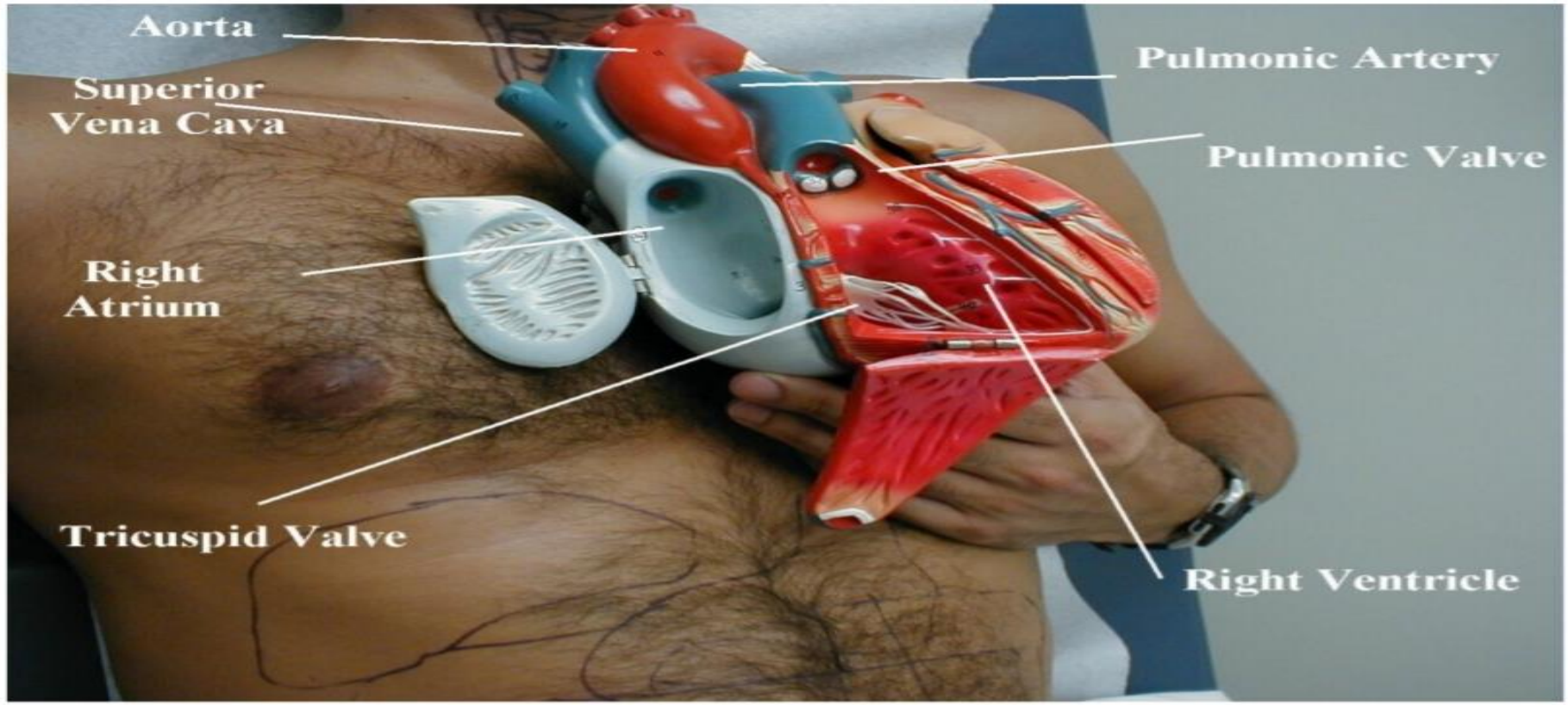
PRECORDIUM EXAMINATION

LOCAL EXAMINATION

Don't forget these 4 items

1. ***Inspection.***
2. ***Palpation.***
3. ***Percussion.***
4. ***Auscultation.***



PATIENT POSITIONING:

- Expose the patient's chest up to the umbilicus.
- Position the patient supine with the head of the table slightly elevated.
- Always examine from the patient's right side.
- Make sure that the patient is comfortable in this position.

Inspection

Observe the chest carefully through tangential view.

Specifically note for:

- Shape of chest & chest wall lesion :- (See chest)
- Dilated vein on chest wall > (S.V.C. obstruction).
- Scar of previous operation
  i. ***Median sternotomy*** (open heart surgery) **e.g.**; valve replacement or coronary bypass.
  ii. ***Inframammary*** = ***lateral thoracotomy*** (closed heart surgery) **e.g.**: mitral valvotomy.

- Precordial bulge:- indicates cardiac enlargement during childhood **e.g.** R.V. enlargement - pericardial effusion.
- Pulsation of different area (mainly for apical pulsation).

