Introduction to patient care 2

IPC-234

Handout

Internal medicine department

Level: 2

2025 – 2026

Staff of Internal medicine department

Overall aim

- Describe a structured, patient centered history.
- Describe appropriately timed full physical examination of patients appropriate to the age, gender, and clinical presentation of the patient while being culturally sensitive.
- Formulate history and physical findings into a meaningful diagnostic formulation.
- Select an empathic and holistic approach to the patients and their problems.
- Display effective communication with patients, their families and community through
- proper verbal and written means, respecting their beliefs and level of education

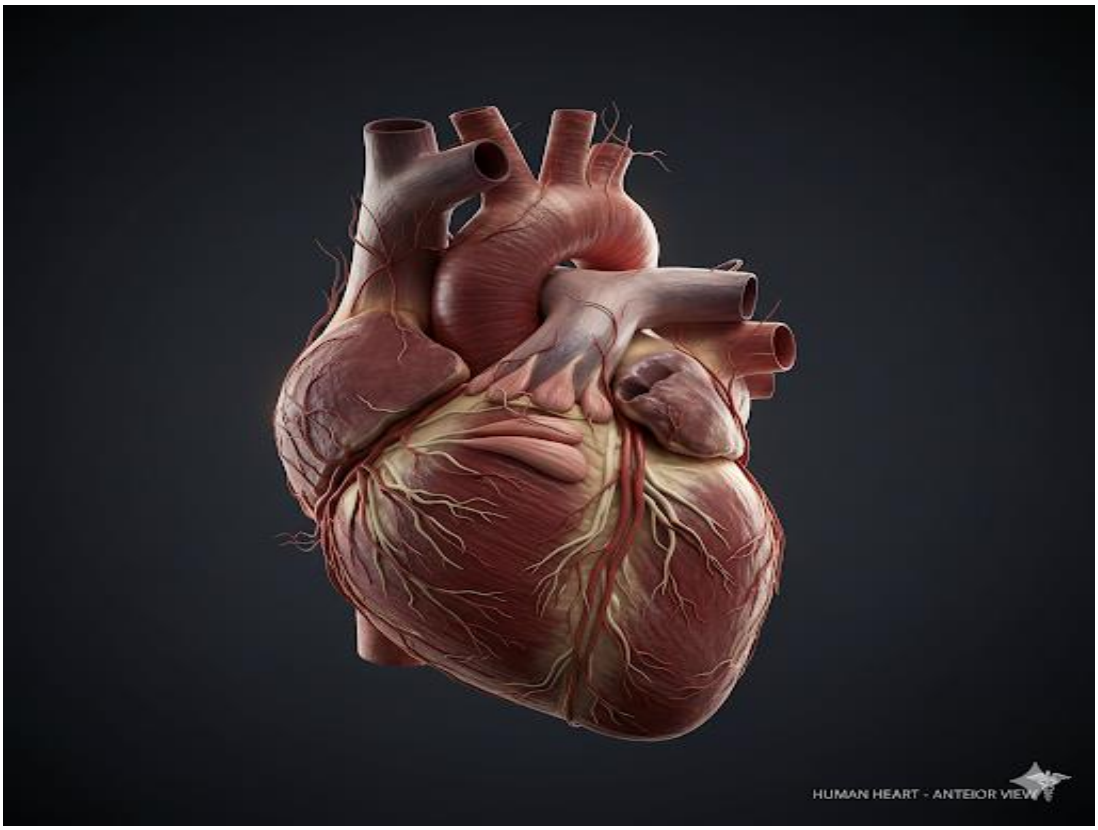
Contents

Part 1: cardiovascular system

Part 2: respiratory system

Part (1)

Cardiovascular system



Lecture (1): Clinical cardiovascular history taking

ILOs:

1. You can Illuminate the history taking steps
2. Enumerate the common Cardiovascular Symptoms
3. Illustrate causes of Dyspnea in CV disease
4. Analysis dyspnea and enumerate 2 special types
5. Correlate between dyspnea and other related CV symptoms

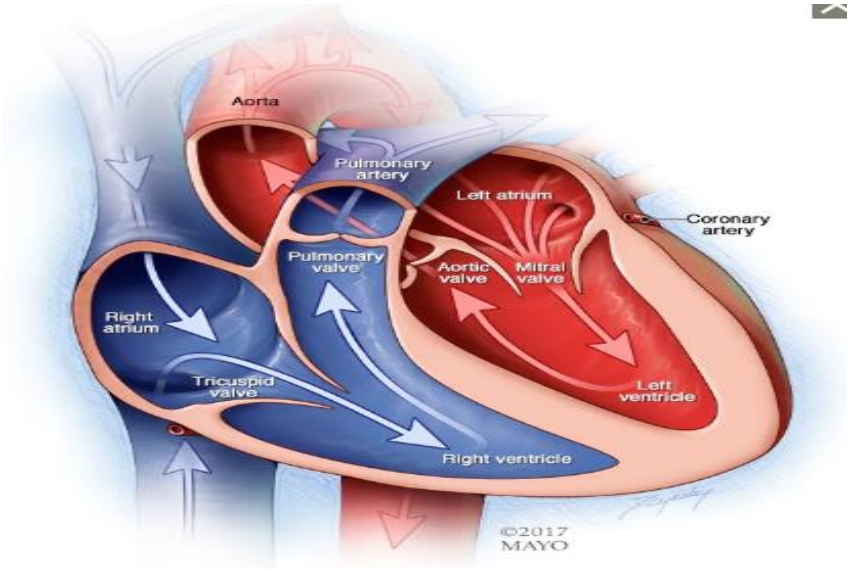
Applied anatomy and physiology

Heart

• The left ventricle lies almost entirely posteriorly and the right ventricle anteriorly.

• The myocardium is arranged in a complex spiral such that a contraction causes the heart to elongate and rotate slightly, hitting the anterior chest wall as it does, this can be felt as the apex beat.

• All of this movement is lubricated by a double-lined cavity filled with a very small amount of fluid that the heart sits in the pericardial sac.



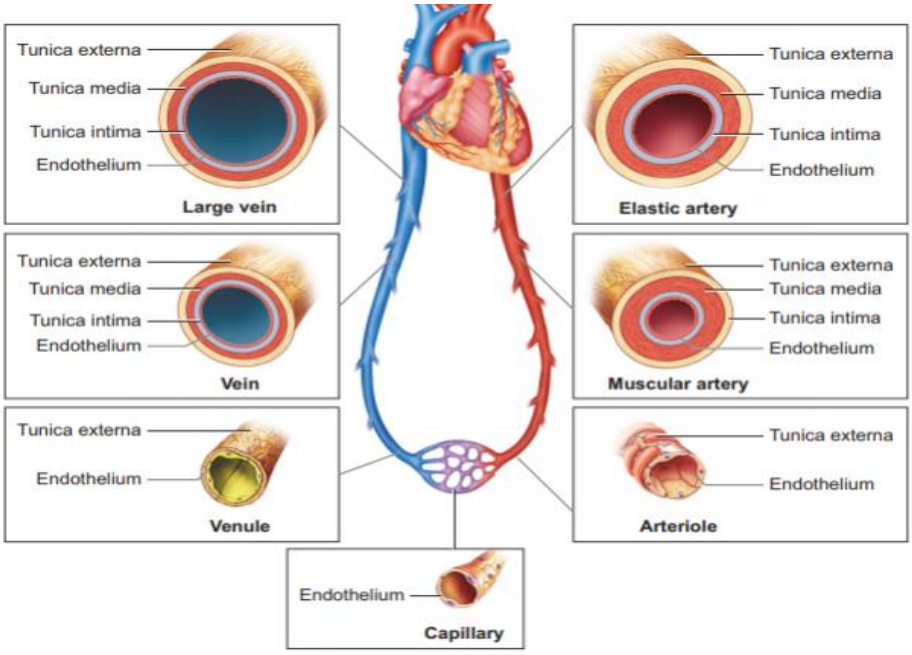
Arteries & Veins

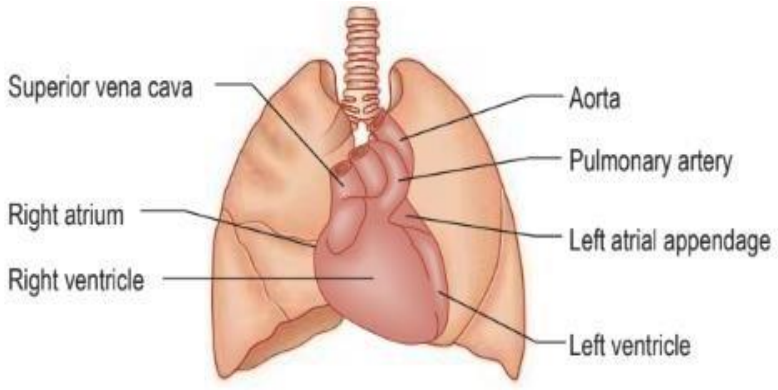
• As the ventricle expels blood into the arteries, it sends a pulse wave to the periphery that can be felt. This is not the actual flow of blood from the ventricle at that contraction but a pressure wave.

• Blood flows at a much lower pressure in the veins.

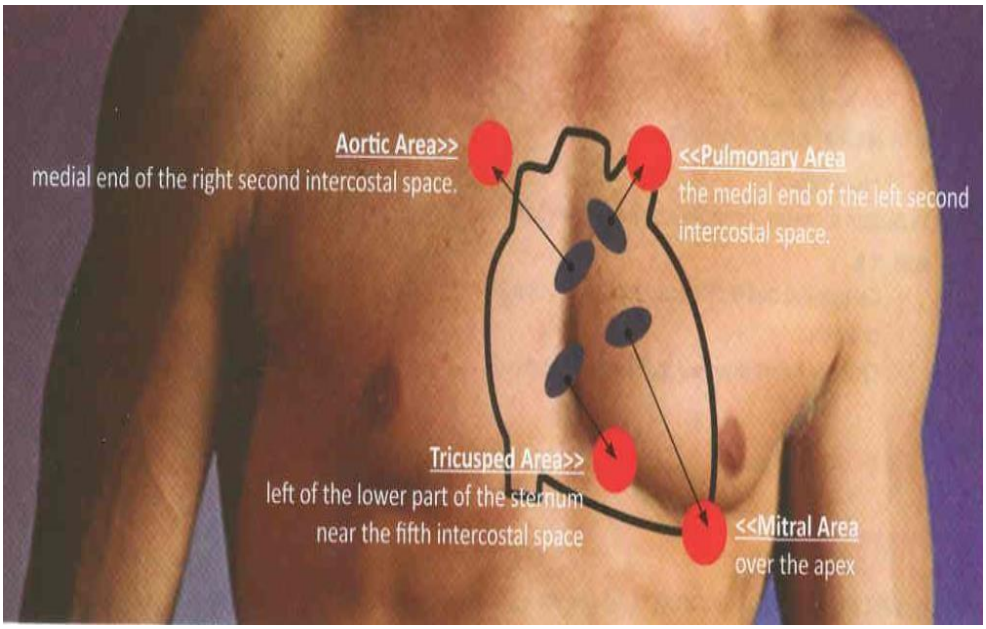
• Above the level of the heart, gravity does most of the work in returning the blood.

• Below, blood return is facilitated by contraction of muscles surrounding the deep veins, helped by numerous one-way valves to prevent backflow.





Cardiac silhouette as seen on the chest X-ray



Surface anatomy of the heart

Review of general roles in History Taking

Cardiac case sheet

History	Examination	Investigation	Diagnosis	Treatment
1)Personal history	1)General			
2)Complaint	2)Local			
3)History of present illness				
3a) Analysis of complaint 3b) Other symptoms of the related system 3c) Systemic inquiry 3d) DM & HTN				
5)Past history				
6)Family history				
7)Therapeutic history				
8)Social history				

Personal history

1)Name: To be familiar with the patient

2)Age: Congenital heart disease in infants and children. Coronary artery disease in middle and old age.

3)Sex: Rheumatic Mitral stenosis common in females, Rheumatic aortic regurge common in males

4)Occupation

5)Marital status: Possible infertility.

