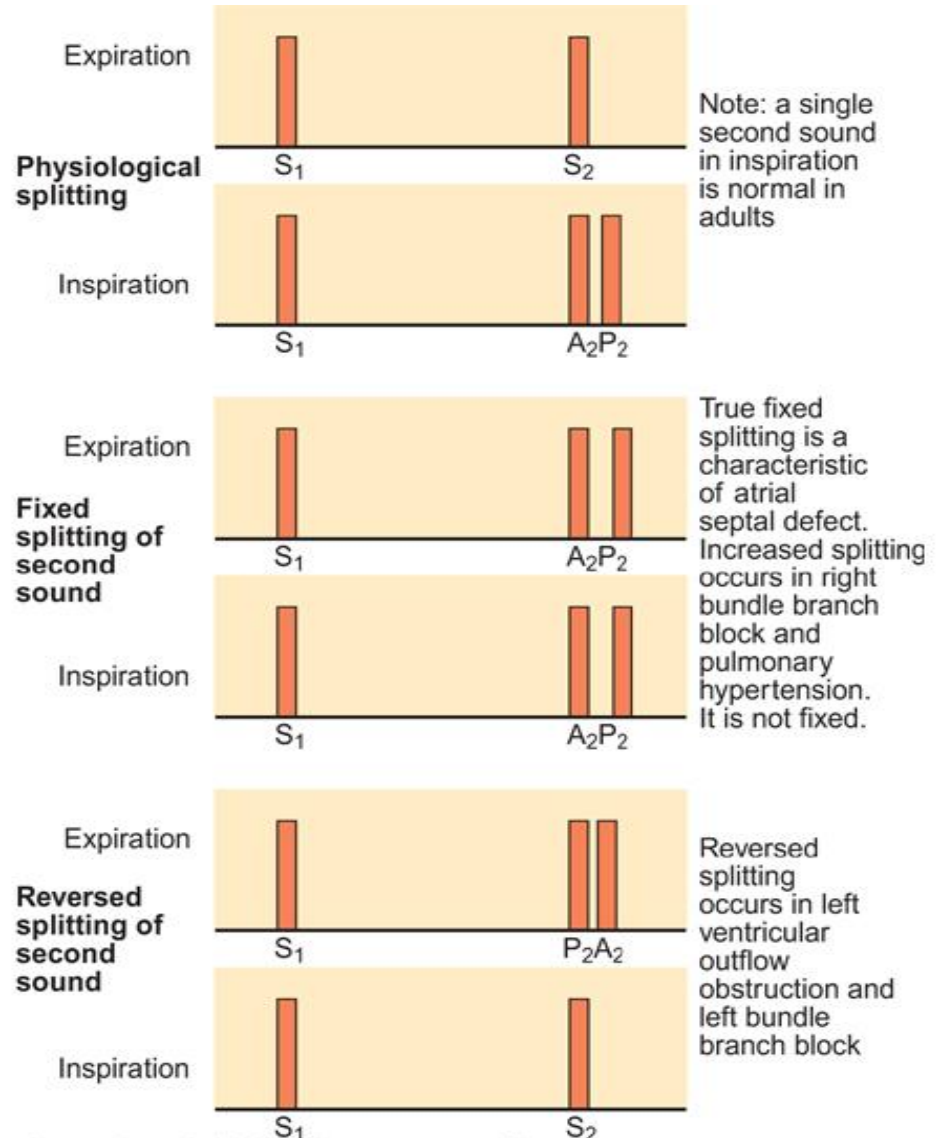
# First & Second heart sounds


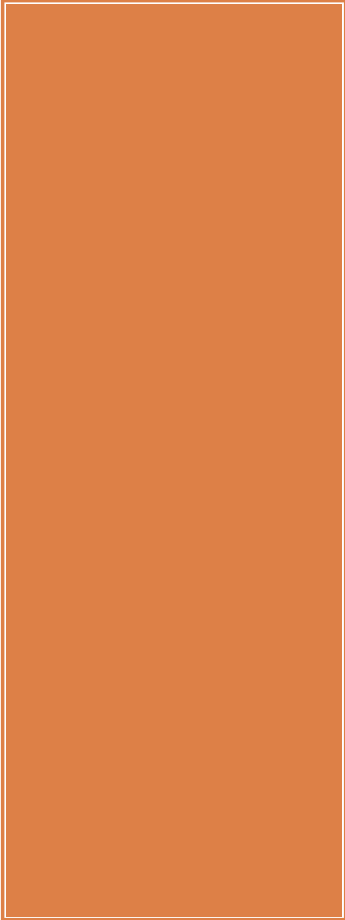
**Basic Sounds**  
**Normal S1 S2 Sounds**



# Second heart sound

Physiological splitting occurs because it precedes Rt ventricular contraction



- 
- 
- In ASD the right ventricular stroke volume is larger than the left, and the splitting is fixed because the defect equalises the pressure between the two atria throughout the respiratory cycle.

# Physiological splitting of second h.s

**Basic Sounds**  
**S2 Split Sound**



# Abnormalities of the intensity of the first heart sound

## Quiet

- Low cardiac output
- Poor left 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
- Extrasystole

# Abnormalities of the second heart sounds

## S2

### Split

Widens in inspiration

Widens in expiration

Fixed splitting

RBBB  
Pulmonary stenosis  
Pulmonary HTN  
VSD

Aortic stenosis  
Hypertrophic cardiomyopathy  
LBBB  
Ventricular pacing

Atrial septal defect

### LOUD

Systemic HYN  
Pulmonary HTN

### Quiet

Low cardiac output  
Calcific aortic stenosis  
Aortic regurge

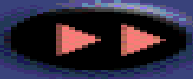
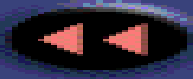
# Third heart sound

- S3 is low-pitched early diastolic sound
- Best heard with the bell at the apex
- Due to rapid ventricular filling immediately after opening the atrioventricular valve
- Normal finding in children, young adults and during pregnancy
- Usually pathological after the age of 40 years, most commonly secondary to left ventricular failure or mitral regurgitation( volume overload in the ventricle)
- (S3 gallop)in HF



# Third heart sound

Basic Sounds  
S3 Sound



Norm

Slow



Introduction

# Fourth heart sounds

- ALWAYS pathological
- S4 is a soft low-pitched sound, best heard at the apex with the bell
- It occurs before S1
- Due to forceful atrial contraction against stiff ventricle secondary to
  - Systemic hypertension
  - Aortic stenosis
  - Hypertrophic cardiomyopathy
- In cases of atrial fibrillation S4 is lost
- S4 gallop
- **Summation gallop** (At a heart rate of 120 beats per minute, the diastolic period is shortened. This causes the third and fourth sound to be superimposed, creating a single loud sound)