Palpation

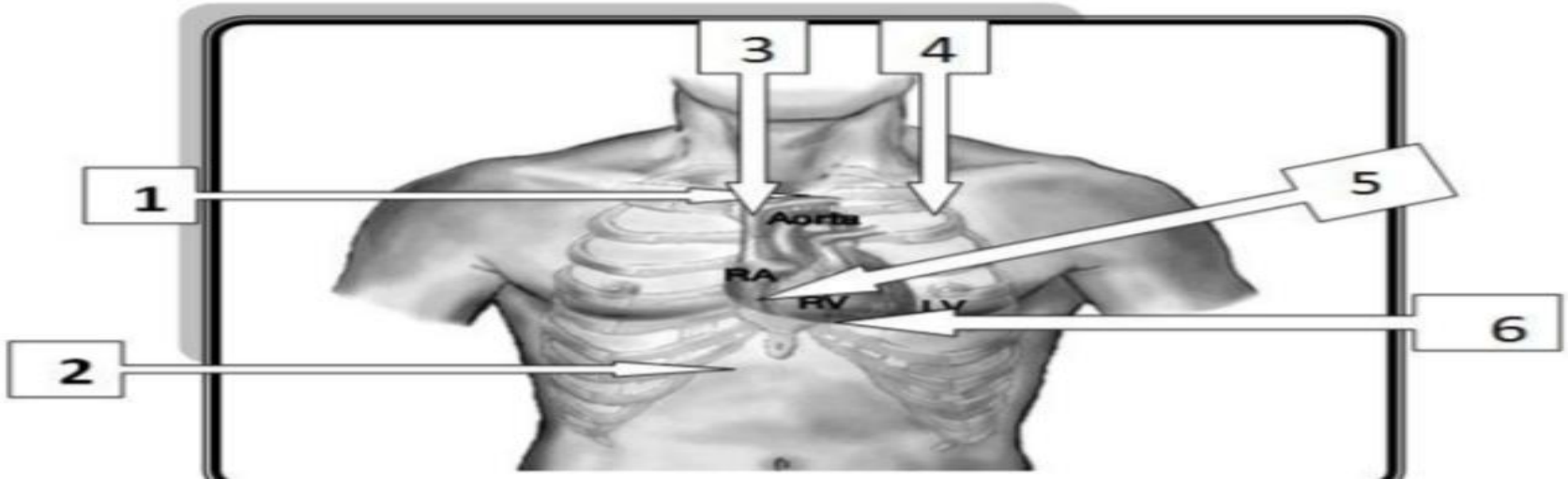
Usually inspect and palpate at the same time

Palpation for detection of:-

1. *Pulsation*
2. *Thrill*
3. *Palpable sound*

Areas of palpation

Area	Aetiology	Technique
1- Supra sternal	A.R. "Corrigan sign" + thin person + Hyperdynamic state Aortic aneurysm	Place your index / semi setting pt.
2- Epigastric P. :- Place your hand longitudinal in the subcostal angle Pulsation classified according to the direction into		
A) *at tip of fingers*	RV++	Increased with deep inspiration
B) *from the right side*	Hepatic P (TS / TR)	Enlarged & Tender during bimanual ex.
C) *from behind*	Aortic P (thin/ Hyperdynamic/aneurysm)	Pulsating down to umbilicus
3- Aortic area	Hypertension A. aneurysm / S	By tip of fingers (TV)
4- Pulmonary area	PH++ /P. anysm.	
5- Rt. parasternal	Rt. Atrium++ / Lt. at.	By tip of fingers (Vert) \or palm of hand
6-Lt. parasternal	R.V. ++ / Lt. atrium	By base of hand (increased with expiration)



7) The apex.

Technique

(Inspection – palpation – left lateral position)

- Firstly, by inspection
- Place your hand over the left hemi-thorax region
- Feel for the outer most and lower most pulsation.
- Left lateral position (for detection of weak P)
- Count the intercostal spaces (first identify the angle of Louis = the rib attached alongside this is the 2nd rib and the space below the rib is the 2nd space).

N.B.

Percussion or auscultation may be used for detection of absent apex.

Apex

Produced by the anterior movement of the left ventricle during early systole, occurs during isometric contraction of the left ventricle.

The normal apex felt as a **GENTLE NONSUSTAINED TAP**

N.B.

the point of maximal impulse may not the apex as in rheumatic mitral valve stenosis
the PMI may be the right ventricle.

Apex = Outermost and lowermost visible and palpable part of the heart.

تمثيلية ال apex

النظر إلى ال apex مماسياً .. ثم وضع اليد كاملةً على ال apex
ثم محاولة تحديدها بمجموعة من الأصابع .. ثم بإصبع واحد
وتحدد مكانها .. ثم زحلقة اليد لليسار قليلاً
وأقلب المريض يساراً وأحدد صفتها
" نظرة – لمسة – عدّة – لفّة "

Question ☺

Absent apex: (OPERA):-

Definition: *Not visible or palpable apex even on left lateral position.*

O ➔ ***O***besity.
P ➔ ***P***ericardial effusion – pleural effusion.
E ➔ ***E***mphysema.
R ➔ ***R***ib "under rib".
A ➔ ***A***nomalies "dextrocardia".

Comment on apex

1. Site :- 5th / Lt. MCL
2. Area.
3. Ch.ch.
4. Thrill
5. Rate "P. deficit".
6. Rhythm.
7. Rocking.

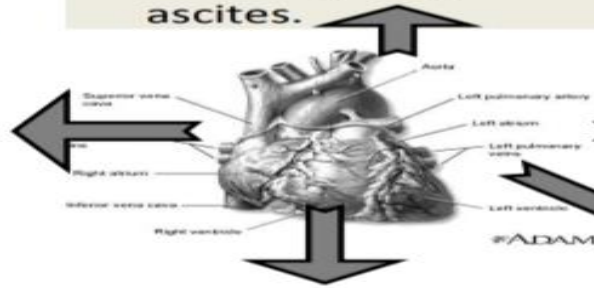
(1) Site

Normally in the Lt. **5th** intercostal space just **inside the M.C.L** (3.5 inch from the midline)

Apical shift

Upward:
- Upper lobe fibrosis.
- Infra diaphragmatic causes as ascites.