6)Residence: Poor socioeconomics and bad hygiene more susceptible to infections as streptococcus infection and rheumatic fever

7)Special habit: Smoking index= No. of cigarettes/day x No. of years of smoking, > 400 Heavy smoker, <100 Mild, 100-399 Moderate smoker.

8)Menstrual history: In females

Complaint and its duration

On the patient own words, brief sentence, choose the most recent one Example:

The patient complains of chest pain one week duration. The patient complains of palpitations 10 days duration.

The patient complains of shortness of breath 14 days duration.

Examples:

“Can you tell me more about what brought you in today?”

“How would you describe the problem you’re experiencing?”

“When did you first notice this?”

Written in patient own words. If more than one arrange either chronologically or the most annoying.

History of present illness

Analysis of complaint

8 as usual	3 for pain
Onset: sudden, acute, gradual	**Site**
Course: intermittent, stationary, decrescendo, crescendo	**Character**
Duration: minutes, days, months	**Radiation**
Association and Date of last attack	
What increase & what decrease	
Effect of treatment	

Cardiovascular symptoms

1) Pulmonary venous congestion symptoms
2) Systemic venous congestion symptoms
3) Low cardiac output symptoms
4) Cyanosis
5) Palpitations
6) Chest pain
7) Pressure manifestations
8) Fever
9) Thromboembolic manifestations

Dyspnea

Abnormally uncomfortable awareness of act of beathing= shortness of breath.

Patients may describe “breathlessness,” an inability to “get their breath,” or being “short-winded.”

“Tightness” نفسي بيروح منى –نفسي ضيق – مش بقدر اخد نفسى

Exertional Dyspnea: Shortness Of Breath on Effort or Exertion

– Onset (Acute, Rapid, Insidious) – Duration – Severity

– Exacerbating Factors (Effort, Emotional Stress, Salt Intake, Drugs.)

– Relieving Factors (Rest, Diuretics)

– Associated Symptoms (Cough, Dizziness, Wheezes.)

Special types of dyspnea:

Orthopnea: Dyspnea when lying flat, relieved by sitting/standing. – Seen in left-sided heart failure, severe lung disease, obesity.

Platypnea: Dyspnea that worsens when sitting or standing, relieved by lying down. – Associated with hepato-pulmonary syndrome, intracardiac shunts (patent foramen ovale), or pulmonary arterio-venous malformations.

Terpopnea: Dyspnea when lying on one side but not the other. Often due to unilateral lung disease, large pleural effusion, or heart disease (left atrial myxoma).

Paroxysmal Nocturnal Dyspnea: It is the sudden awakening at night with a sensation of severe shortness of breath, usually occurring 1–3 hours after sleep, that makes the patient sit upright or stand to get relief.

Caused by redistribution of fluid from the lower limbs to the lungs during recumbency, leading to pulmonary congestion.

Classically associated with left-sided heart failure.

Patients often report needing to open a window, sit upright, or sleep propped up with pillows to breathe comfortably.

Orthopnea

Dyspnea on lying flat relieved with sitting up and erect position. Orthopnea (Latin Ortho =).

• Can you prescribe to me how can you sleep? • How can you sleep? Your position during sleep?

• Do you need to raise your back, if do so How many number of pillows used during sleep?

• Do you sleep in sitting position or can sleep flat?

Paroxysmal nocturnal Dyspnea

Dyspnea, cough & wheezes developed after 1, 2 hours after sleep, awaken patient, also called cardiac asthma. WHY?

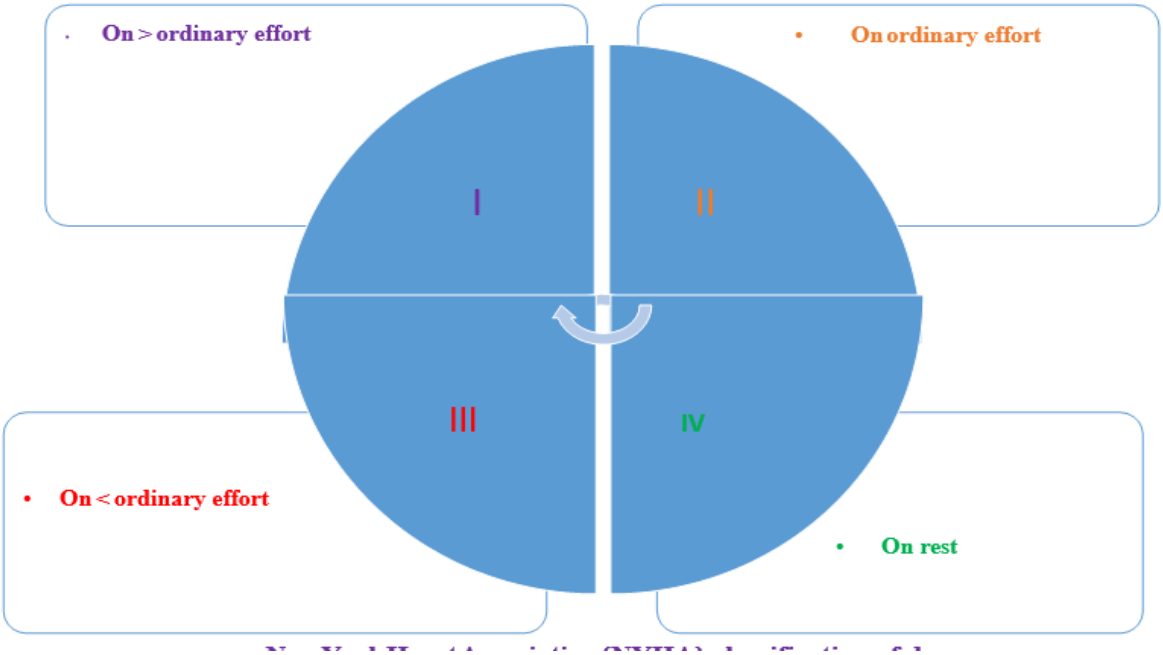
Patient sit up or stand and many go to the window for "fresh air" in an attempt to regain their normal breathing • How Often? "Every Night – frequent - infrequent".

• Time of occurrence "Mid-night- Early morning"

• Severity! "Sit-up - Stand - Go to the widow or street"

• Lasting for "minutes – prolonged"

• Associated Symptoms "Cough – Frothy sputum – Sweating - Palpitation"



New York Heart association of dyspnea

Cardiac asthma	Bronchial asthma
Any age	Young age
Associated cardiac synptoms	Associated chest symptoms
Short duration	Long duration
Resolved spontaneously	Resolved by bronchodilators
Inspiratory dyspnea	Expiratory dyspnea
Frothy sputum, may be blood tinged	thick

Mechanism of paroxysmal nocturnal dyspnea (PND)

1. Increased venous return (VR) during sleep.
2. Absorption of oedema fluid from circulation, increasing VR.
3. Diminished sympathetic activity during sleep →reduction of cardiac contractility.

Pathogenesis of cardiac dyspnea

1

Mechanical factors:

1) Pulmonary venous congestion: → decreased lung compliance in LT sided heart failure or interstitial lung oedema and transudation in some alveoli or bronchial mucosa oedema.

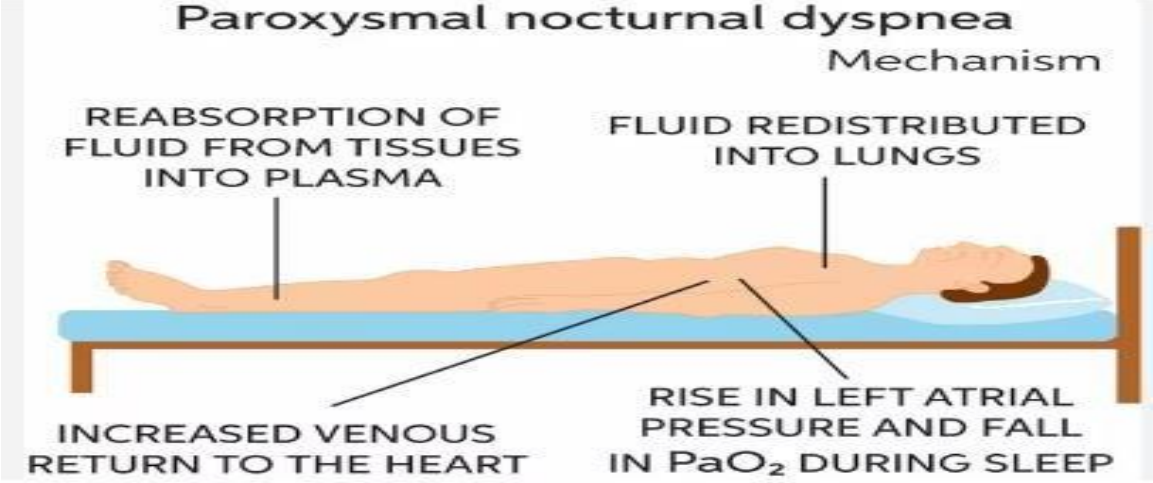
2) Fatigue of respiratory muscles: Due to low cardiac output →decreased respiratory muscle perfusion.

3) Pericardial &or pleural effusion →mechanical lung compression.

2

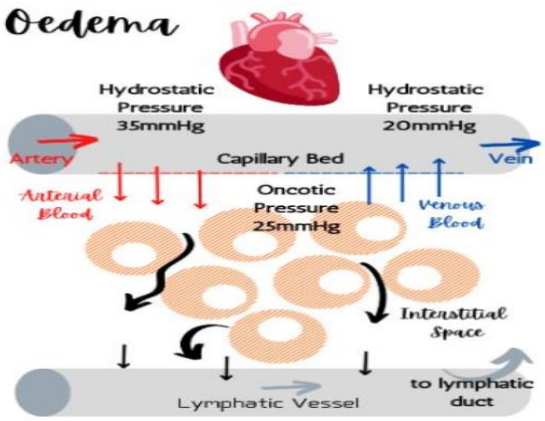
Chemical factors:

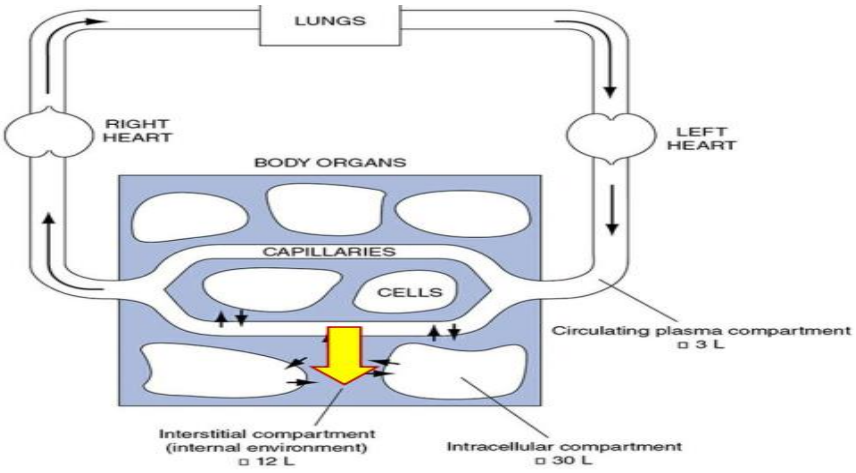
Pulmonary venous congestion and diminished tissue perfusion by low cardiac output→ Hypoxia, which stimulates respiration.



Systemic venous congestion symptoms

Swelling of Lower Limbs (LL) • **Edema** refers to fluid accumulation in the subcutaneous tissues.





Analysis of lower limb edema

Onset & Duration: "When did you first notice swelling in your legs?" "Did it start suddenly or gradually?"

Progression: "Has the swelling been getting worse over time?" "Does it spread upwards (from feet to ankles, then legs)?"

Laterality & Distribution: "Is the swelling in both legs or just one?" "Does it involve the feet, ankles, or extend up to the thighs?"

Timing & Variation**:** "Is the swelling worse at the end of the day or after standing for long?"

"Does it improve with rest or elevation of the legs?"

Associated symptoms

"Do you have shortness of breath or orthopnea?" (→ suggests cardiac cause).