# Fourth heart sounds

**Basic Sounds**  
**S4 Sound**

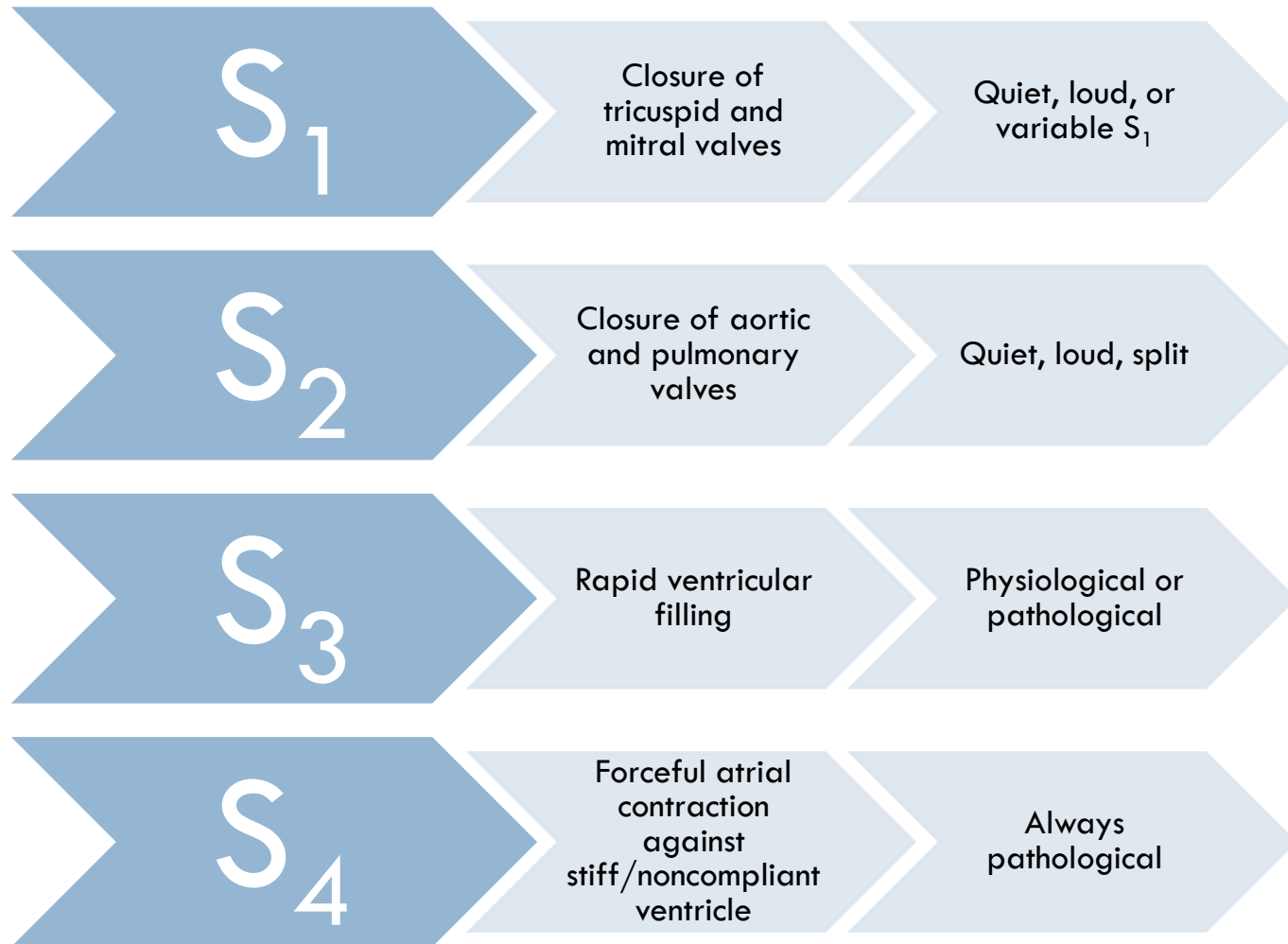


The diagram illustrates the heart's anatomy with the left ventricle highlighted in red. A red arrow points to the posterior wall of the left ventricle, indicating the location where the fourth heart sound (S4) is generated. The surrounding chambers and vessels are shown in blue and red.