Inward
- Lt pleural effusion
- Lt pneumothorax.
- Rt lung fibrosis.
- Dextrocardia.



Outwards
- RV ++
- Rt Pleural effusion
- Rt Pneumothorax.
- Lt Lung fibrosis or collapse.

Down
- Viscero-ptosis
- Thin person

down and out
- LV ++

(2) Area "extend"

Normally it is localized (less than **one inch** / occupies **one space**).

Diffuse apex: - Right ventricular enlargement
The apex diameter is more than one inch or more than one space or the apex with ill-defined medial border

Localized apex: - Left ventricular pulsation
The apex diameter is less than one inch or in one space or the apex with well defined medial border.

(3) Character

Defined as: -
Force and duration of the apex

Hyperdynamic = forcible (In left lateral)
Volume overload as A.R. / MR / VSD.

Heaving = Sustained.
Tension overload as systemic Hypertension / AS / A coarctation

Slapping = papable S1 MS.

(4) Thrill & palpable sounds

Thrill

a. Diastolic thrill in M.S.
b. Systolic thrill in M.I.

Palpable sounds 1st H.S.:- in M.S.

(5) & (6) Rate & Rhythm

Normal: - Regular with HR equal to the radial pulse.
Irregular = (AF/ extra systole) / Apical rate for counting of P. deficit.

(7) Rocking

Left ventricle ++:- Apical bulge + left parasternal retraction **(anti-clockwise)**
Right ventricle ++:- the reverse **(clock-wise)**.

Palpated sound

Better to be detected by the tip

1. Apex
    - Palpable S_1 in **M.S.**
    - Palpable S_3 or S_4.
    - Palpable rub.

2. Aortic area
    - Palpable A_2 "syphilitic **A.R.**".

3. Pulmonary area
    - Palpable pulmonary component of S_2 in PH^{++}.

Auscultation

Technique

1. Stethoscope.
2. Site of auscultation.
3. The maneuver of auscultation.

Auscultatory findings

1. Heart sounds: S1 & S2
2. Additional sounds: - S3, S4, opening snap and clicks.
3. Murmurs.

± Pericardial rubs / L. crepitations.

a) Ideal stethoscope

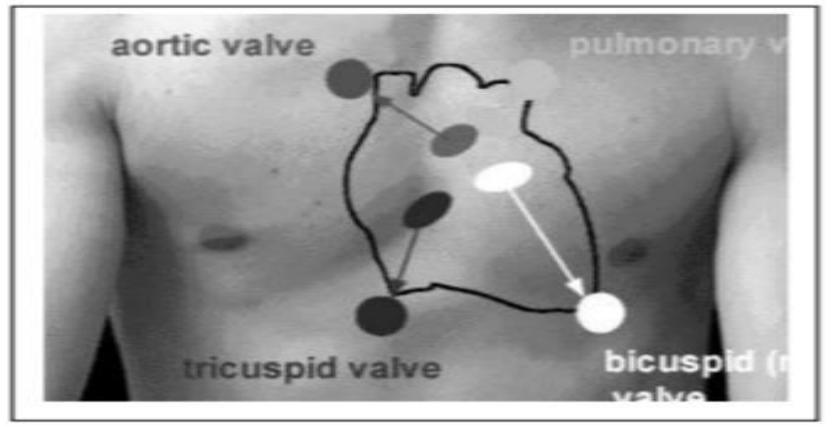
1. Optimal stethoscope tubing length is twelve inches (30 cm)
2. Make sure that the earpieces are fit in the external ear.
3. Make sure no air leaks occur between the chest wall and the stethoscope earpiece.

The Cone (bell)	The diaphragm
is best listened to low pitched sounds e.g.: S3 / S4 / rumbling murmur of MS.	Identifies high pitched sounds e.g.: normal heart sounds and the murmur of aortic incompetence.

Remember

The anatomical sites of valves

- **P** = 2nd left sternal border.
- **A** = 3rd left sternal border.
- **M** = 4th left sternal border.
- **T** = 5th left sternal border.



N.B.
Pulmonary & tricuspid *valves are anterior*
So, heard at their anatomical sites
But the ***aortic*** *&* ***mitral*** *valves are posterior*
So, heard at the direction of blood flow.