"Any abdominal swelling, jaundice, or loss of appetite?" (→ liver disease).

"Any decrease in urination or foamy urine?" (→ kidney disease).

"Any pain, redness, or warmth in one leg?" (→ DVT).

Ascites = accumulation of fluid in the peritoneal cavity due to right-sided or biventricular heart failure.

• Ascites precox: It means ascites appears before hepatomegaly, splenomegaly, or marked edema. Seen in Chronic right-sided heart failure (e.g., from pulmonary hypertension, tricuspid stenosis/regurgitation).

• Constrictive pericarditis.

• Restrictive cardiomyopathy.

Analysis of ascites

Onset & Duration

"When did you first notice your abdomen becoming swollen?"

"Was it gradual or sudden?"

Progression

"Has it been increasing steadily?"

"Do you feel more bloated after meals or all the time?"

Associated Symptoms

"Do you feel short of breath when lying down?" (→ diaphragmatic pressure from fluid). "Any ankle or leg swelling with it?"

"Any yellowing of the eyes or skin?" (→ liver disease) "Any history of heart problems or difficulty breathing?" (→ cardiac ascites).

"Any change in urine amount or frequency?" (→ renal cause).

"Do you have a history of liver disease, heart failure, kidney disease, or tuberculosis?" "Have you ever had a similar swelling before?"

Right hypochondrial tenderness/ pain

• Right heart failure → ↑ right atrial pressure →↑ systemic venous pressure → congestive hepatomegaly.

• The stretched liver capsule (Glisson's capsule) causes dull, aching pain or discomfort in the right hypochondrium.

• If congestion is severe, it can lead to tender hepatomegaly and sometimes jaundice (congestive hepatopathy).

• Dull aching pain in the right upper abdomen.

• Worsens with exertion or when venous congestion increases.

• Associated with: Tender, enlarged liver. • Ascites (in advanced cases).

• Peripheral edema raised JVP (signs of systemic venous congestion).

GI Symptoms

• Anorexia, early satiety, nausea, abdominal discomfort → due to visceral congestion

Low cardiac output symptoms

Fatigue, weakness, easy fatigability → reduced muscle perfusion.

Cold extremities → poor peripheral circulation.

Exercise intolerance.

Pallor, sweating, tachycardia (compensatory sympathetic activation).

Low blood pressure, narrow pulse pressure

Dizziness, lightheadedness, syncope → reduced cerebral perfusion.

Neurological Symptoms

Confusion, poor concentration, memory problems (especially in elderly).

Syncope or near-syncope (especially in severe aortic stenosis, arrhythmias).

Renal Symptoms

Oliguria (reduced urine output).

Nocturia (in mild cases, due to improved renal perfusion when supine).

Intermittent claudication: It is exercise-induced pain, cramp, or tightness in a muscle group (usually calf, sometimes thigh or buttock) caused by inadequate arterial blood supply. The pain is relieved by rest within minutes.

Syncope

Syncope is a transient loss of consciousness due to inadequate cerebral blood flow

Postural (orthostatic) hypotension is a drop in systolic blood pressure of 20mmHg or more on standing from a sitting or lying position. Usually, reflex vasoconstriction prevents a drop in pressure, but if this is absent or the patient is fluid-depleted or on vasodilating or diuretic drugs, hypotension occurs.

A vasovagal attack is a simple faint and is the most common cause of syncope.

The mechanism begins with peripheral vasodilation and venous pooling of blood, leading to a reduction in the amount of blood returned to the heart. The near-empty heart responds by contracting vigorously, which stimulates mechanoreceptors (stretch receptors) in the infero-posterior wall of the left ventricle.

These, in turn, trigger reflexes via the central nervous system, which act to reduce ventricular stretch (further vasodilation and sometime profound bradycardia), but this causes a drop in

blood pressure and therefore syncope. These episodes are usually associated with a prodrome of dizziness, nausea, sweating, tinnitus, yawning and sinking feeling.

Chest pain

- Onset, course, duration
- Site of maximal intensity
- Radiation, and reference
- Character
- Mode of precipitation and mode of relief

Analysis of chest pain

Onset

"When did the pain start?"

"Was it sudden or gradual?"

"What were you doing when it started?"

Location

"Where exactly do you feel the pain?"

"Can you point to it with one finger, or is it spread out?"

Character (Quality): "Can you describe what the pain feels like — sharp, dull, burning, pressure, heaviness?"

Radiation: "Does the pain move anywhere, like to your arm, neck, jaw, back, or stomach?"

Associated symptoms

"Do you feel short of breath?" "Any sweating, nausea, or vomiting?"

"Any palpitations, dizziness, or fainting?" "Any cough, fever, or sputum with blood?"

Timing & Duration

"How long does the pain last?"

"Is it constant or does it come and go?"

"Is there a particular time of day it happens?"

Exacerbating/Relieving factors

"What makes the pain worse — exertion, deep breathing, coughing, meals, lying down?"

"What makes it better — rest, sitting forward, medications (like nitroglycerin or antacids)?"

Severity "On a scale of 0–10, how bad is the pain?"

Angina pectoris

• Diffuse chest pain, compressing, burning, heaviness or stabbing in character

• Retrosternal referred to left shoulder, left arm, left side of neck

• Precipitated by exertion and relieved by rest and nitrates

• If the pain becomes continuous without relief acute myocardial infarction should be put in consideration.

Dissecting aortic aneurysm

• Onset: Sudden, abrupt onset (patients often remember the exact moment it started).

• Character: Described as severe, tearing, ripping, or stabbing in nature.

• Location: Typically retrosternal or interscapular (between the shoulder blades).

• Location may depend on site of dissection:

– Ascending aorta → anterior chest pain.

– Descending aorta → interscapular/back pain.

– Abdominal aorta → abdominal pain.

• Radiation: Can radiate to the back, abdomen, neck, or legs depending on extension.

• Duration: Persistent and unrelenting (unlike angina, which lasts minutes).

• Severity: Usually very severe, maximal at onset (distinguishing from myocardial infarction where pain builds up gradually).

• Associated Features

Syncope, neurological deficits (if carotids involved).

Hypertension or hypotension/shock (if rupture or tamponade).

Asymmetrical pulses or blood pressure.

New diastolic murmur (aortic regurgitation).

Pleuritic and pericarditis pain

• Pain due to inflammation of pleura and pericardium is sharp stitching will localized pain increase with movement or respiration, either central in pericarditis or intercostal in pleurisy.

Palpitation

• Onset, course, duration • Rate (rapid or slow) • Rhythm (regular or irregular) • Mode of precipitation and relief.

Types as described by the patient

• Rapid/fast heartbeat → “My heart is racing” (tachycardia).

• Slow heartbeat → "It feels like my heart is too slow" (bradycardia, less common as a complaint).

• Irregular heartbeat → "My heart skips beats" or "beats come at random" (atrial fibrillation, ectopics).

• Thumping or pounding → Strong forceful beats, sometimes after a pause (commonly felt with premature beats).

• Fluttering → Rapid, light, butterfly-like sensation in the chest (often supraventricular arrhythmias).

• Pause or missed beat → Feeling like the heart stops then starts again (ectopic beats).

• Exertional palpitations → worsen with activity (may suggest arrhythmia, ischemia, or structural disease).

• Resting or nocturnal palpitations → may suggest anxiety, thyrotoxicosis, or ectopics.

• Postural palpitations → occur when standing up (e.g., postural orthostatic tachycardia syndrome, POTS).

TO FINISH THE SHEET: Other system review (Systemic inquiry)

Respiratory System

"Do you have cough or sputum?"

"Any blood in the sputum (hemoptysis)?"

"Do you wheeze or have frequent chest infections?"

"Any shortness of breath on exertion, lying down, or at night?"

Gastrointestinal System

"Any abdominal swelling or fullness?" (ascites)

"Any swelling or pain in the right side under the ribs?" (hepatic congestion)

"Have you noticed yellowing of the eyes/skin?" (jaundice in right HF)

"Any nausea, vomiting, loss of appetite, or early satiety?"

"Any black stools or vomiting blood?" (anticoagulant complications)

Genitourinary System

"Any change in urine amount — less than usual or passing more at night?" (oliguria, nocturia)

"Any swelling of the body?" (fluid retention).

"Any frothy urine?" (proteinuria suggesting renal disease).

Nervous System

"Any fainting or blackouts?" (arrhythmia, low cardiac output).

"Any weakness, numbness, or difficulty speaking?" (stroke/TIA from emboli in AF, valve disease).

"Any headache or dizziness?"

Musculoskeletal System

"Any joint pains?" (rheumatic fever history, infective endocarditis with arthralgia)

"Any swelling/redness in the legs?" (DVT, edema)

General/Systemic

"Any fever, chills, or night sweats?" (infective endocarditis)

"Any significant weight gain (fluid retention) or weight loss (chronic illness, heart failure)?"

"Any fatigue or reduced exercise tolerance?"

PAST HISTORY

1.Past cardiac illness history

• "Have you ever been told you have a heart problem before?"

• History of rheumatic fever or rheumatic heart disease.

• Previous myocardial infarction, angina, heart failure.

• Arrhythmias (atrial fibrillation, palpitations, syncope).

• Congenital heart disease or corrective surgery.

• Valvular disease or valve replacement.

• Hypertension (duration, control). • Hyperlipidemia.

2. Other Medical Illnesses

• Diabetes mellitus (major risk factor for ischemic heart disease).

• Renal disease (causes hypertension, fluid overload).

• Chronic lung disease (can cause cor pulmonale).

• Thyroid disease (thyrotoxicosis → arrhythmias, hypothyroidism → bradycardia).

3. Previous Hospitalizations / Interventions

• "Have you ever been admitted for chest pain, heart failure, or high blood pressure?"

• "Have you had any cardiac procedures like angioplasty, bypass surgery, pacemaker, valve surgery?"

4. Infective / Inflammatory History

• History of tuberculosis (can cause constrictive pericarditis).

• History of endocarditis.

5. Medications

"Are you on any regular medications?" (antihypertensives, anticoagulants, antianginals, diuretics, digoxin). Past use of drugs with cardiac side effects (e.g., chemotherapy, steroids, NSAIDs).

6. Allergies & Surgeries

• Drug allergies (important before giving contrast, antibiotics, etc.).

• Previous surgeries (cardiac or non-cardiac).

FAMILY HISTORY

• **Premature Ischemic Heart Disease**

"Has anyone in your family had a heart attack or angina at a young age?"

– Premature CAD = men <55 years, women <65 years.

• **Sudden Cardiac Death**

"Any history of sudden, unexplained death in the family?"

– Suggests inherited arrhythmias (e.g., Long QT syndrome, Brugada syndrome) or hypertrophic cardiomyopathy.

• **Hypertension, Diabetes, Hyperlipidemia**

"Does anyone in your family have high blood pressure, diabetes, or high cholesterol?"

– Important cardiovascular risk factors.

• **Congenital Heart Disease**

"Any family members born with heart problems or who had surgery for a heart defect?"

• **Valvular or Rheumatic Heart Disease:** Rarely familial but may appear in regions with high prevalence of rheumatic fever.

• **Cardiomyopathies**

"Any family history of heart muscle disease, heart transplant, or unexplained heart failure?"

– Dilated, hypertrophic, or restrictive cardiomyopathy can be inherited.

• **Aortic Disease**

"Any history of aortic aneurysm or dissection in the family?" – Seen in Marfan syndrome, Ehlers–Danlos, bicuspid aortic valve.

Menstrual History

• **Age at menarche & menopause** → Early menopause is linked with ↑ cardiovascular risk.

• **Cycle regularity & amount of bleeding** → – Heavy menstrual bleeding may cause iron-deficiency anemia, worsening angina or heart failure.

– Amenorrhea/oligomenorrhea may suggest endocrine issues (thyroid, PCOS) that impact the heart.

• **Menopausal status** → post-menopausal women lose the protective effect of estrogen → ↑ ischemic heart disease. – Ask about hormone replacement therapy (HRT).

Obstetric History

• **Gravida and para** (number of pregnancies, deliveries, abortions).

• **Complications of pregnancy**:

– **Pre-eclampsia / eclampsia** → Strongly associated with later hypertension and ischemic heart disease.