Navigation controls: Home, Stop, Previous, Play/Pause, Next, Norm, Slow

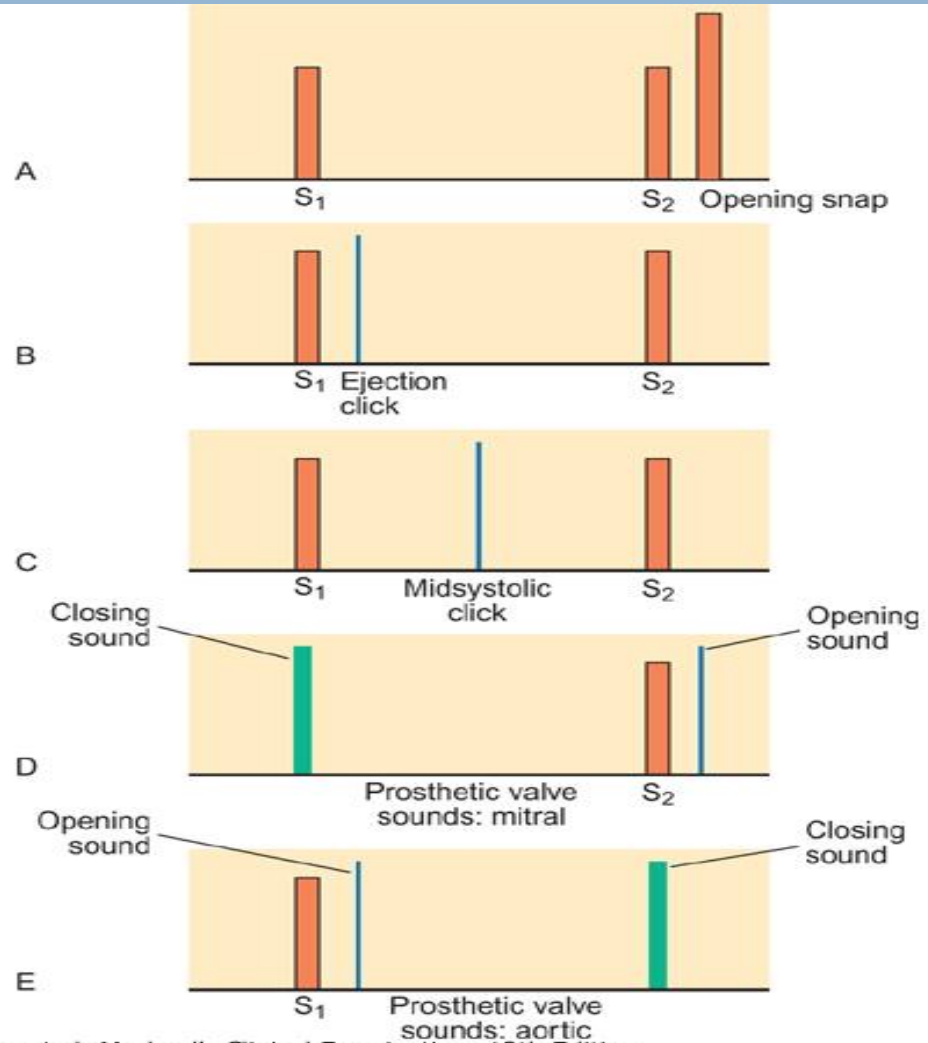
Introductic

# Heart sounds

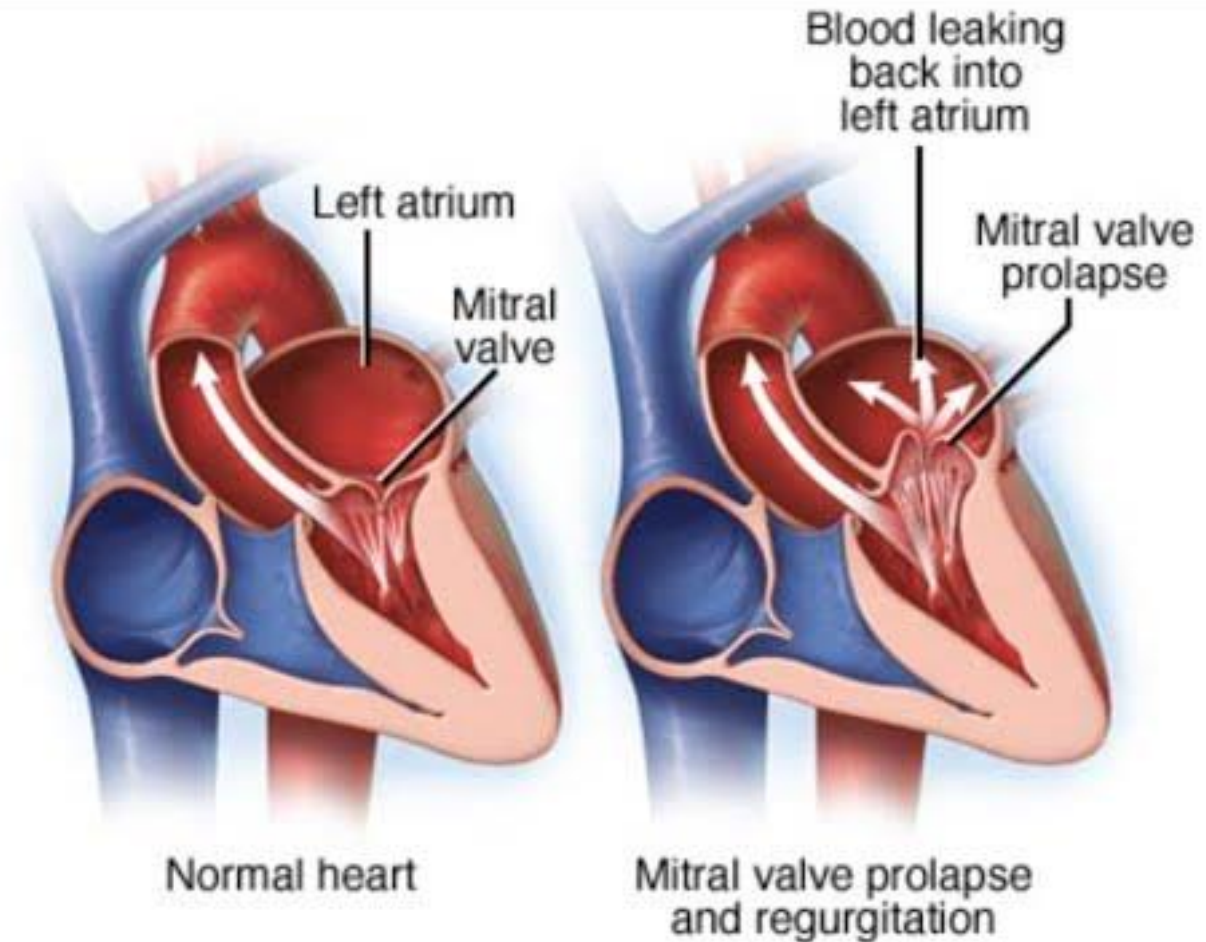


# Added sounds

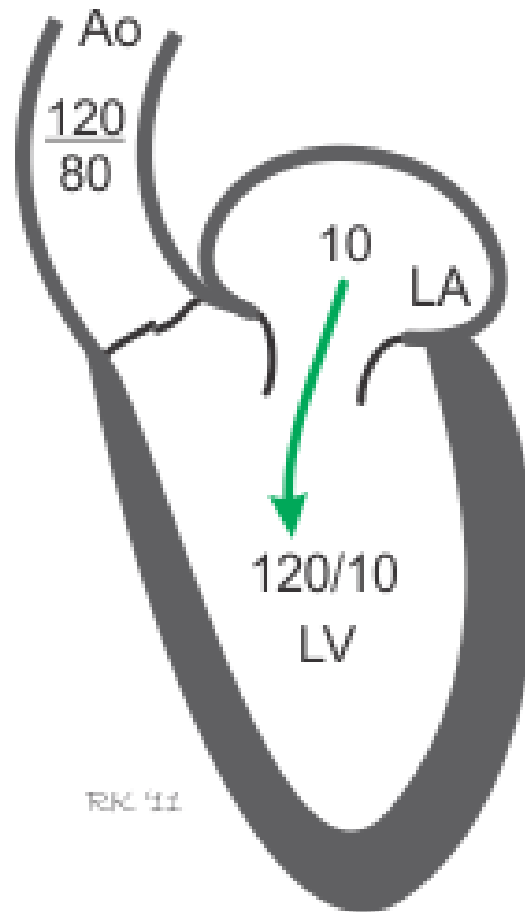
Normal heart valves make a sound when they close but not when they open



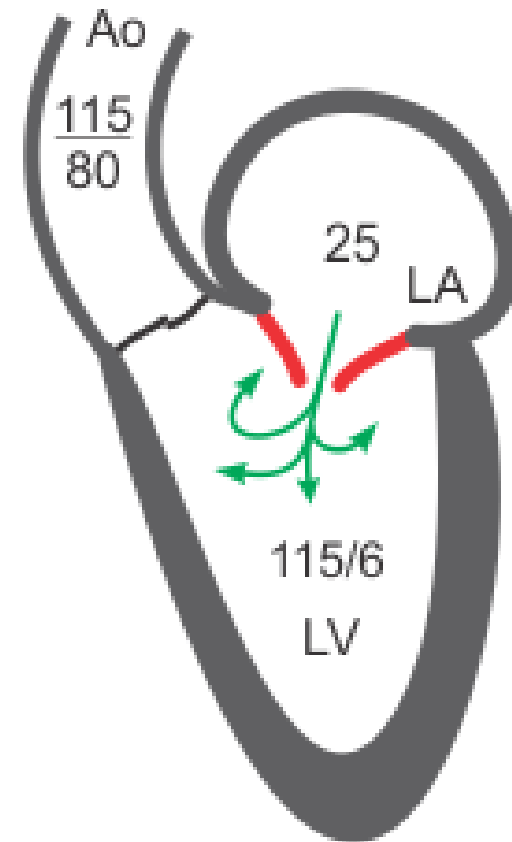
Click-  
murmur  
syndrome



- opening snap
- mid-diastolic murmur
- mitralization



Normal



Mitral Stenosis

# Murmurs

- Heart murmurs produced by:
  - ▣ Turbulant flow across an abnormal valve, septal defect or outflow obstruction
  - ▣ Increased volume or velocity of flow through a normal valve (a.k.a innocent m.)

- Examination includes:
  - ▣ Timing and duration
  - ▣ Character and pitch
  - ▣ Intensity
  - ▣ Location and radiation