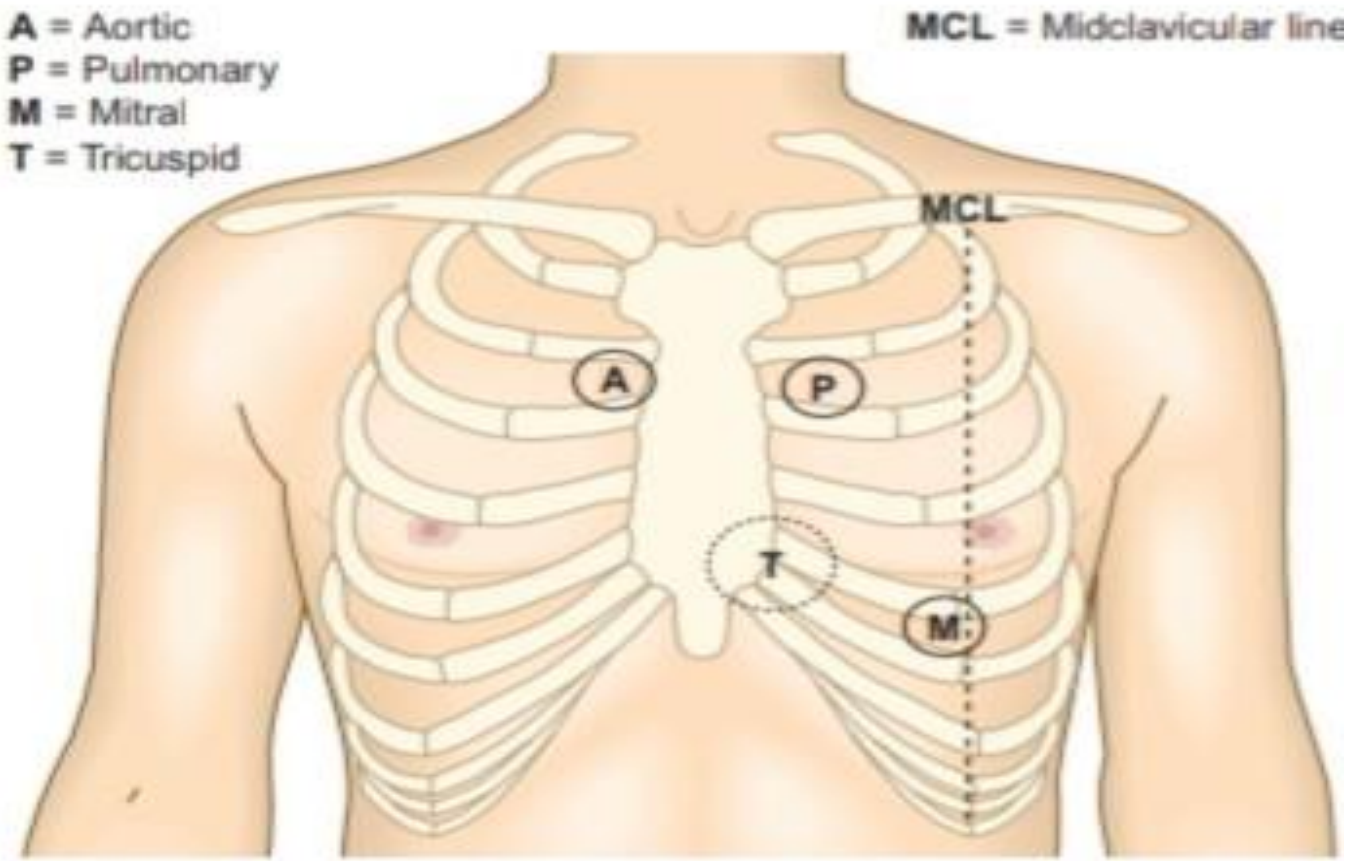


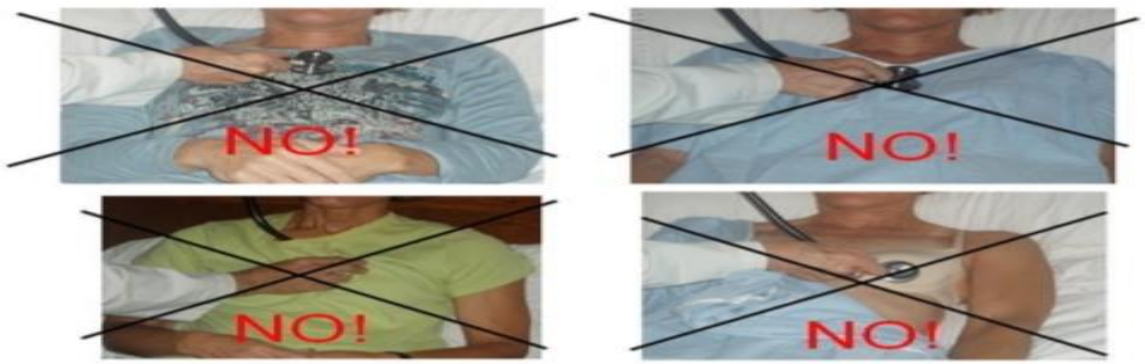
Fig. 6.21 Sites for auscultation. Sites at which murmurs from the relevant valves are usually, but not preferentially, heard.

b) Site of auscultation

- ***Mitral***: - apex (lt 5th space at the MCL)
- ***Tricuspid***: - at lower end of the sternum
- ***Pulmonary***: - left 2nd space
- ***Aortic***
  A1 = right 2nd space.
  A2 = left 3rd space. (Erb's area)

Other rare areas

- Lt Parasternal spaces:- VSD
- Left infra clavicular:- PDA.
- Posterior thorax, T2-T6: coarctation of aorta.



طيب تقولي لوالحالة سيده
في الامتحان احط السماعه فين ؟؟؟!!!!

اقولك كده غلط والصح

c) *The manoeuvre of auscultation*

For timing examine the carotid pulse

- ***Cone***

Start with the cone of the stethoscope listens to the:

- Mitral area
- Tricuspid area

You may need special manoeuvre as:

Roll the patient on to their left lateral position and listen for the murmur of mitral stenosis.

- ***Diaphragm***

Start with mitral area
then in a Z shape direction listen to

- Tricuspid
- Pulmonary
- Then aortic areas.