– **Gestational diabetes** → Risk of future diabetes & coronary artery disease.

– **Peripartum cardiomyopathy** → May present during late pregnancy or early postpartum.

• **Mode of delivery** → Caesarean section, operative deliveries (important for anticoagulated patients).

• **History of excessive bleeding** → Relevant in patients on anticoagulants or with prosthetic valves.

• **Contraceptive use** → Oral contraceptives ↑ risk of thrombosis, hypertension, myocardial infarction, stroke.

References:

• Oxford American Handbook of Clinical Examination and Practical Skills

• Macleod`s clinical Examination 12th edition

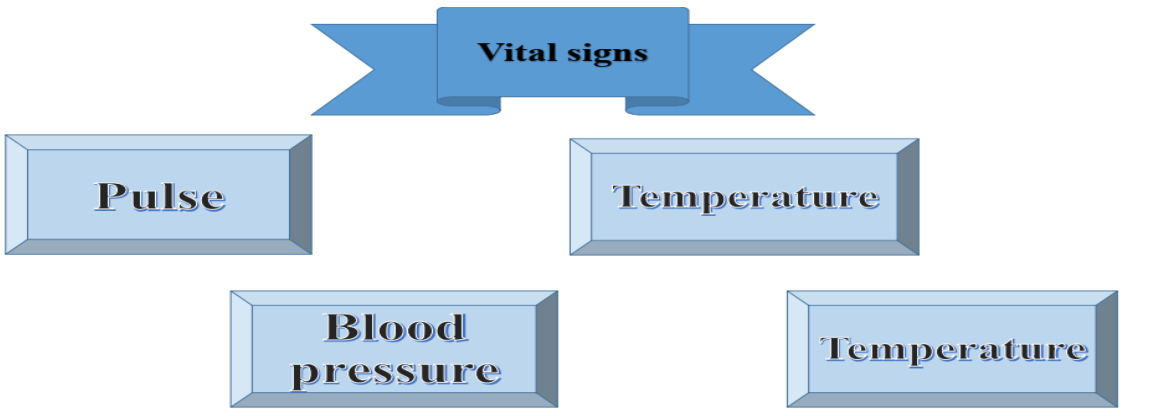
Lecture (2) General Examination and Vital signs

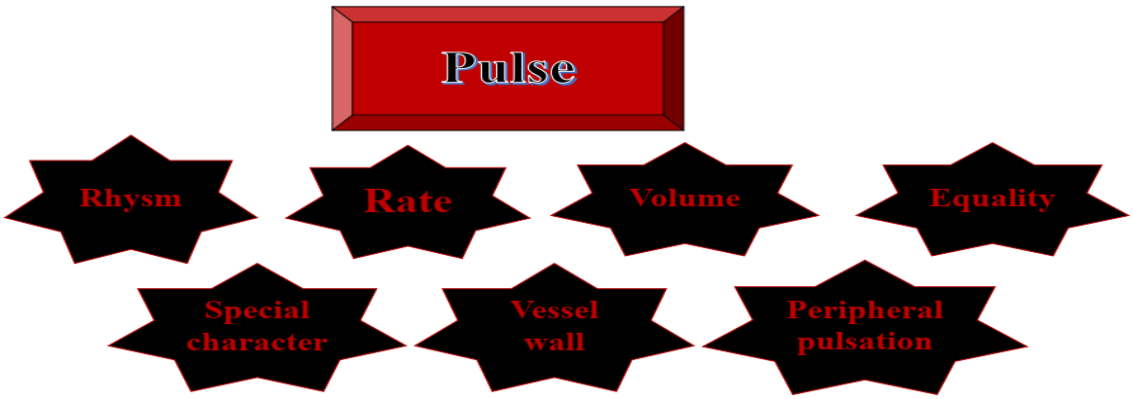
ILOs

After this lecture, student should be able to:

▪ Identify the items of general examination and vital signs.

▪ Identify the normal and abnormal values of pulse and blood pressure.





Rhythm

Examine rhythm before rate, if regular → count in 30 secs and multiply by 2.

If irregular → count in one minute.

Regular	Regular irregularity	Irregular irregularity
Normal	Pulsus bigeminus. Pulsus trigeminus.	Atrial fibrillation. Atrial flutter with changeable degree of A-V block. Heart block with changeable degree of block. Ventricular fibrillation.

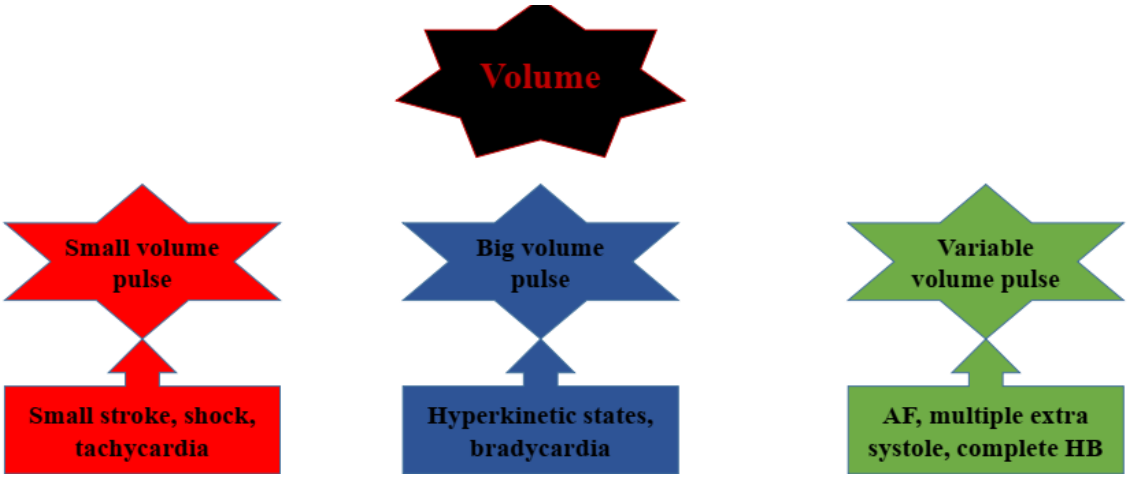
	Extra systole with sinus rhythm	**Atrial fibrillation**
Pulse		
Rhythm	Regular irregularity	Irregular irregularity
Exercise	Decrease irregularity	Increase irregularity
Pulsus deficit	< 10 beats/ minute	> 10 beats/ minute
Neck veins		
A wave	Present	Absent

V wave	Systolic collapse	Systolic expansion
Heart sounds		
S1	Normal in intensity	Variable intensity
ECG		
P wave	Preserved	Absent
QRS wave	Premature complex followed by compensatory pause	Marked irregularity

Rate

Normal:60-100 bpm. Tachycardia: >100bpm. Bradycardia: <60bpm.

Ideally count rate in one minute



Character:

Collapsing or water hammer pulse:

- Large volume pulse characterized by short duration with brisk rise and fall.
- Technique**:** Palpitating the radial artery with palmer aspect of four fingers while raising the patient's arm above the level of heart.
- Examples: Aortic Regurge, Persistent ductus arteriosus, anemia.

Pulsus Paradoxus

Paradoxical pulse is an exaggeration of the normal (≤10 mm Hg) inspiratory decrease in arterial pressure. It occurs classically with cardiac tamponade but occurs occasionally with other restrictive cardiac abnormalities, severe congestive heart failure, pulmonary embolism, and chronic obstructive pulmonary disease.

Pulsus Alternans

Alternation of stronger and weaker beats, rarely occurs in healthy persons and then is transient after a premature ventricular contraction. It usually is associated with severe myocardial failure and is frequently accompanied by an S3, both of which impart an ominous prognosis. Pulsus alternans may be affected by alterations in venous return and may disappear as congestive heart failure progresses. Electrical alternans (alternating variation in the height of the QRS complex) is unrelated to pulsus alternans.

Condition of vessel wall:

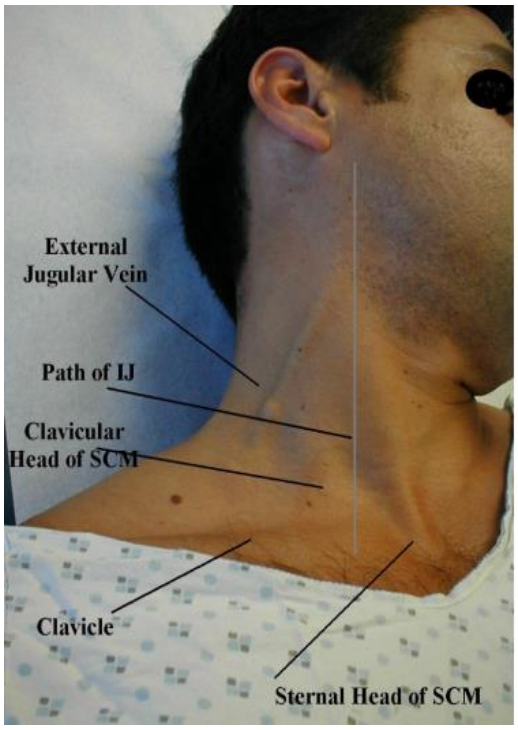
- Assess any change in medial layer of radial artery by palpation.
- Technique**:** Empty the radial artery by two fingers and use one finger to assess the wall by rolling radial artery against radial bone.
- Felt thickened (Cord like): Normal in elderly and pathologically due to atherosclerosis in young people.

Jagular Veinous Pressure

In the presence of normal sinus rhythm, there are 2 positive or outward moving waves (a and v) and 2 negative or inward moving waves (x and y). The x descent is sometimes referred to as the systolic collapse. Ordinarily, the c wave is not readily visible.

Clinical significance:

Reflects the pressure changes and volume status inside RT atrium, as the internal jagular vein is connected to the RT atrium via superior vena cava without any valves in between. Measurement:



Distinguishing the internal jugular vein pulsations from the carotid artery

Jugular Vein	Carotid Artery
No pulsations palpable.	Palpable pulsations.
Pulsations obliterated by pressure above the clavicle.	Pulsations **not** obliterated by pressure above the clavicle.
Level of pulse wave decreased on inspiration; increased on expiration.	No effects of respiration on pulse.
Usually two pulsations per systole (x and **X & V**)	One pulsation per systole.
Prominent descents.	Descents **not** prominent.
Pulsations sometimes more prominent with abdominal pressure.	No effect of abdominal pressure on pulsations.

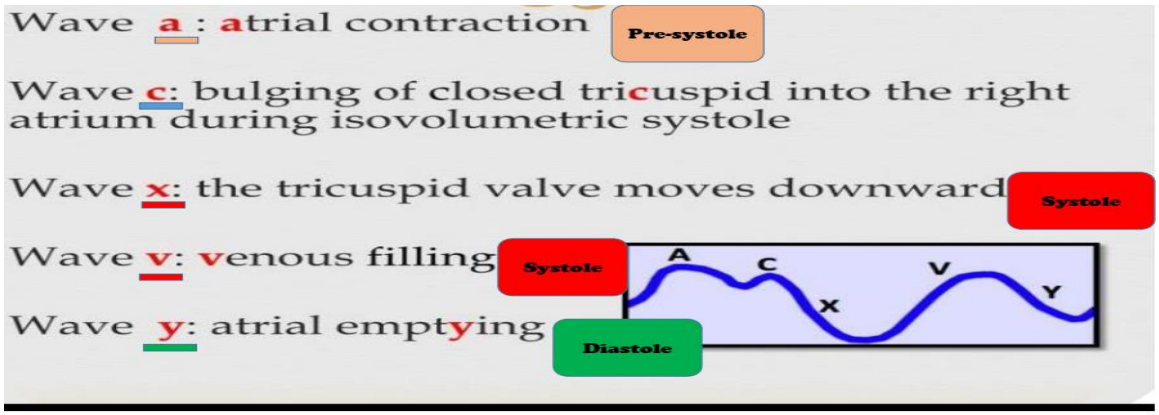
Measurement:

- With the patient Lying On 45^0, Expose the neck.
- Ask the patient to turn head away from you (to Left) and ensure that the neck muscles are relaxed.
- Try to look upward, along the line of the sternomastoid. Don't get too close and use oblique lighting (By torch) to make the pulsation more obvious.
- When you assess if the pulsation is palpable or not, just put your hand (Don't press) otherwise you will feel transmitted impulse from carotid artery and mistakenly will diagnose jugular vein as palpable carotid artery.
- After make sure that this pulsation arises from jugular vein, measure the vertical distance from the top of the pulsation to the sternal angle:

✓ Right atrium lies 5 cm below the sternal angle, which is used as the reference point.