## Grades of intensity of murmur

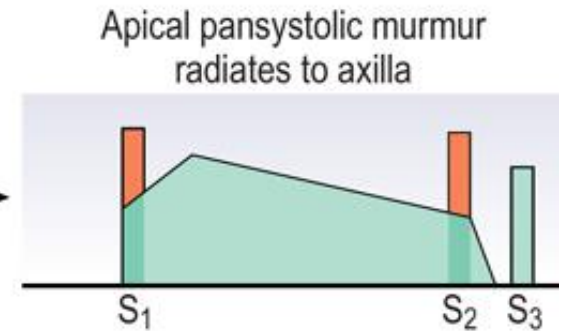
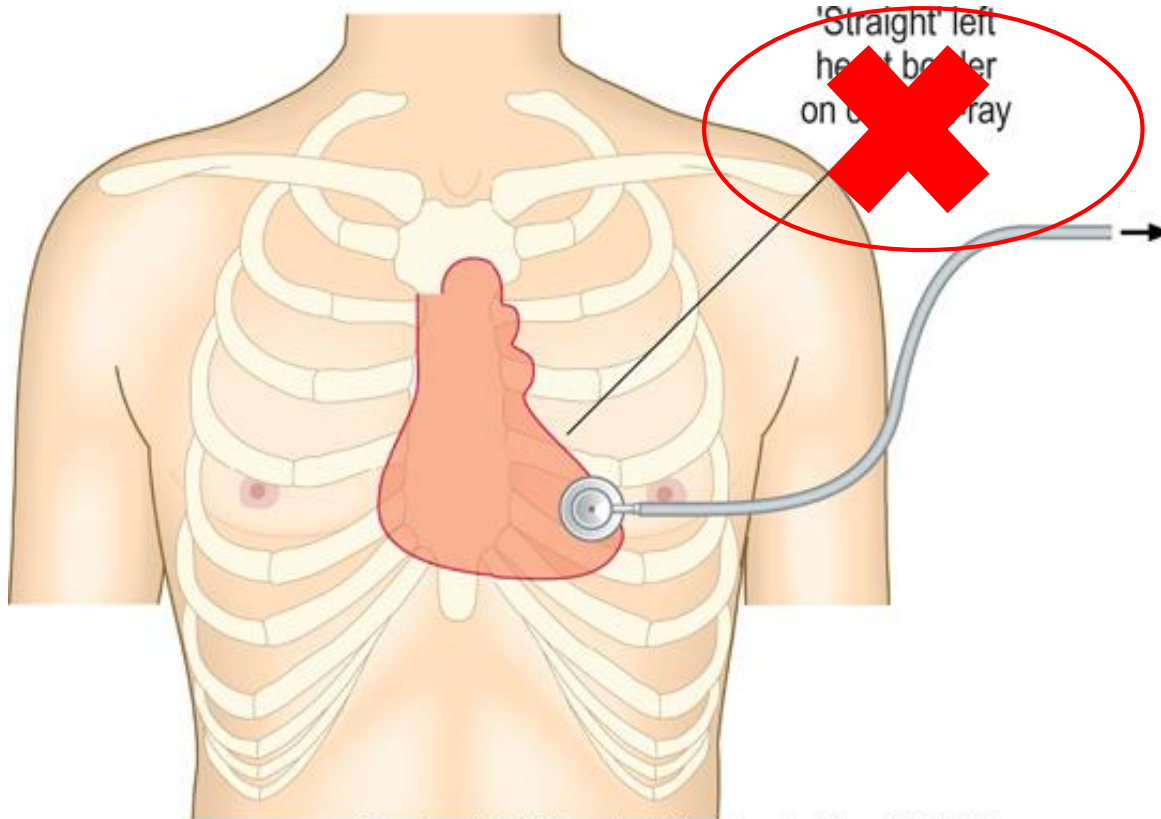
Grade 1	Heard by an expert in optimum conditions
Grade 2	Heard by non-expert in optimum conditions
Grade 3	Easily heard, no thrill
Grade 4	A loud murmur, with a thrill
Grade 5	Very loud, over large area, with thrill
Grade 6	Extremely loud, heard without stethoscope



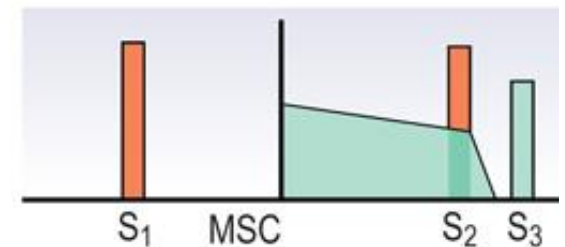


# Mitral regurgitation

Loud , blowing



**Variant:** midsystolic click/  
late systolic murmur  
(mitral valve prolapse)

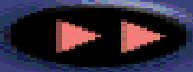
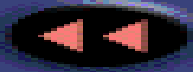