You may need special manoeuvre as:

1. ***Listen into the axilla area*** for the murmur of mitral incompetence.
2. ***Over T area*** ask the patient to breath in (murmur of right side increased with inspiration)
3. ***Over P area*** compare between A2 and P2 (S2 of P accentuated in PH++)
4. ***Over A area,*** listen on the carotid a. (propagation of AS murmur) & ask the patient to set and holding breath in expiration (or hearing of AR)








In each sound comment on

- Def. & mechanism
- Causes
- Site
- Timing
- Character

1. Heart sounds

	First heart sound	Second heart sound
Formed	a. Valvular: closure of the mitral and tricuspid valve. b. Muscular: contraction of the ventricle.	Closure of the semilunar valves (P & A) Vibration of the great vessels.
Site	Over M & T areas	Over the base (A & p)
Time	At the start of systole (carotid ascend)	At the end of systole (carotid descend).
Accentuated	• Thin person. • Tachycardia. • Children.	
	• ***M.S.*** = decreased filling of left ventricle = closure of the valve from a lower position. • ***Hyperdynamic states.*** • ***Short P.R. interval*** = decreased filling of the heart. • ***S. hypertension***= left ventricular +++ (muscular component).	• Pulmonary hypertension. • Systemic hypertension. • Aneurysm of ascending aorta (magnification). • Hyperdynamic circulation.
Weak	***Mechanical factor e.g.*** thick chest wall, obesity emphysema, pericardial effusion. (***Distant heart sound).*** ***Shock – hypotension***	
	• ***M.I. – T.I.*** • Severe myocardial diseases or heart failure. • Calcific M.S.	• A.S. – A.I. • Severe pulmonary stenosis.
Variable: atrial fibrillation		

S1: - The mitral precedes and louder than Tricuspid

S2: -

- *Aortic component louder & heard all over the pericordium.*
- *Pulmonary component heard on pulmonary area only.*

So the pulmonary component and aortic component heard over the pulmonary area and this is called physiological splitting which increase during inspiration and decrease during expiration.

Splitting of the second HS

- Physiologically the 2nd HS is formed by aortic and pulmonary components
- The aortic valve is closed by pressure greater than that of pulmonary valve. So the aortic valve is closed before the pulmonary valve
- The two component are so closed so heard as a single HS

Normal (physiological) splitting:

- During inspiration the pulmonary flow is increased so the closure of P valve physiologically delayed and accepted as two sounds

Wide splitting:

- From the start the **P valve is delayed** so accepted as two sounds
- By inspiration the pulmonary flow is increased so the splitting will be increases

Causes:- PS / RBBB / ASD

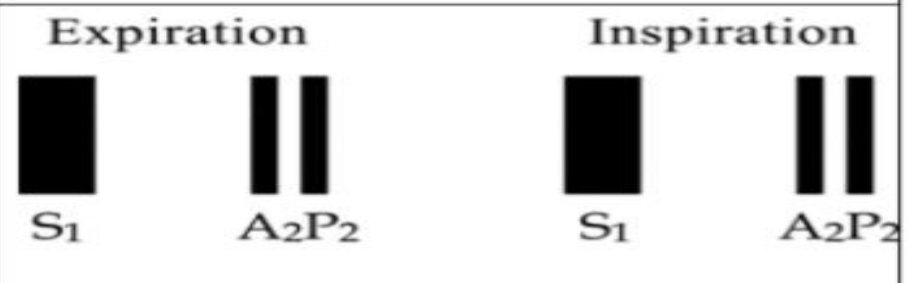
Paradoxical splitting

- From the start the **A valve is delayed** so accepted as tow sounds
- By inspiration the pulmonary flow is increased so the splitting will disappear

Causes:- AS / LBBB / VSD

Fixed splitting:-
The second HS formed by two component not changed by inspiration

Causes:- A.S.D.



2. Additional sounds

	Third heart sound	Fourth heart sound
Def	Low pitched sound heard due to gush of blood from atrium to ventricle or flabby ventricular wall	Low pitched sound heard due to forced atrial contraction against resistance
	Physiological :- in children and young adults. **V. overload :-** MR / AR / TR / VSD / ASD / Hyperdynamic **Diminished V distinsability:-** LVF \ RVF Constrictive pericarditis (**Pericardial knock**)	**T. overload :-** S. hypertension / IHD / A.S. P.S., P. embolism & PH++
Site	**Mitral** (left sided causes) or **Tricuspid** (right sided causes)	
Timing	Early diastolic (protodiastolic)	Late diastolic (presystolic)
		

Gallop: additional HS (3rd or 4th) plus tachycardia
It is so called because it is a triple rhythm resembles the sound of a galloping horse.
Causes
S3 gallop = protodiastolic gallop = LVF (M) / RVF (T)
S4 gallop = presystolic gallop = S hypertension & tachycardia

Summation Gallop: - Third & fourth sounds plus tachycardia
Causes
Hypertensive heart failure / IHD

Ejection click

Def: - Opening of the normal aortic (or pulmonary) valve is soundless while opening of the stenosed aortic (or Pulmonary) valve produce ejection click sound due to doming of this stenosed valve.

Chr.: Clicky sound.

Site	Aortic area (A.I.)	Pulmonary area
Causes	A.S. (valvular) — S. hypertension.	P.S. (valvular). — PH +++

N.B.

- *No ejection systolic click with subvalvular or Calcific A.S.*

Opening Snap

Def: - Snapy sound in M.S due to rigid periphery & pliable centre of the mitral valve in M.S.

Timing: - Early diastolic / separated from S2 by the isometric relaxation phase / heard by cone

Site: - Between M & T areas.

Significance: -

a. Diagnostic for M.S.

b. Non calcified.

c. Detect severity of M.S.

(Diminished distance between O.S. & S2 = sever lesion).