✓ Normal JVP is up to 3 cm above sternal angle.

✓ CVP = JVP (Above sternal angle) + 5 Cm (That are not measured below sternal angle).



Hepatojugular" (Abdomino-jugular) Reflux Sign

The neck veins distend with steady (>10 seconds) upper abdominal compression while the patient continues to breathe normally without straining. Straining may cause a false-positive reflux sign.

Jugular venous pressure (JVP) that remains increased and then decreases abruptly (≥4 cm water) indicates an abnormal response. It may occur in LV failure with secondary pulmonary hypertension.

If the jugular veins are engorged but not pulsatile, consider superior vena caval obstruction

Kassmul's Sign: Elevation of JVP during inspiration (Normally decrease).

 # Causes Of Congested + Wavy JVP:

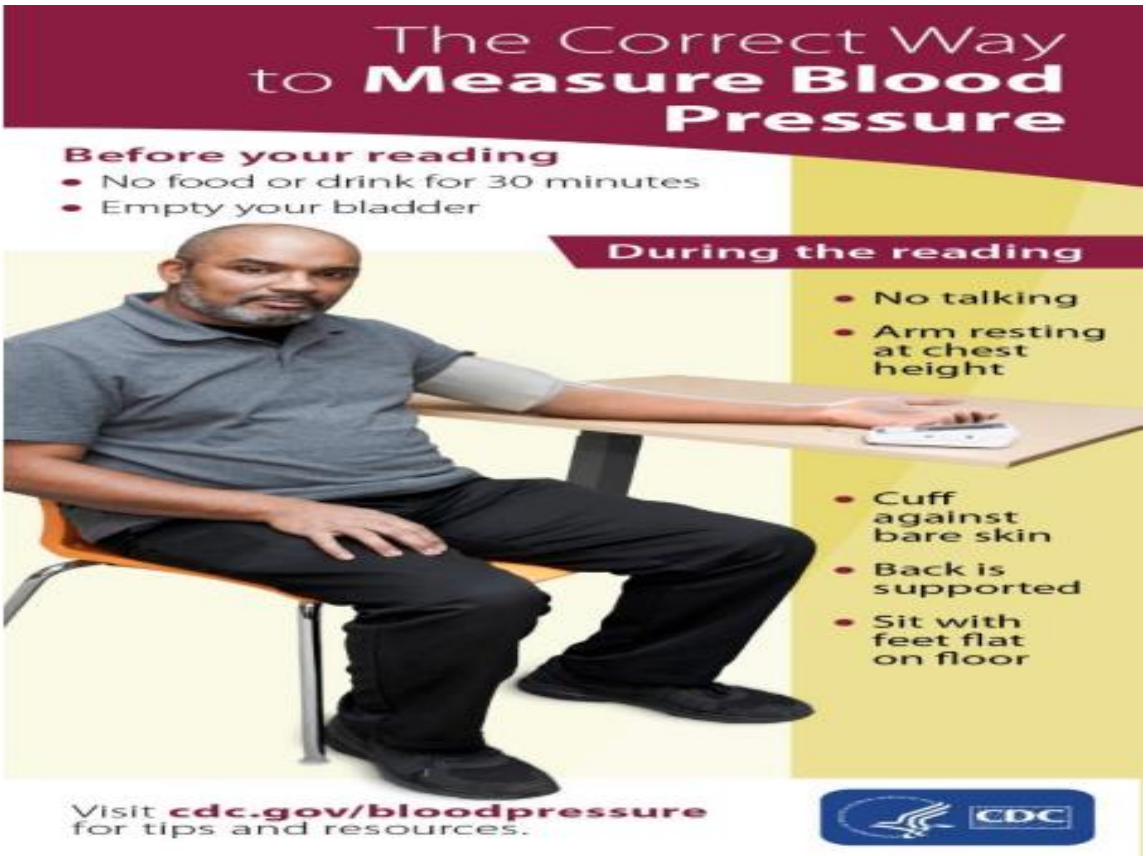
- Increase right atrial pressure (Rt sided HF).
- Increase intra-thoracic pressure (Pneumothorax).
- Increase intra-abdominal pressure (Tense ascites).
- Increase blood volume (Anemia, pregnancy).

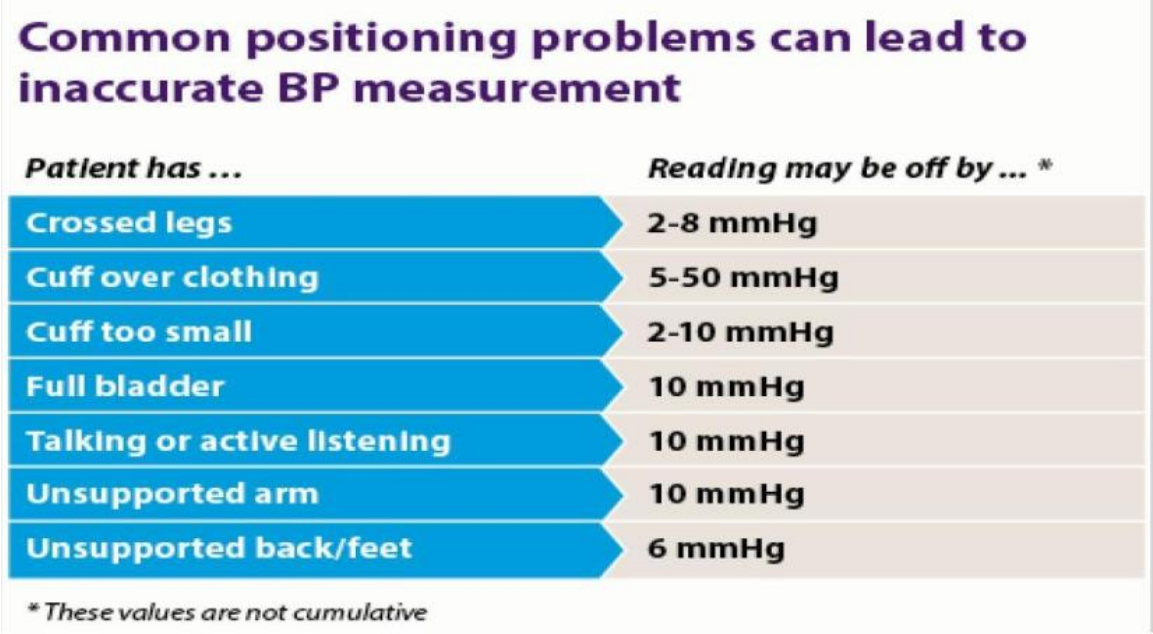
 # Causes of Congested + Non-Wavy JVP:

- Severe right sided HF.
- Complete SVC obstruction.
- Pericardial effusion and constrictive pericarditis.

Blood pressure

Category	Systolic (mmHg)		Diastolic (mmHg)
Hypotension	<90		<60
Normal	90-119		60-79
Prehypertension	121-139		80-89
Stage 1 Hypertension	140-159		90-99
Stage 2 Hypertension	160-179		100-109
Stage 3 Hypertension	>180		>110





References:

• Oxford American Handbook of Clinical Examination and Practical Skills

• Macleod`s clinical Examination 12th edition

Lecture (3): Heart inspection

ILOs

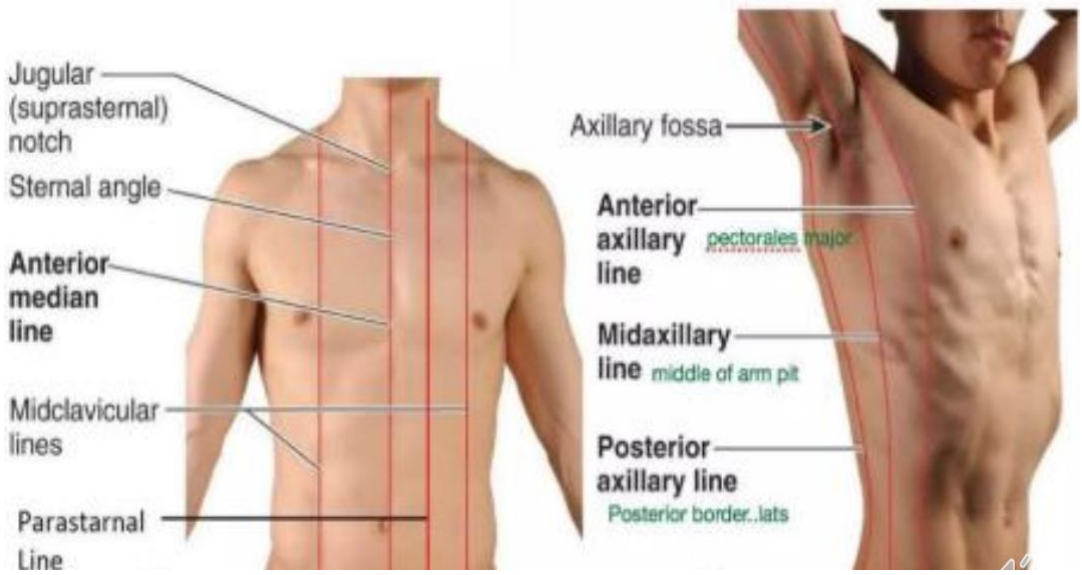
After this lecture, student should be able to:

- Identify the items of cardiac inspection.
- Describe the steps of cardiac inspection

Patient should be examined for

1. Masses, Scars, Lesions.
2. Signs of trauma and previous surgery (median sternotomy).
3. Precordial bulge.
4. Visible pulsations or dilated veins.
5. Increased jugular venous pressure (JVP).

Normal chest wall is bilaterally symmetrical and elliptical in cross section.



Precordial bulge

Precordial bulging	Causes
1. Cardiac	Pericardial effusion, cardiomegaly
2. Non-cardiac	Skeletal abnormality: scoliosis, kyphoscoliosis, rickety chest, bronchogenic carcinoma, mediastinal new growth

Precordial bulging due to kyphoscoliosis

Pectus excavatum

Depressed sternum and ribs, (sunken) due to too much growth of the connective tissue that joins the ribs to the breastbone (sternum). This causes the sternum to grow inward.

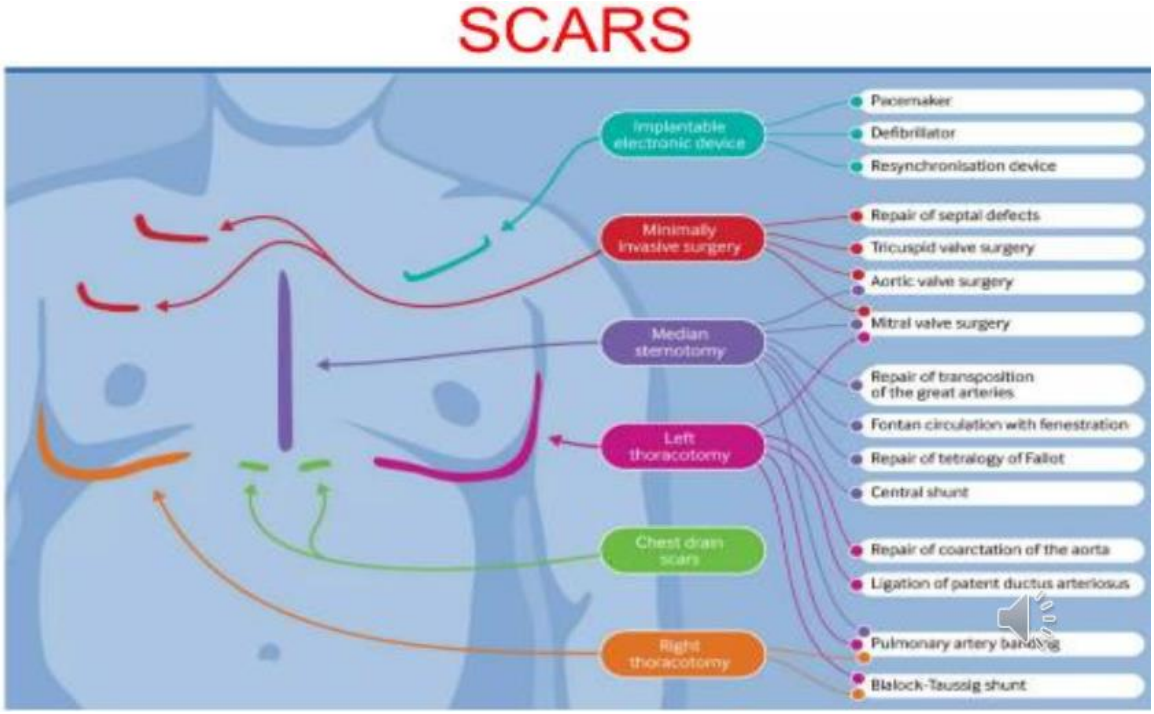
Medical problems linked with this condition include:

• Marfan syndrome (connective tissue disease).