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# Mitral regurgitation

**Murmurs**

**Holosystolic Regurgitant Murmur**

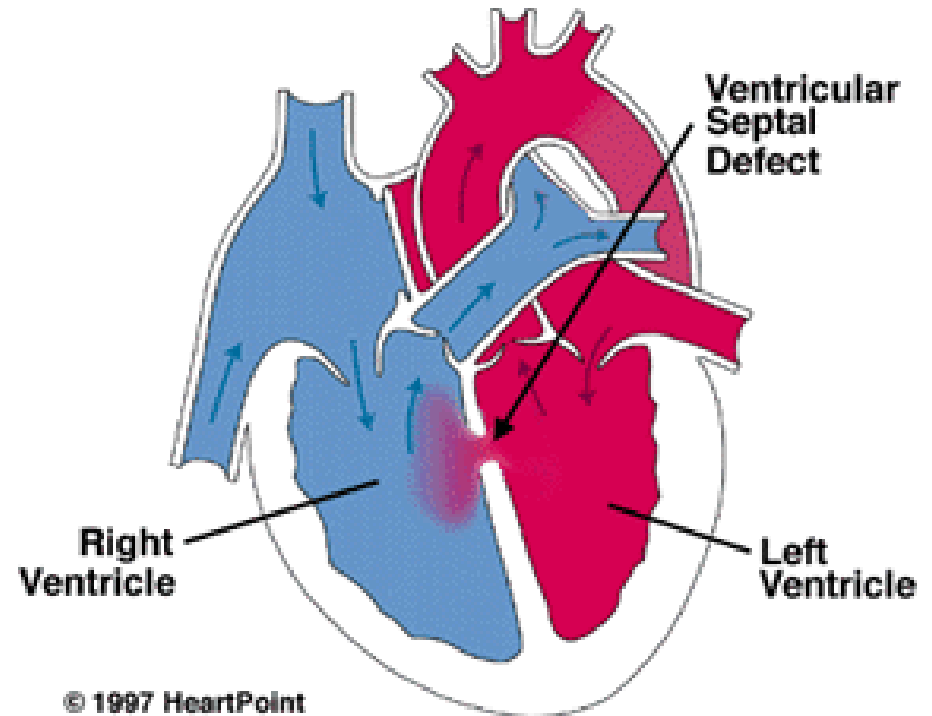


Norm

Slow

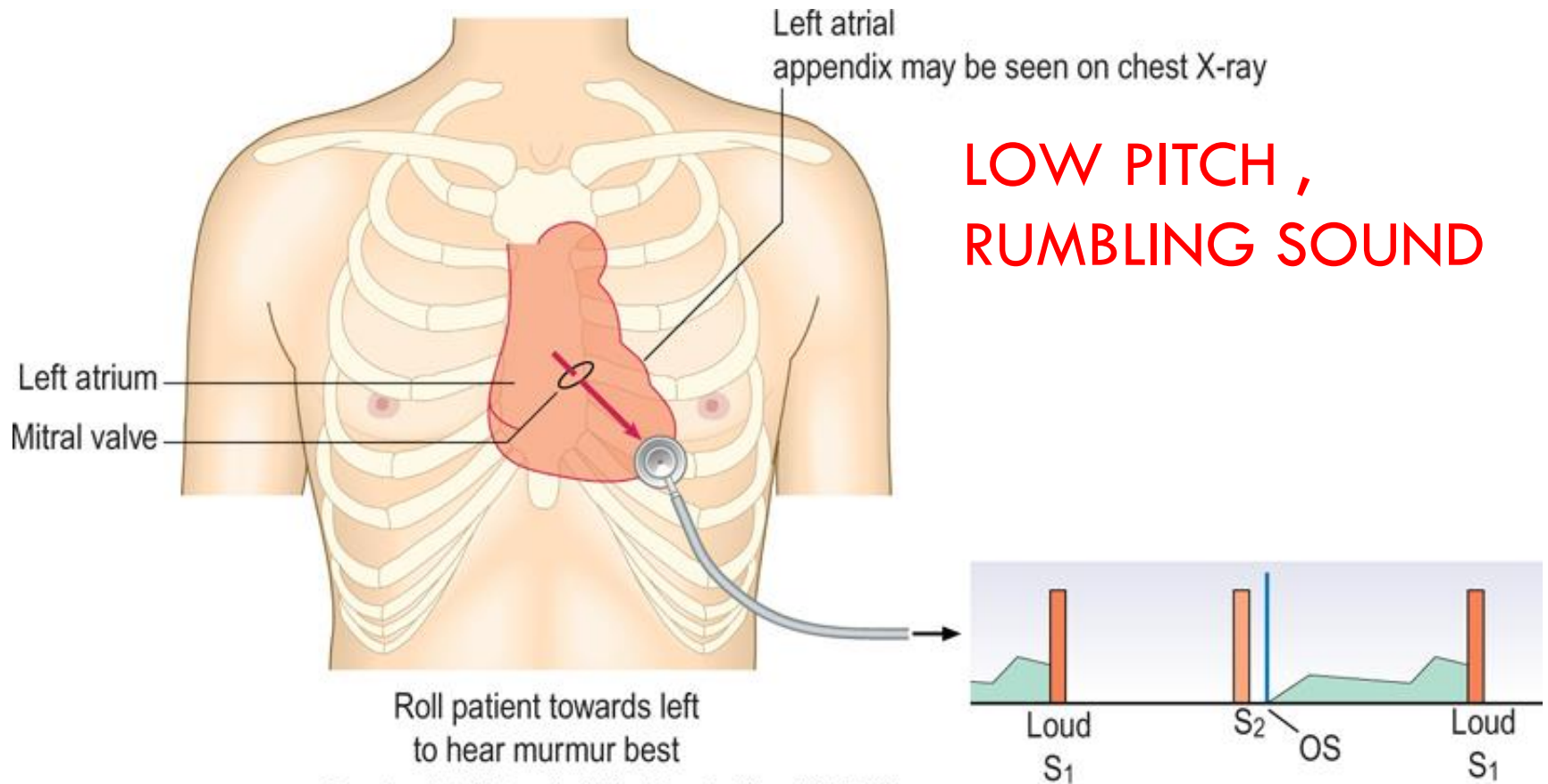
# Ventricular septal defect

- pansystolic murmur
- loud
- left sternal border
- radiating to the right sternal border



- Ventricular septal defects also cause a pansystolic murmur.
- Small congenital defects produce a loud murmur audible at the left sternal border, radiating to the right sternal border and often associated with a thrill.
- Rupture of the interventricular septum can complicate myocardial infarction, producing a harsh pansystolic murmur.