Murmur

Mechanism of Turbulence (murmur):

1. Passage of blood through
   - Stenosis (A.S. / M.S / P.S)
   - Irregularity (congenital bicuspid aortic valve)
   - Shunt (VSD / P.D.A.)
2. Abnormal direction of Blood (M.R. and A.R.)
3. Over blood flow (relative stenosis)
4. Passage of blood into a relatively dilated structure (ejection systolic murmur in PH ++ or S hypertension)

*Comment on **SCRIPT***

- ***S***ite.
- ***C***haracter.
- ***R***elation to respiration & position

  N.B.

  - ✓ *L**e**ft sided heart murmurs are louder on **e**xpiration.*
  - ✓ *R**i**ght sided heart murmurs are louder on **i**nspiration.*
- ***I***ntensity.
- ***P***ropagation.
- ***T***iming.

Timing:
A.S / M.R / T.R. / VSD = systolic.
A.R./ M.S. = Diastolic.

Chr:.
A.S. = Harsh.
A.R. = Soft blowing.
M.S. = Rumbling.
M.R. = Soft (80%), harsh = (20%)

Site:
According to the diseased valve.
N.B, : A.R. murmur at A2 (Left 3rd I.C. space)

Propagation:
M.R. : Axilla / Sternum & base.
A.S. : Carotid & Apex.

Increased by:
Mitral murmur: by
1. Left lateral position.
2. Exercise.

Aortic murmur: by
1. Leaning forward.
2. Expiration.

Right. Sided murmurs: by Inspiration "***karvallo's*** sign"

N.B.
Severity of the lesion detected by duration of the murmur not by grade. As duration of murmur depends on the pressure gradient across the valve

Grades (Intensity):
Intensity of a murmur is described in grades as follows:

No thrill	**Grade I:** Just audible in a quiet room. (Heard by an expert) **Grade II:** Quiet- (Heard by a non expert) **Grade III:** Loud without thrill. (Easily heard)
Thrill	**Grade IV:** Loud with thrill. **Grade V:** Very loud with the thrill. (Heard over wide area) **Grade VI:** Audible without a stethoscope. (Extremely loud)

Types of murmur

(1) Organic murmur	(2) Functional murmur
Murmur produced by structural lesions	Murmur due to functional disturbance with or without structural lesions
Most of them are diastolic	Most of them are systolic
Loud	Faint
Long	Short
Harsh (usually)	Soft
Propagated	No
With Thrill	No
WithC/P	No

Pericardial Rub

Superficial, gritty, high pitched sound caused by friction of parietal & visceral layer of pericardium.

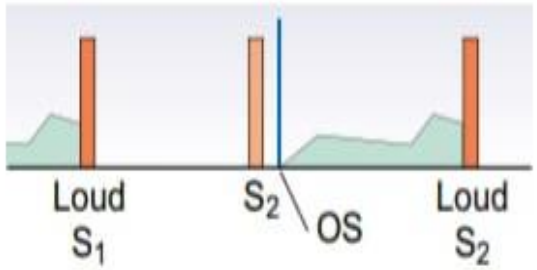
It is best heard at the left of the lower sternum with the patient breathing out using the diaphragm of the stethoscope.

Timing: To & Fro = Systolic & Diastolic.

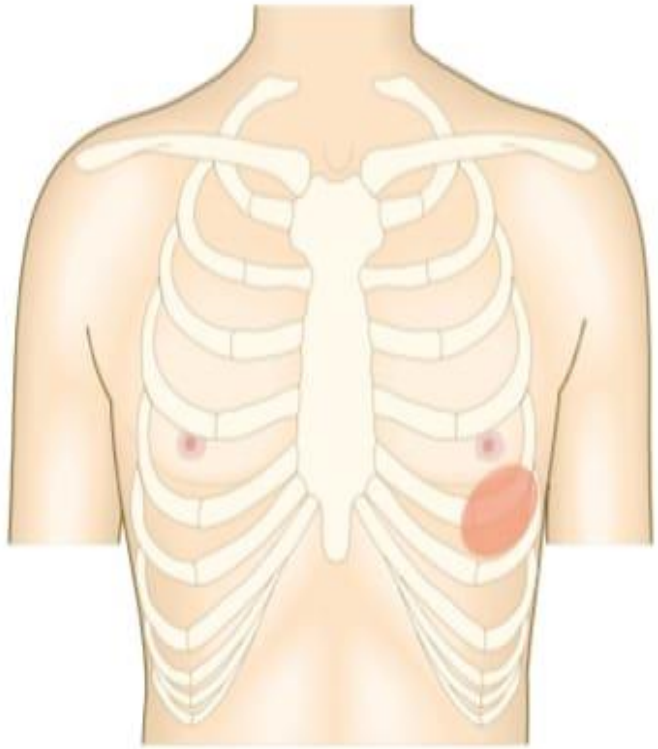
D.D.

- Pleural rub:- disappeared by withholding breath
- Friction of stethoscope: disappeared by firm pressure
- ***Crepitaion***

Fine B.B.C.	Medium sized	Coarse
MS – LVF	Chest infection	Acute pulmonary oedema.