• Noonan syndrome (disorder that causes many parts of the body to develop abnormally).

• Rickets (softening and weakening of the bones).

• Scoliosis (abnormal curving of the spine)



Visible pulsations:

Apical pulse: The lowermost, outermost area of definitive cardiac impulse in early systole. It is smaller than 2 cm in diameter, in the 5th MCL, in LT lateral position.

Epigastric Pulsation: Right ventricle, aorta or liver (Differentiated by palpation).

LT Parasternal Pulsation: Huge LT atrium or RT ventricle enlargement.

RT Parasternal Pulsation: Huge LT atrium, RT atrium enlargement or aortic aneurysm.

Aortic Area Pulsation (2nd Right ICS): Aortic aneurysm, systemic hypertension.

Pulmonary Area Pulsation (2nd Left ICS): Pulmonary hypertension.

Suprasternal / Carotid Pulsation: Aortic Regurgitation (Corrigan's sign).

References:

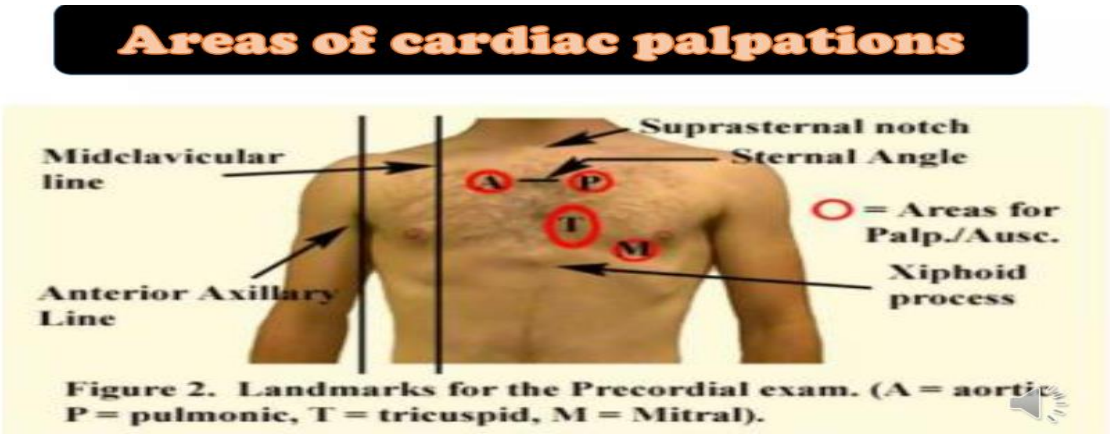
- Oxford American Handbook of Clinical Examination and Practical Skills
- Macleod`s clinical Examination 12th edition

Lecture (4) Heart palpation

ILOs

After this lecture, student should be able to:

- Identify the items of cardiac palpation.
- Describe the technique of cardiac palpation



Apex beat

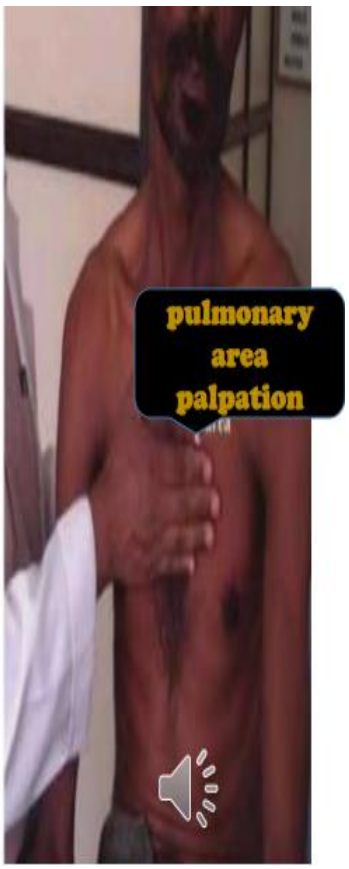
Definition: The lowermost, outermost area of definitive cardiac impulse in early systole, which imparts perpendicular gentle thrust to a palpating finger, followed by medial retraction in late systole. It is smaller than 2 cm in diameter and moves quickly away from the fingers. It is best appreciated at end-expiration, when the heart is closest to the chest wall.

Position for apex palpation: Ideally, in the 5th MCL, in LT lateral position.

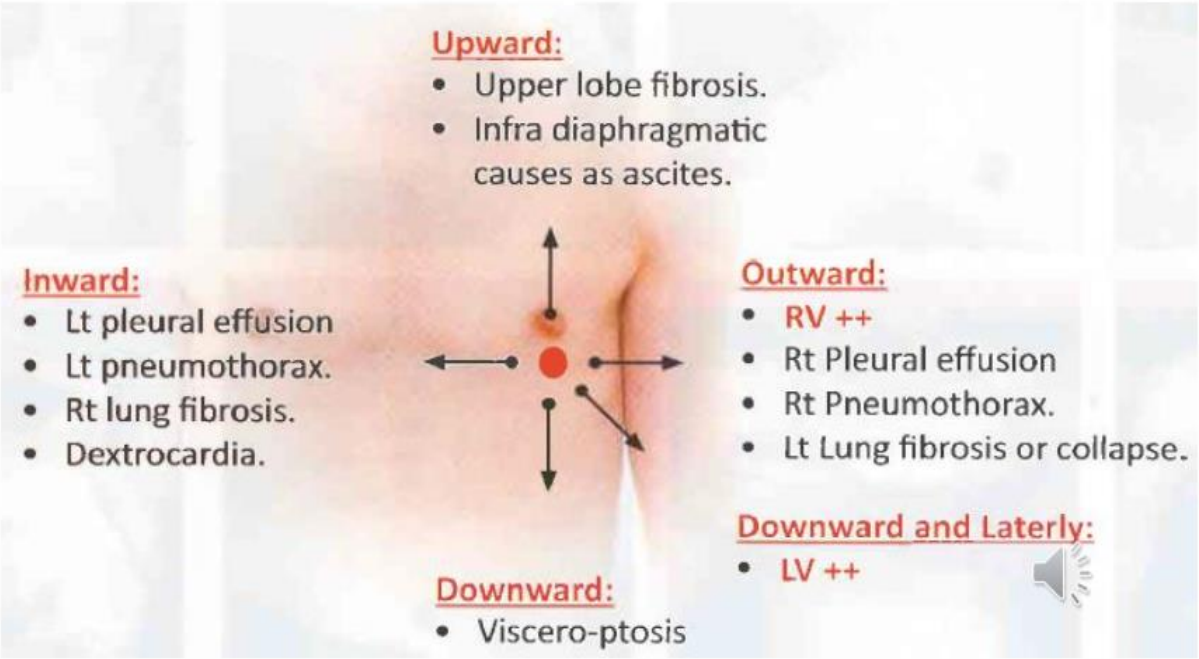
Causes of impalpable apex: in obese, thoracic cage deformities, pericardial effusion and pleural effusion.

Comment on apex:

1. site. 2. Rate. 3. Rhythm.
2. Area: Diffuse in RV enlargement, or Localized LV pulse.
3. Character: Heaving (sustained) in AS, Hyperdynamic in AR or Slapping (Tapping) in MS.
4. Thrill: better to be detected with palm of hand. Systolic or Diastolic



Apex shift from normal site



Thrills: Palpable vibrations associated with turbulent blood flow, typically indicating a significant heart murmur.

References:

• Oxford American Handbook of Clinical Examination and Practical Skills

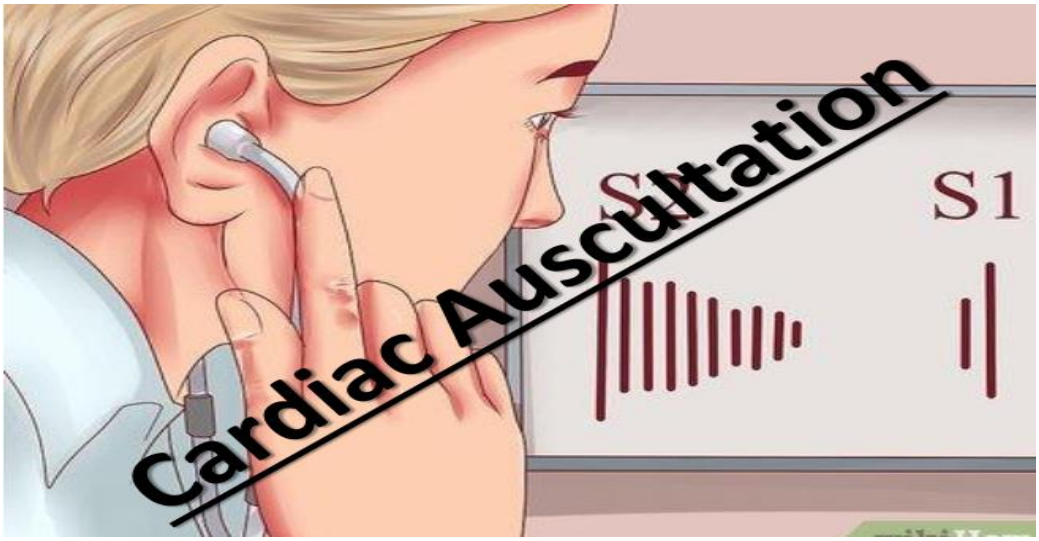
• Macleod`s clinical Examination 12th edition

Lecture (5) Heart auscultation

ILOs

After this topic, student should be able to:

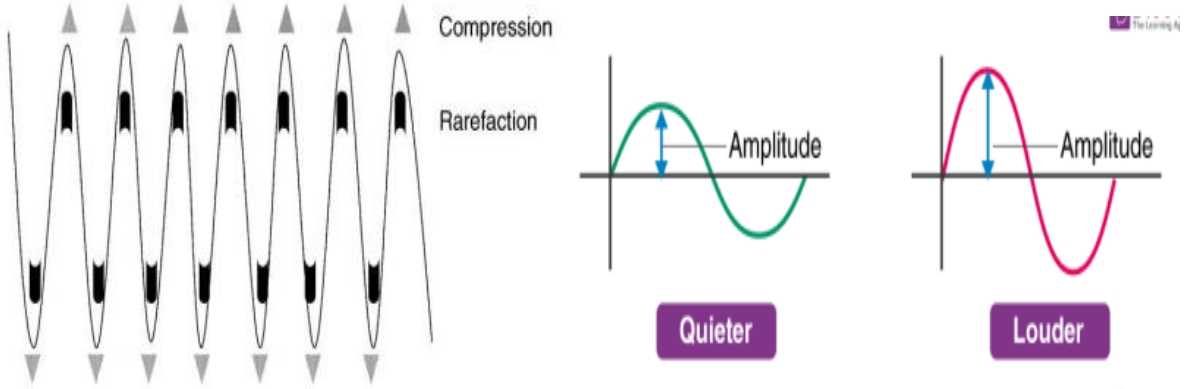
- Identify the items of cardiac auscultation.
- Describe the technique of cardiac auscultation.