- The differential diagnosis of a murmur heard after myocardial infarction includes acute mitral regurgitation due to papillary muscle rupture, functional mitral regurgitation caused by left ventricular dilatation, and a pericardial rub.

# Mitral stenosis



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# Mitral stenosis

**Murmurs**  
**Mid Diastolic Murmur**



Norm

Slow

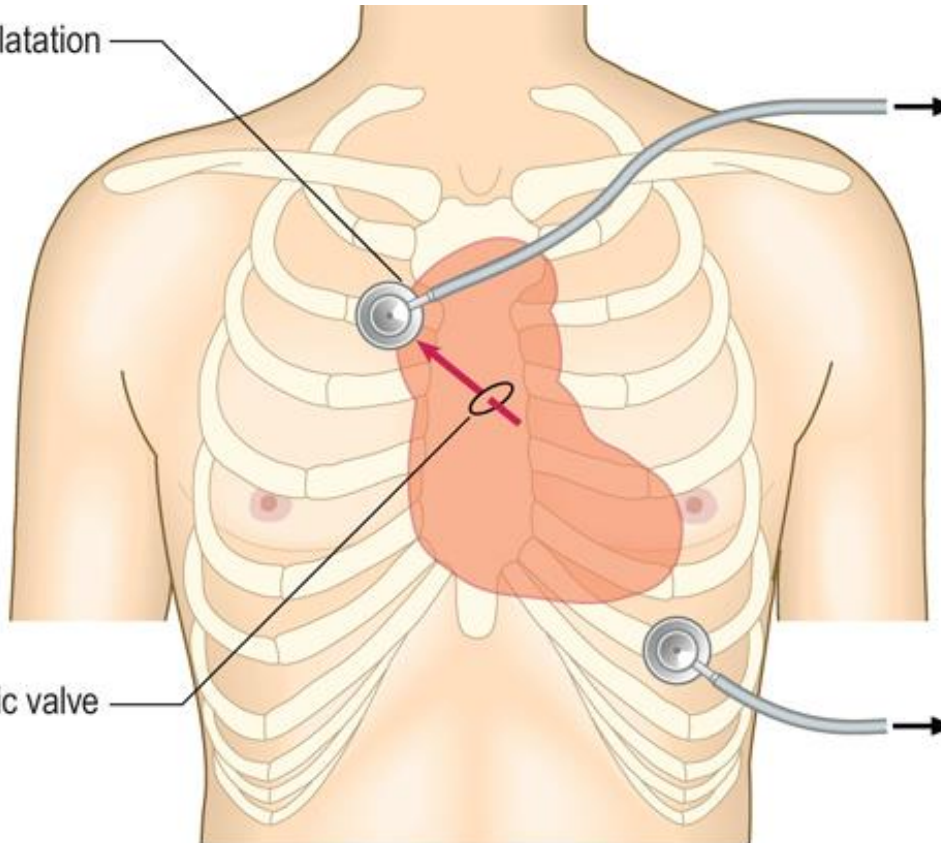


Introduction

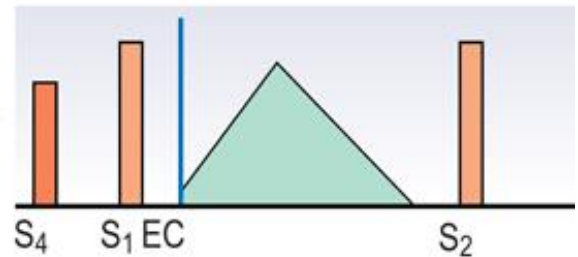
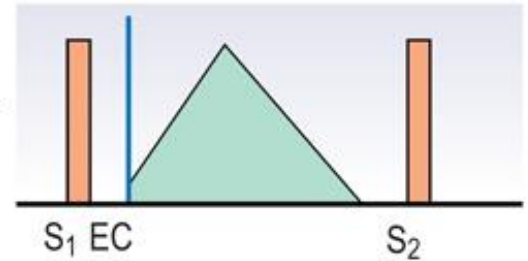
# Aortic stenosis

Harsh ,  
high  
pitched  
&  
musical

Aortic dilatation



Aortic valve




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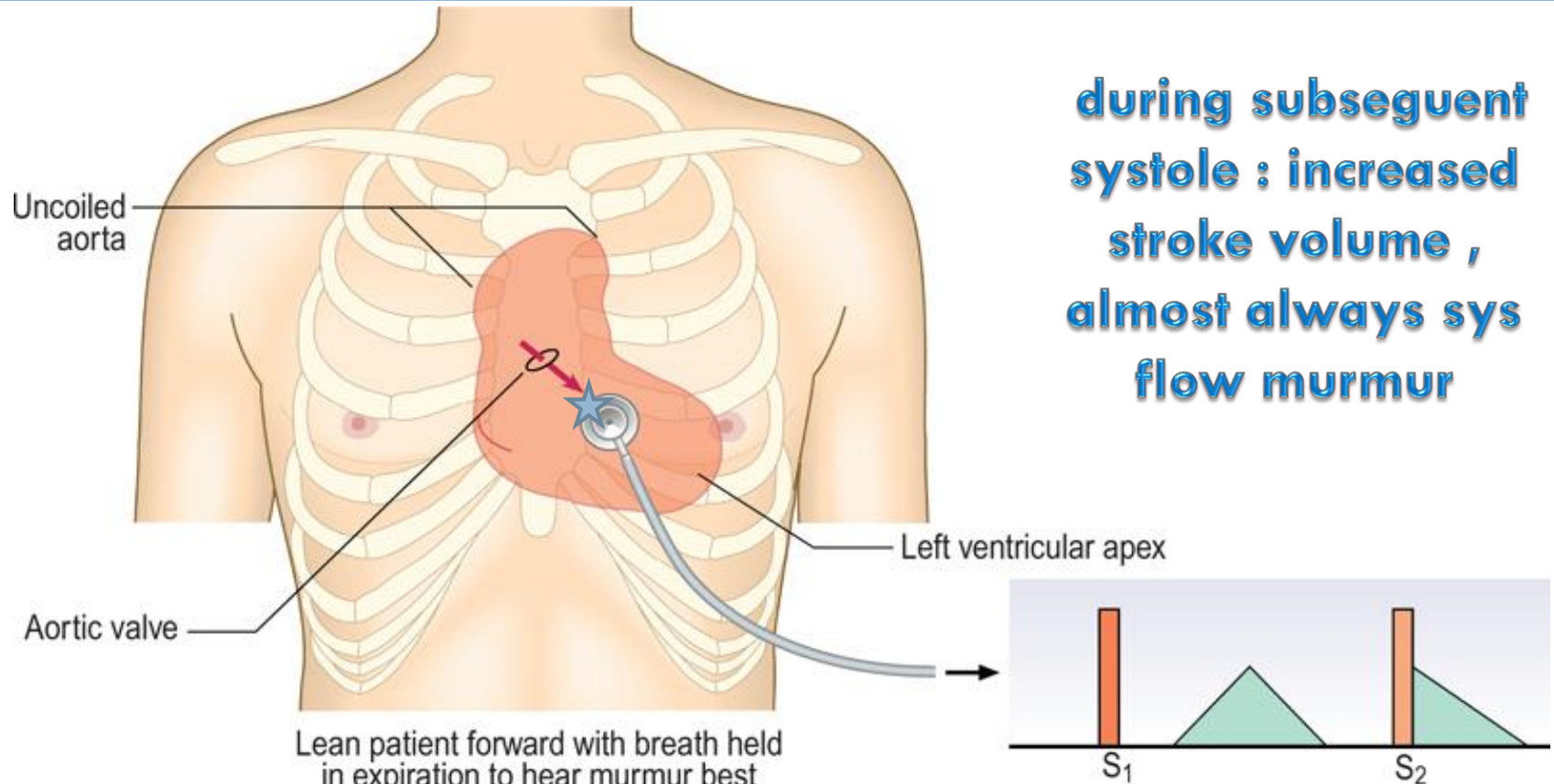