Roll patient towards left
to hear murmur best

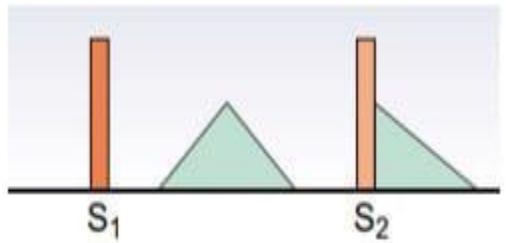


Additional clinical findings

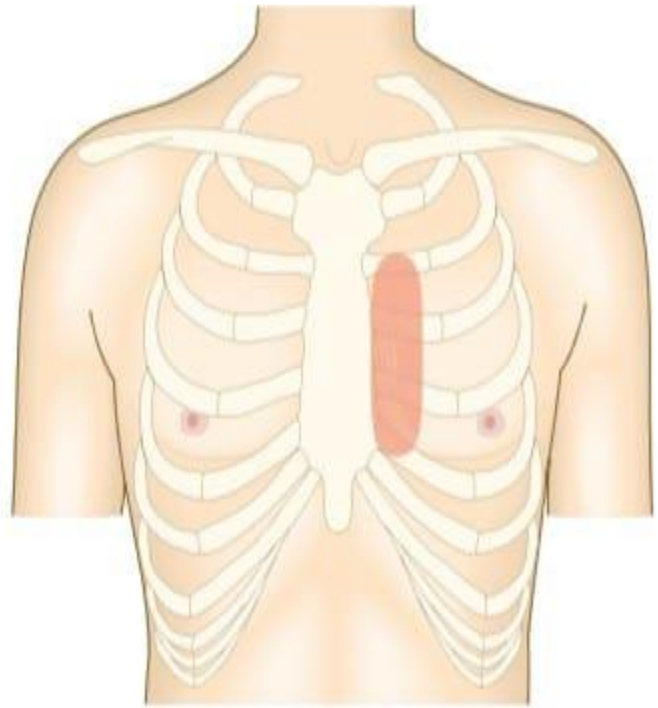
Low volume pulse
Tapping apex beat
Loud S1
Opening snap
Right parasternal heave*
Loud pulmonary component
of second heart sound*

*If pulmonary hypertension
has developed

Fig. 4.26 Mitral stenosis. There is a pressure gradient across the mitral valve, giving rise to a low-pitched mid-diastolic murmur that is heard best with the bell at the apex. Occasionally, an opening snap (OS) can arise due to the sharp movement of the tethered anterior cusp of the mitral valve at the time when the flow commences.



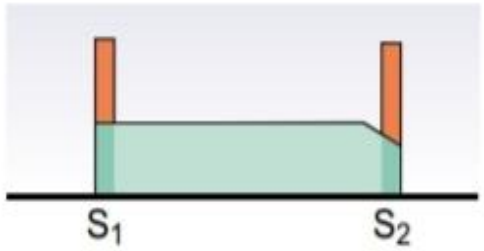
Lean patient forward with breath in held expiration to hear murmur best



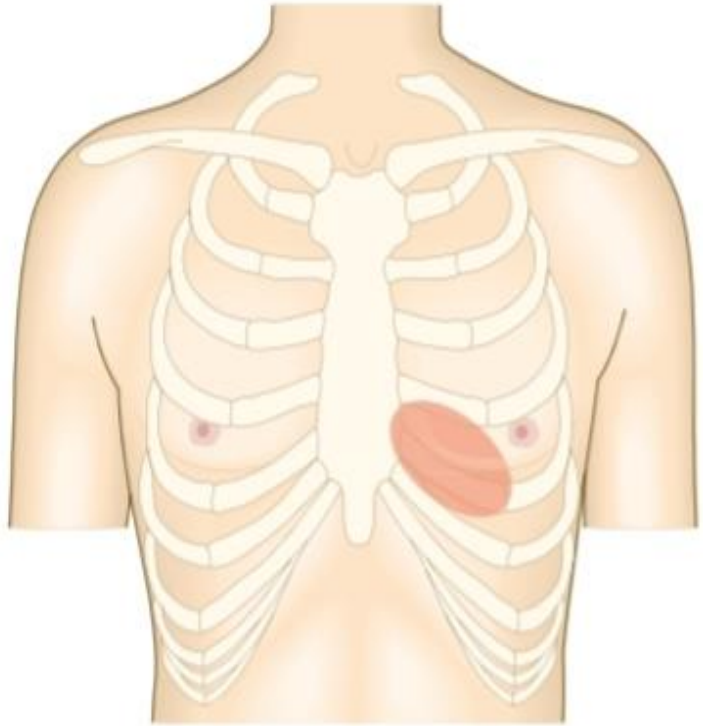
Additional clinical findings

- Large volume pulse
- Collapsing pulse
- Wide pulse pressure
- Prominent carotid pulsations (Corrigan's sign)
- Displaced apex beat

Fig. 4.25 Aortic regurgitation. There is an early diastolic murmur, best heard along the left sternal edge, with the diaphragm during held expiration. An associated systolic murmur is common because of the increased flow through the aortic valve in systole.



Pansystolic murmur.
The murmur intensity
increases with inspiration.