What is sound?

• Sound is the sensation of hearing resulting from stimulation of the auditory nerves by vibrations transmitted in a medium.

• Vibrations are caused by the rhythmic compression and rarefaction of molecules within a medium.



Amplitude

The wavelength's **amplitude** is related to the sound waves' energy.

• It is measured by the height of the sound waves from the mean position.

• The perceived loudness of the wavelength is dependent on the amplitude.

• Amplitude tends to be measured on a logarithmic scale and is measured in decibels (dB).

Frequency “Pitch”

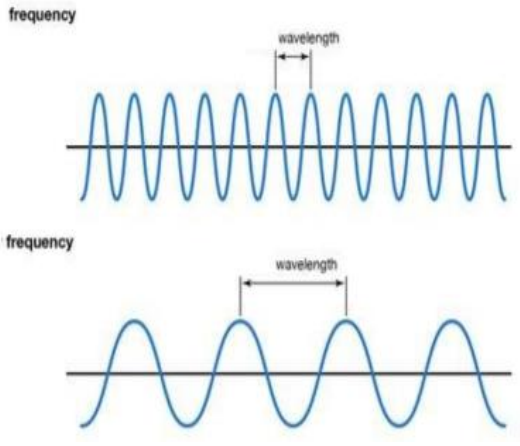
Frequency is the number of vibrations per second measured in Hertz (Hz).

• The frequency of a wave determines our perception of the pitch.

• Frequency is dependent on the number of wavelengths per second. Low frequencies have a low pitch and high frequencies have a high pitch. When wavelengths are short, there are more of them per second and thus higher frequencies.

• When the wavelengths are longer the frequencies will be lower

• Many heart sounds are at the low end of pitch and frequency, so they are not as audible from a distance and need to be amplified.



Low-frequency low pitch

Low frequency sounds are often associated with deep, rumbling, or vibrating sensations and can carry over long distances.

• These sounds occur naturally in many phenomena, such as thunder, earthquakes, ocean waves, and large animal vocalisations, such as whales.

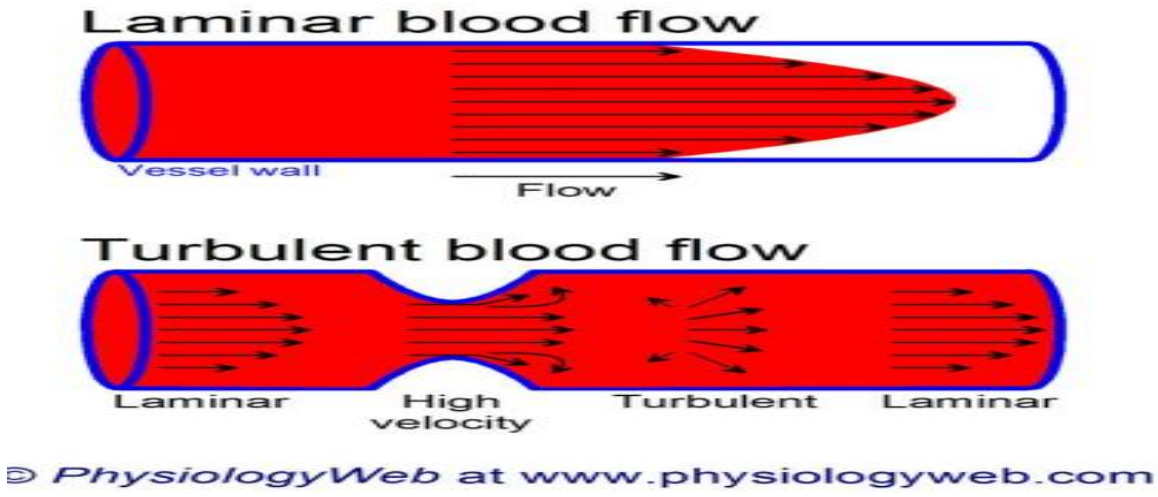
• There are many practical applications of low frequency sounds. They are used in medical imaging techniques such as ultrasound.

• Low frequency ultrasounds penetrate deeper into the body than high frequency sounds.

High -frequency high pitch

High-frequency sounds refer to sounds with a high pitch or higher frequencies. These sounds are typically sharper, crisper, or more piercing in nature.

Whistles, whining sounds, or screeches are some examples of high-frequency sounds. They can be produced by air escaping from a small opening, rapid movement, or the friction between surfaces



The transition region is a type of flow that occurs between laminar and turbulent regions.

• In medicine it is usually caused by narrowing of an artery or windpipe.

• This section is usually characterized by laminar flow on the outside and turbulent flow in the middle.

Turbulent flow tends to be disorganized, chaotic and can be heard through auscultation

Stethoscope

How to listen (general rules)

• To listen, place the stethoscope firmly against the skin over the area of interest.

• Auscultation should be done in a quiet room • Ideally done on bare skin

• Many of the sounds can be heard in more than one location, but this is where it is the loudest or clearest.

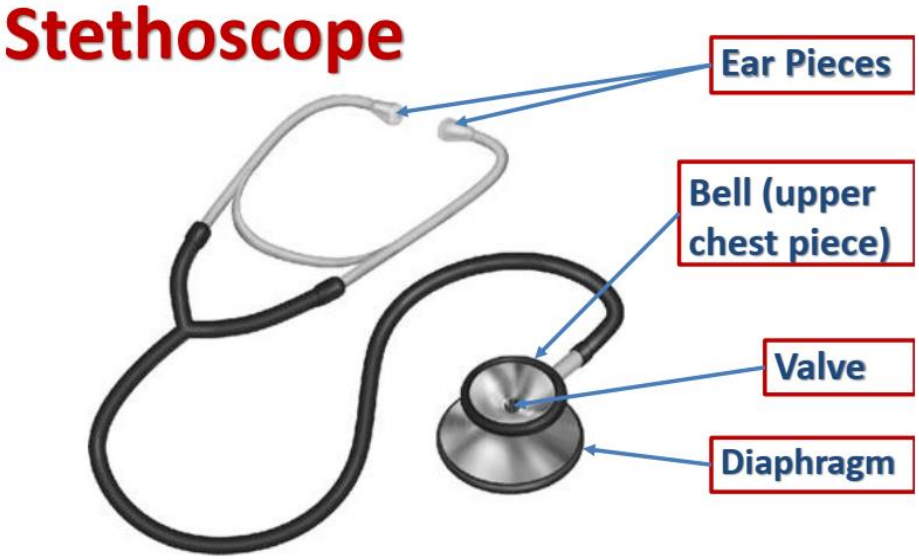
• You will listen for any sounds or abnormalities while adjusting pressure, position, and the bell/diaphragm as needed.

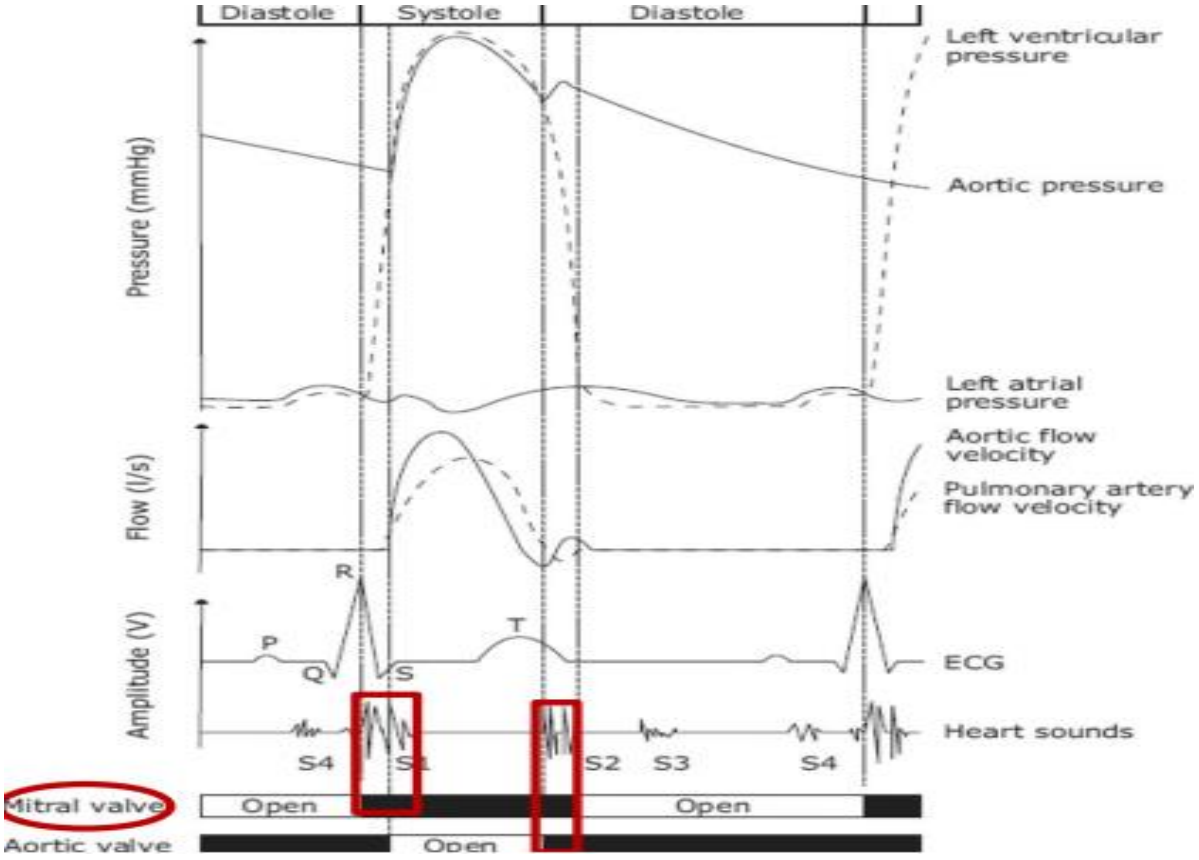
• The stethoscope bell should be used with low-pitched sounds and the diaphragm for medium or high-pitched sounds.

• When listening to breathing sounds ask the patient to take deep breaths with their mouth open.

Auscultation

• Heart sounds • Added sounds • Murmurs • Lung auscultation


Stethoscope
Ear Pieces
Bell (upper chest piece)
Valve
Diaphragm


Diastole
Systole
Diastole
Left ventricular pressure
Aortic pressure
Left atrial pressure
Pressure (mmHg)
Aortic flow velocity
Pulmonary artery flow velocity
Flow (l/s)
R
P
Q
S
T
ECG
Amplitude (V)
Heart sounds
S4
S1
S2
S3
S4
Mitral valve
Open
Open
Aortic valve
Open

Auscultation of the heart Standard listening points of the heart

Mitral valve: Standard listening points for mitral valve is heart apex

Aortic Valve: Standard listening points for aortic valve is 2nd interspace to the right of the sternum

Pulmonary artery valve: Standard listening points for pulmonary artery valve is 2nd interspace to the left of the sternum

Tricuspid valve: Standard listening points for tricuspid is 4^{th} ICS LT parasternum.

Botkin-Erb's point: listening point to the left of the sternum at the 3rd and 4th costosternal articulation– so called Botkin-Erb's point, was proposed to assess aortic valve sound. (2nd Aortic Area)

Normal heart sounds

• Normal heart sounds have a steady, two-beat rhythm to them often known as the "lub -dub."

• The first sound is called S1 or "lub" and occurs due to the closing of the mitral and tricuspid valves. (Dull prolonged) with onset of ventricular Systole.

• The second sound is called S2 or "dub" and occurs due to the closing of the aortic and pulmonary valves (Short sharp) at the beginning of Diastole.

Normal heart sound: S1 consists of four pair components:

Atrial component:

tension and contraction of the right atrium, tension and contraction of the left atrium.

Valvular component:

closure and vibration of mitral valve cusps, closure and vibration of tricuspid valve cusps.

Muscular component:

isometric tension and contraction of the right ventricle, isometric tension and contraction of the left ventricle.