# Aortic stenosis



- 
- An ejection systolic murmur is also a feature of hypertrophic obstructive cardiomyopathy, where it is accentuated by exercise or during the strain phase of the Valsalva manoeuvre.

# Aortic regurgitation



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★ **Plus minus Austin Flint murmur**

# Aortic regurgitation

## Murmurs

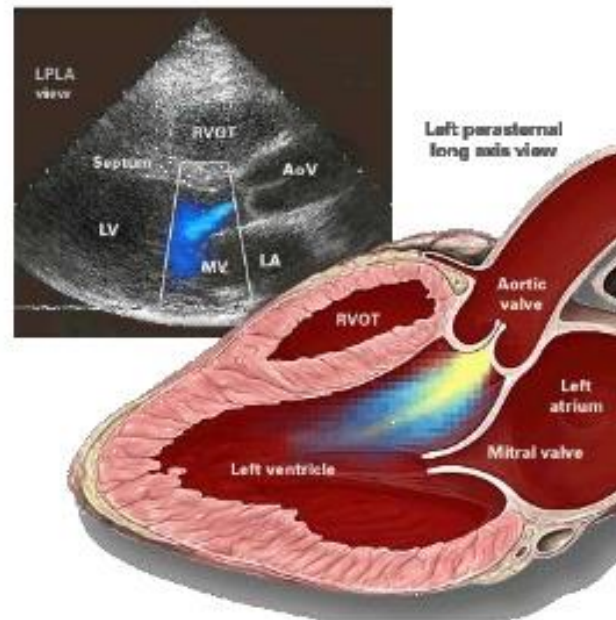
### Early Diastolic Murmur



# Austin flint murmur

## Aortic Regurg – Austin Flint Murmur

Mid-  
diastolic  
murmur



Due to the vibration of the anterior leaflet of the mitral valve as it is buffeted simultaneously by the blood jets from the left atrium and the aorta.

## The murmur of pulmonic regurgitation

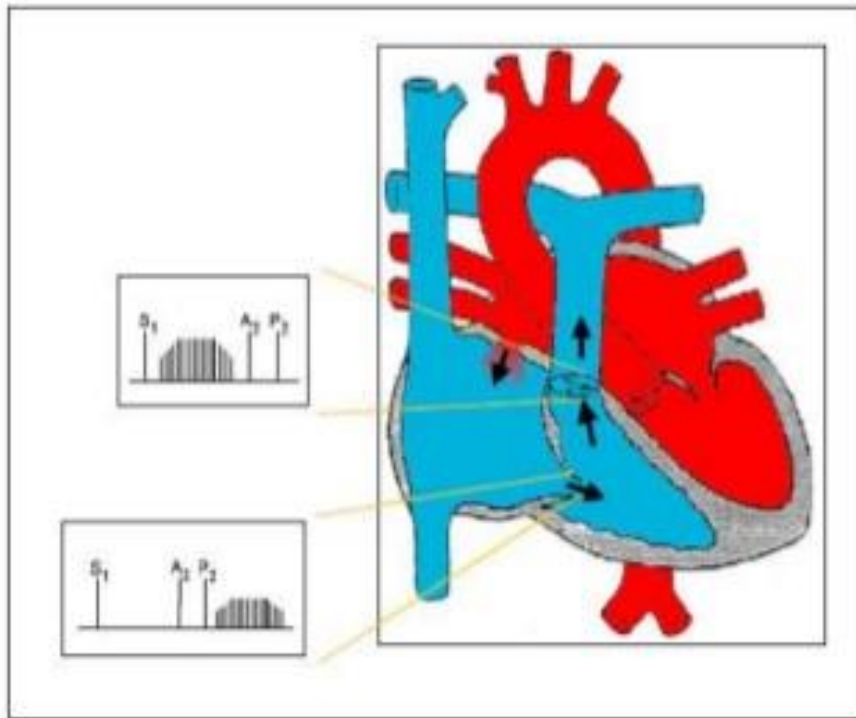
Mild pulmonic regurgitation

Severe pulmonic regurgitation



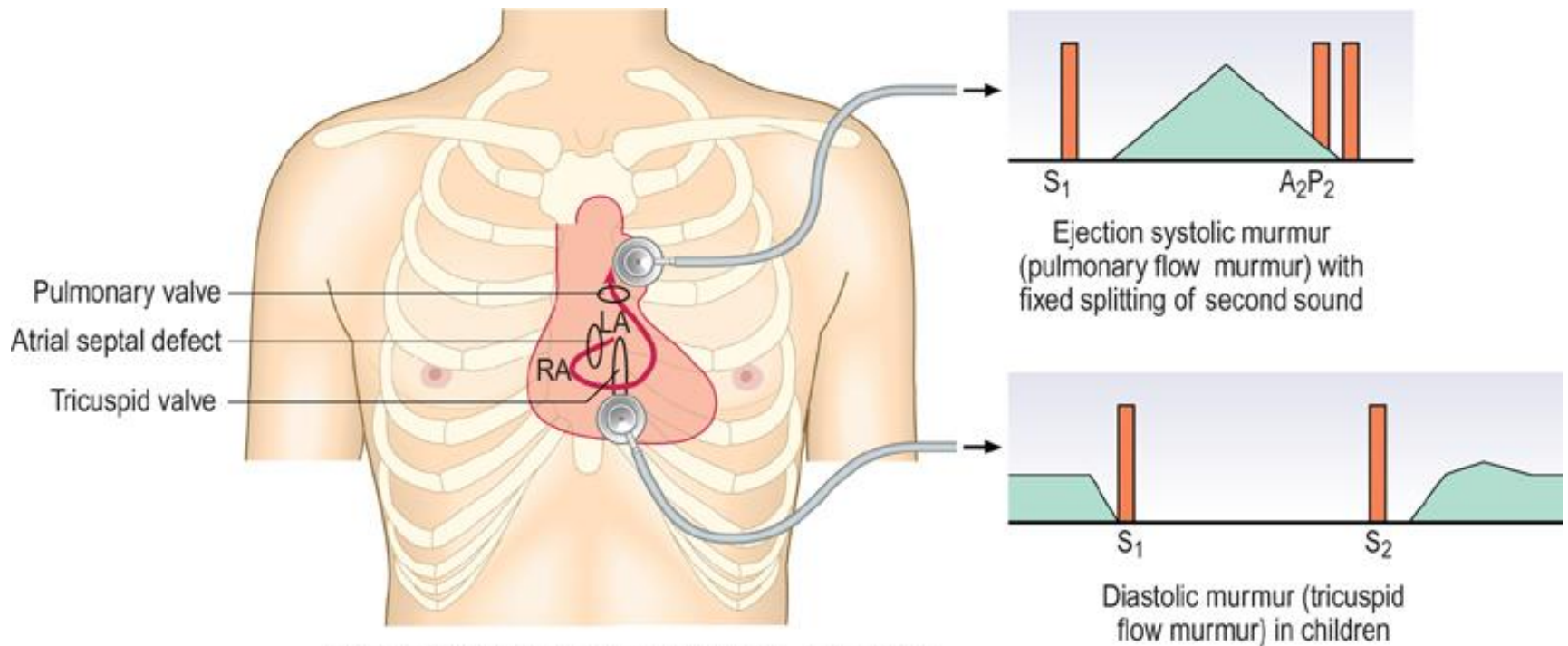
Graham steell murmur : pulmonary egurgitation  
Pulmonary HTN