Additional clinical findings

Elevated JVP with systolic cv wave

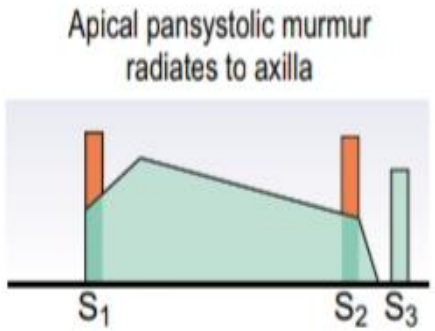
Pulsatile hepatomegaly

Right parasternal heave*

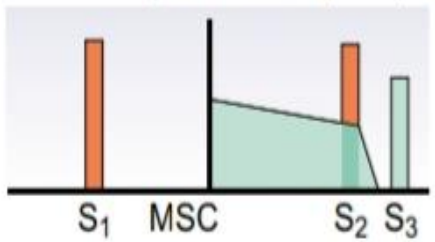
Loud pulmonary component of second heart sound*

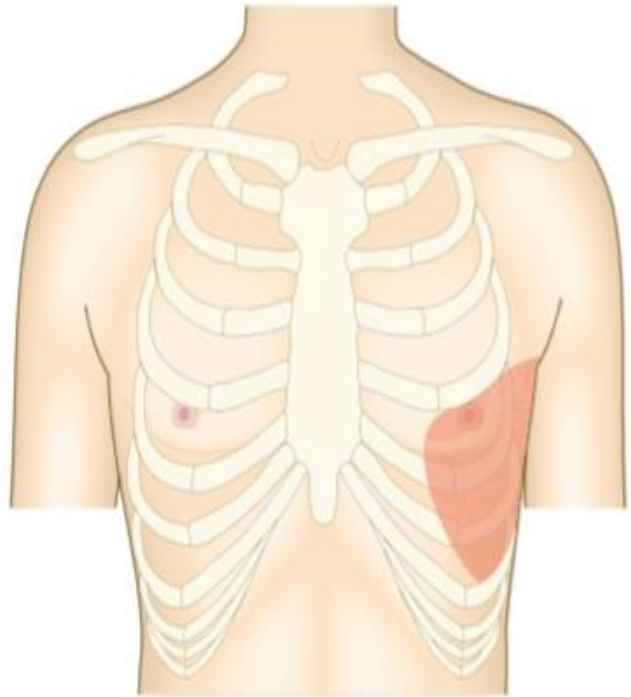
*If pulmonary hypertension has developed

Fig. 4.24 Tricuspid regurgitation. The murmur is usually heard only in the tricuspid area (left sternal edge, fourth intercostal space) and not at the other common sites of auscultation. It typically begins at the moment of valve closure and varies little in intensity throughout systole. *JVP*, Jugular venous pressure.



Variant: mid-systolic click/
late systolic murmur
(mitral valve prolapse)

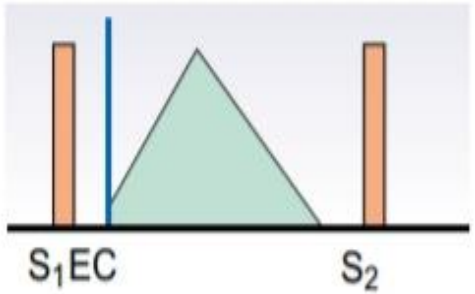




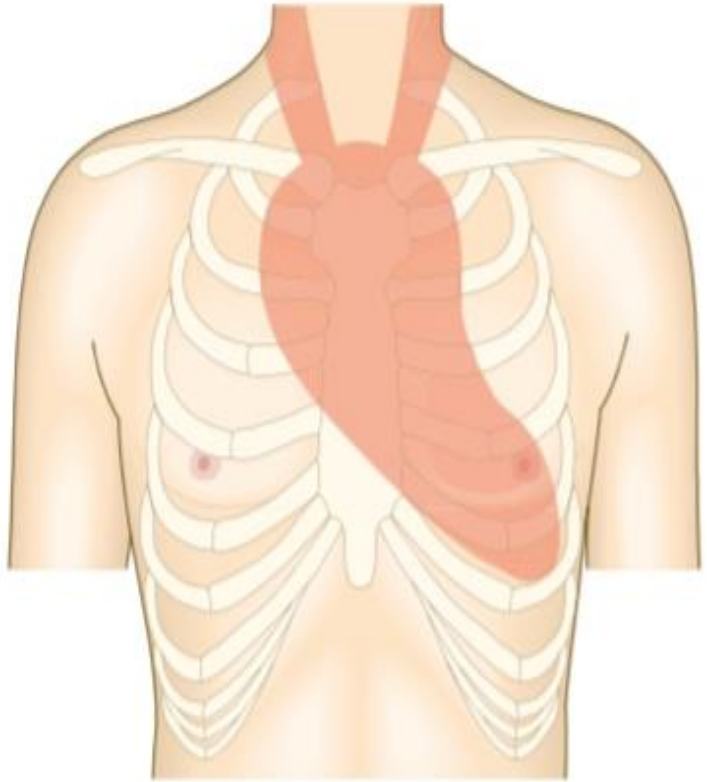
Additional clinical findings

Displaced apex beat
Third heart sound

Fig. 4.23 Mitral regurgitation. The murmur is best heard at the apex with radiation to the axilla and is usually audible only below the third intercostal space. It typically begins at the moment of valve closure and may obscure the first heart sound. It varies little in intensity throughout systole. In mitral valve prolapse the murmur begins in mid- or late systole and there is often a mid-systolic click (MSC).



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



Additional clinical findings

Slow rising pulse*
Reduced pulse volume*
Narrow pulse pressure
Apical heave
Thrill in aortic region
Reduced or absent second heart sound over aortic area*
Radiation of murmur to carotid artery*

*In patients with an ESM, 3 or more of these features make moderate to severe aortic stenosis highly likely

Fig. 4.22 Aortic stenosis. There is a systolic pressure gradient across the stenosed aortic valve. The resultant high-velocity jet tends to be widely audible throughout the praecordium, though it is best heard with the diaphragm in the aortic area. Alternatively, the bell may be placed in the suprasternal notch. In patients with bicuspid aortic valve, the ejection systolic murmur follows an ejection click (EC).