# Auscultation in ASD



- Increased flow across the pulmonary valve produces a systolic ejection murmur and fixed splitting of the second heart sound
- Increased flow across the TV produces a diastolic rumble at the mid to lower right sternal border.

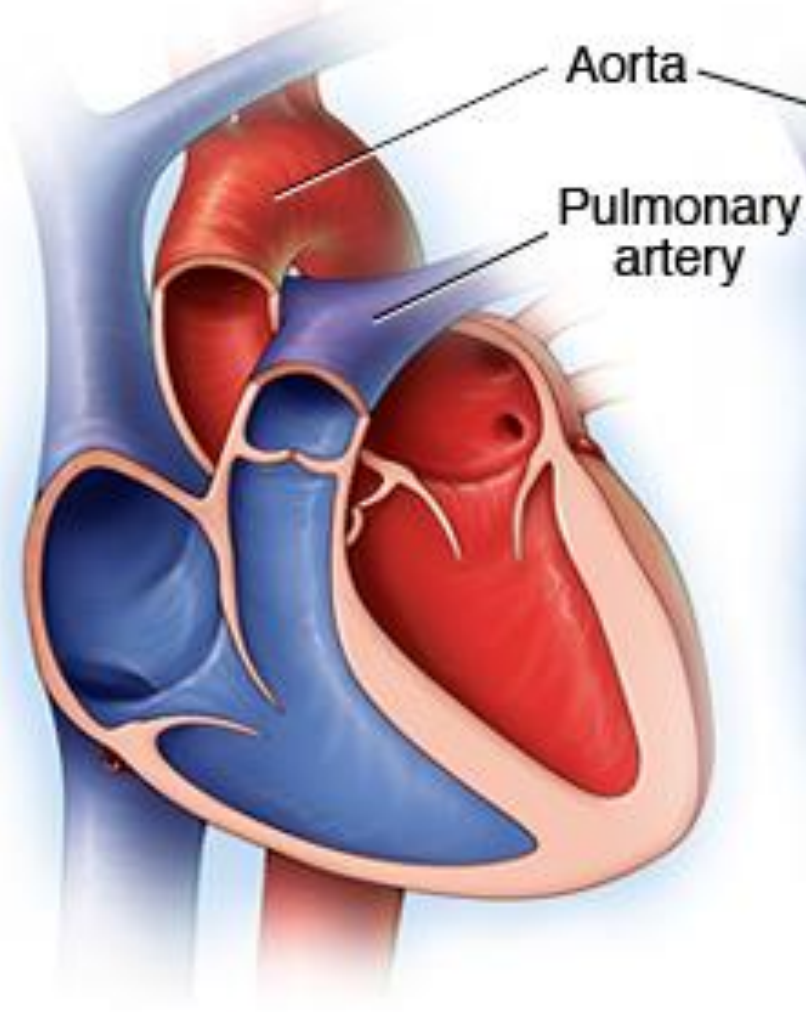
# Atrial septal defect



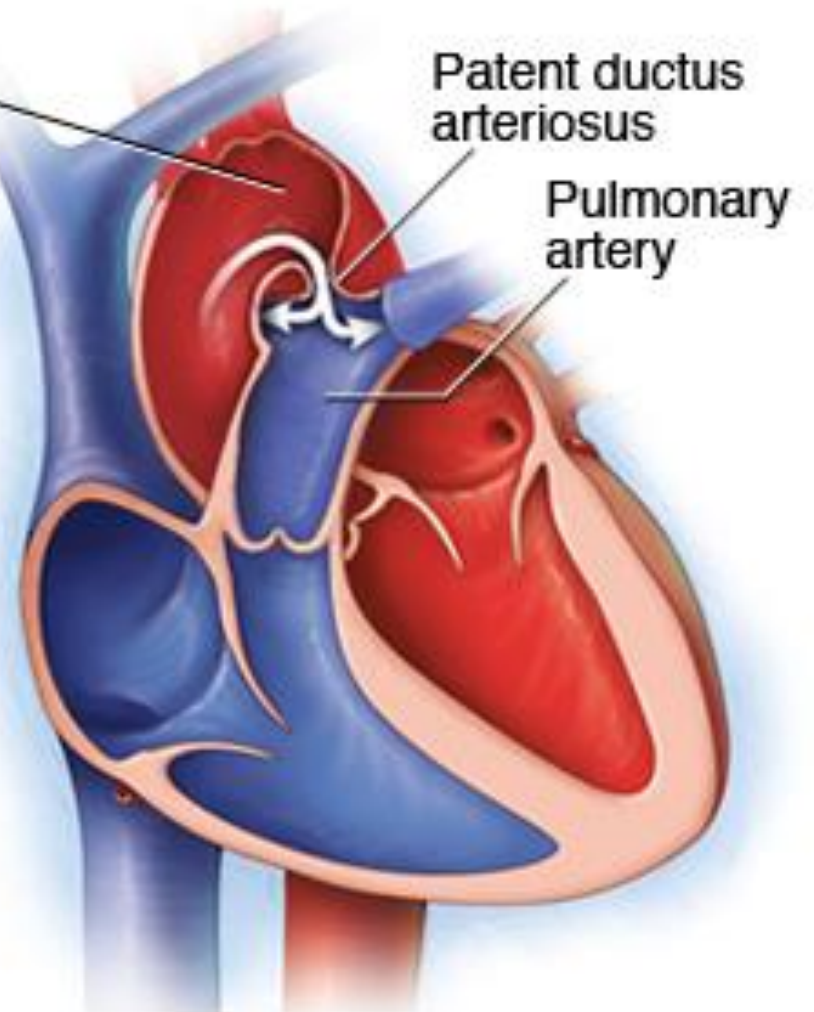
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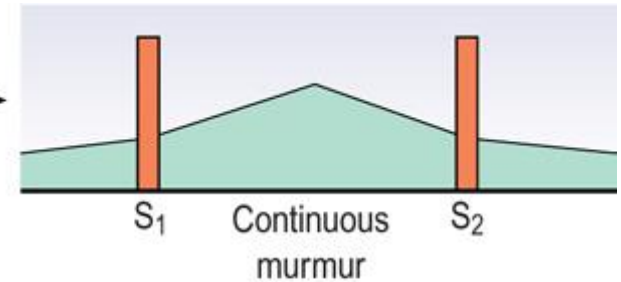
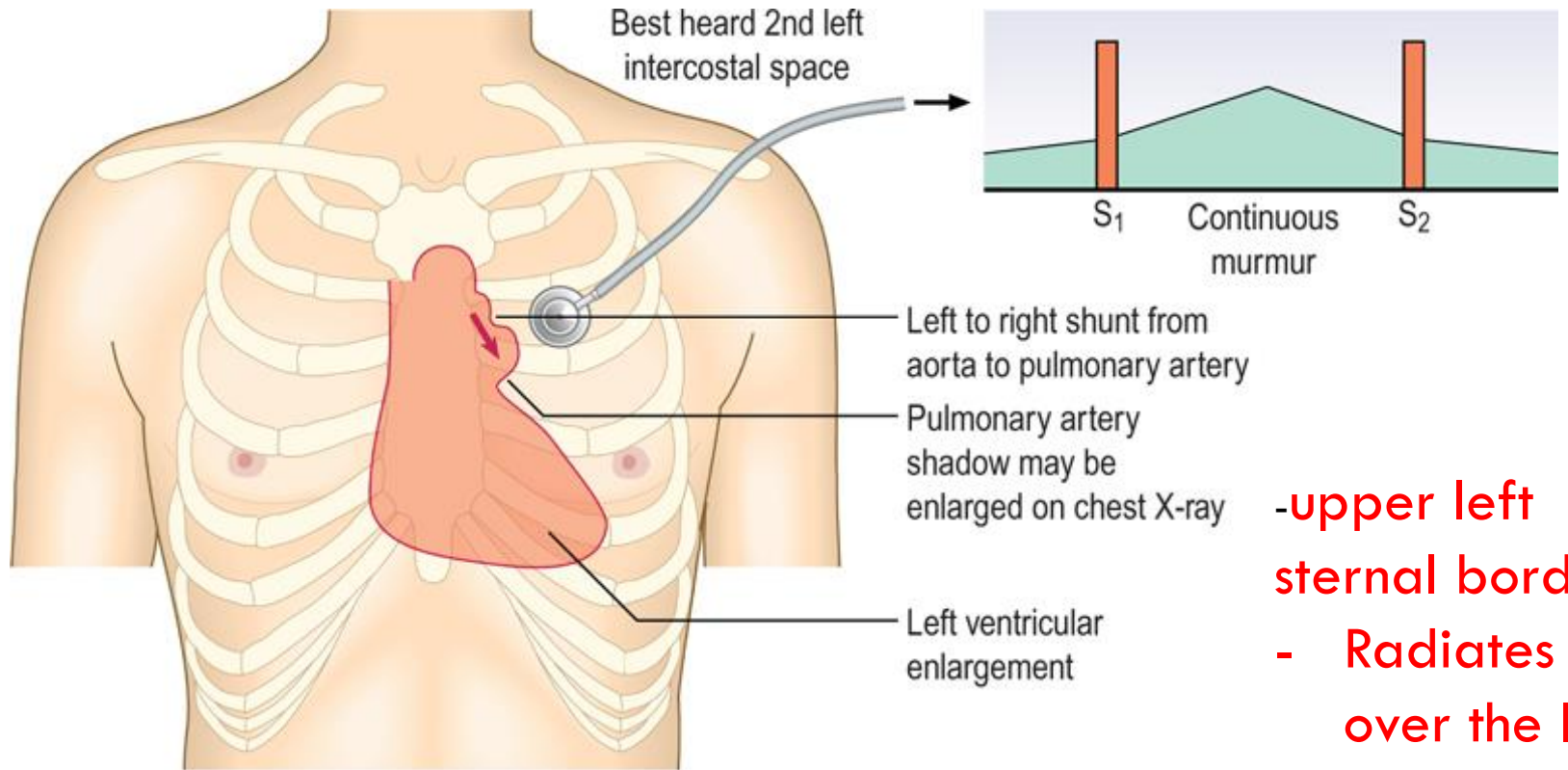
Normal heart



Patent ductus arteriosus



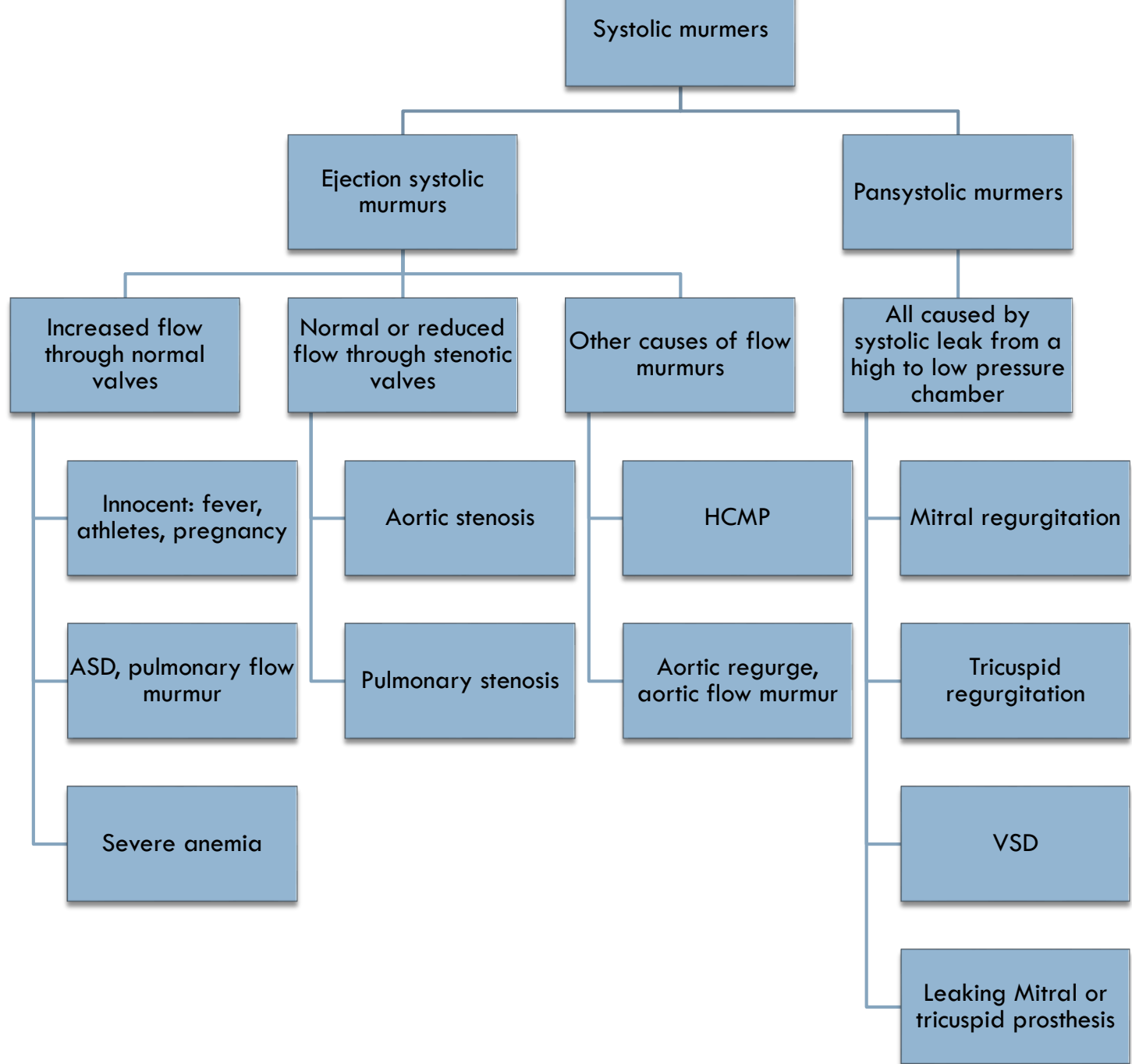
# Patent ductus arteriosus



Large volume peripheral pulses  
(including dorsalis pedis pulse in infants)

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- upper left sternal border
- Radiates over the left scapula
- machinery



**THANK  
YOU**