Vascular component:

vibration of the initial portion of the aorta,

vibration of the initial portion of the pulmonary trunk

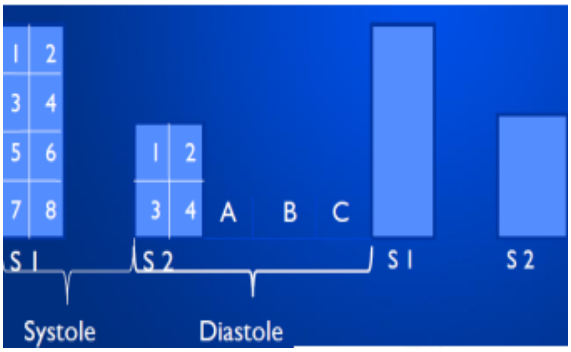
Normal heart sound: S2 consists of two pair components:

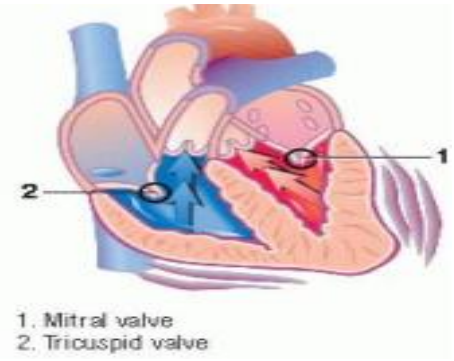
Valvular component:

closure and vibration of the aortic valve cusps, closure and vibration of the pulmonary valve cusps.

Vascular component:

vibration of the aortic walls, vibration of pulmonary trunk walls.



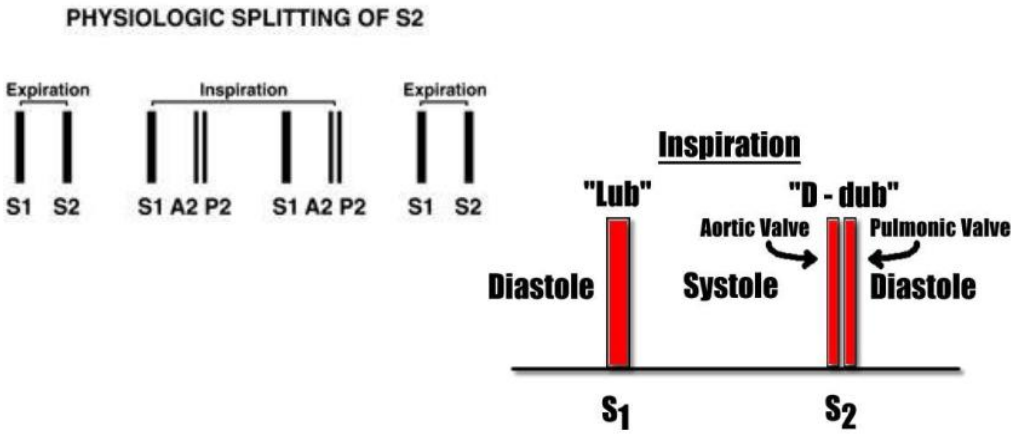


S3: The vibration set up in the cardiac wall by the inrush of the blood during Rapid Passive Filling Phase (0.11 sec) of the Ventricular Diastole.

S4: Caused by the vibration set up during Atrial Systole During Last Rapid Filling Phase of Ventricular Diastole (0.1 sec) – Coinsides with Atrial systole.

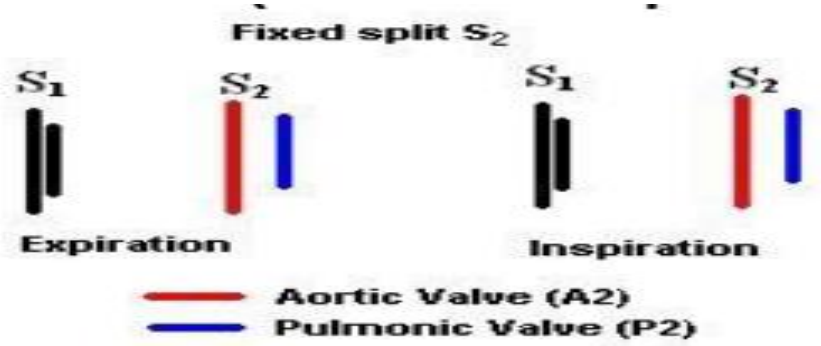
Physiological splitting of the second heart sound

1. During inspiration, the aortic valve closes before pulmonary valve → reduplication (physiological splitting of S2).
2. The increased venous return to the right side of the heart delays closure of the pulmonary valve. The right ventricle has more blood than usual to eject and it thus takes more time.
3. No splitting of the second heart sound is normally seen during expiration.



Fixed splitting of the S2

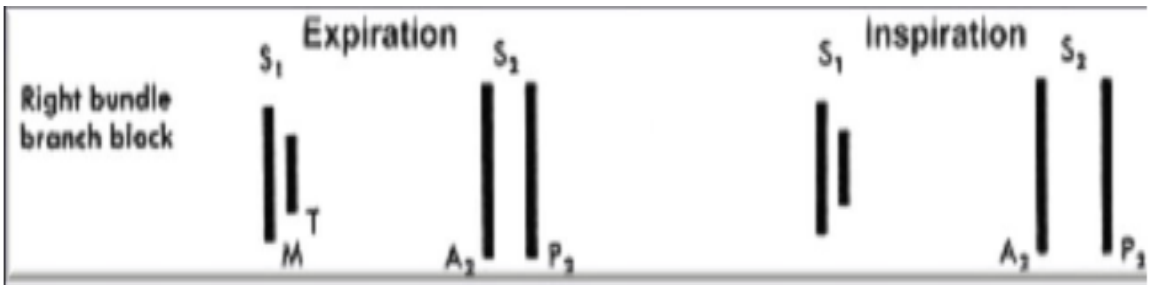
1. Splitting of S2 is heard in both during inspiration and expiration, with the aortic valve closing before the pulmonary valve.
2. This is heard in cases of ASD. (Atrial septal defect)



Wide Splitting of S2

A split in the second heart sound during inspiration may become wider and the split may also be seen during expiration if:

1. There is a delay in the closing of the pulmonic valve (as would be seen in right bundle branch block due to delay in right ventricular depolarization and contraction).
2. The aortic valve closes earlier than normal (this is seen with either mitral regurgitation or ventricular septal defect).



Paradoxical (reversed) Splitting of S2

• Reversed (paradoxical) splitting of the second heart sound is typically heard during expiration, with the pulmonary valve closing before the aortic valve.

• No splitting is apparent during inspiration, since the pulmonary valve is closing earlier (relative to the aortic valve) than normal.

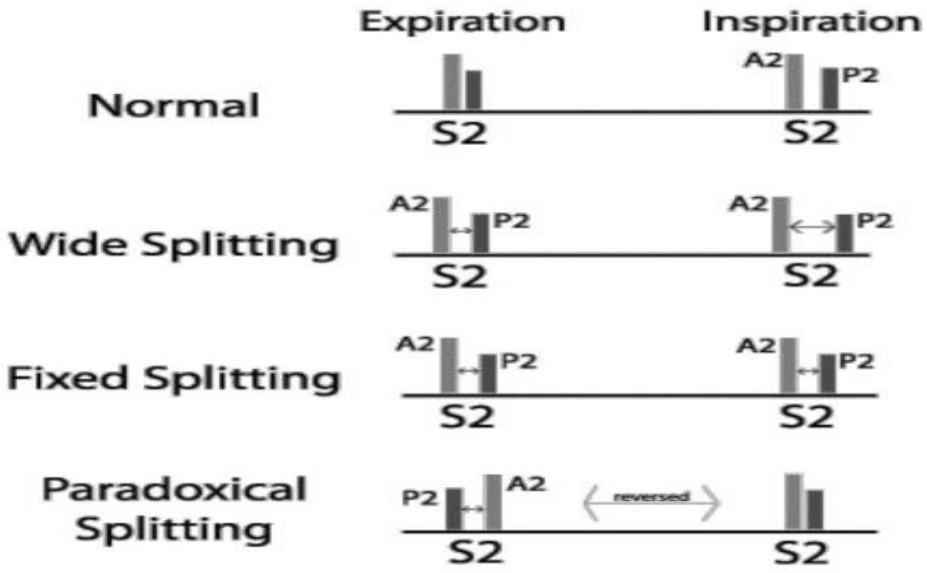
• This may be caused by the following:

Delayed onset of left ventricular systole (example:

1. left bundle branch block.

2. Prolonged left ventricular systole (examples: aortic stenosis, severe hypertension, left-sided congestive heart failure).

3. Early onset of right ventricular systole (example: Wolff-Parkinson White syndrome).



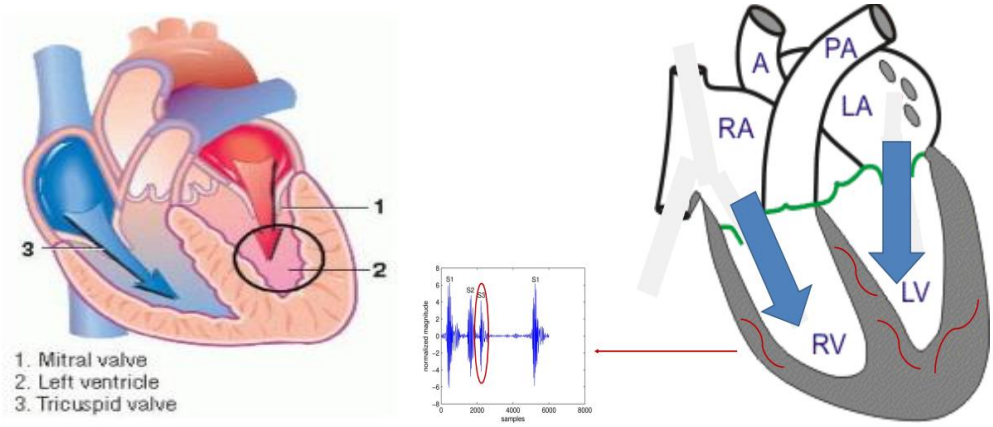
Third Heart Sound

• It may be heard normally in children, thin adults, and pregnant women or after exercise. It is also called S3.

• It is caused by the striking of the blood to the wall of ventricles during rapid filling phase of ventricular diastole.

• It occurs in the early diastole in relation to cardiac cycle.

• It is a low-pitched sound that can follow S2



Fourth Heart Sound (s4)

• It is pathological

• It is caused by the forceful contraction of atria.

• It is produced by the atria contraction that pushes blood into a stiff ventricle.

• It occurs just before the first heart sound during late diastole in relation to cardiac cycle.

Comparing the 3rd and 4th heart sounds

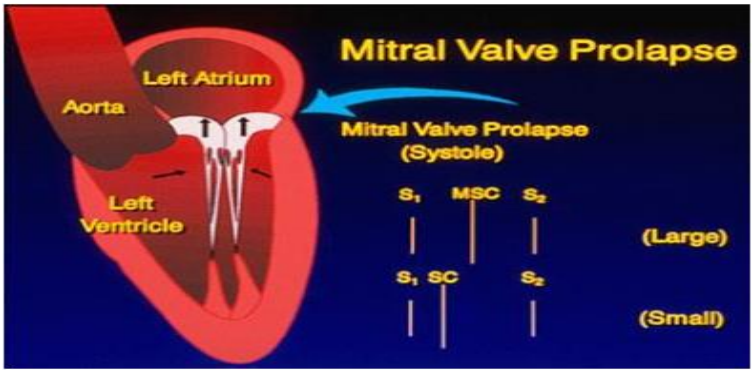
LearnTheHeart.com

S3 - "ventricular gallop"	S4 - "atrial gallop"
Occurs in early diastole	Occurs in late diastole
Occurs during passive LV filling	Occurs during active LV filling
May be normal at times	Almost always abnormal
Requires a very compliant LV	Requires a non-compliant LV
Can be a sign of systolic CHF	Can be a sign of diastolic CHF

Systolic Click

• Denotes prolapse of one or both cusps of the mitral valve and less common may be caused by tricuspid valve prolapse.

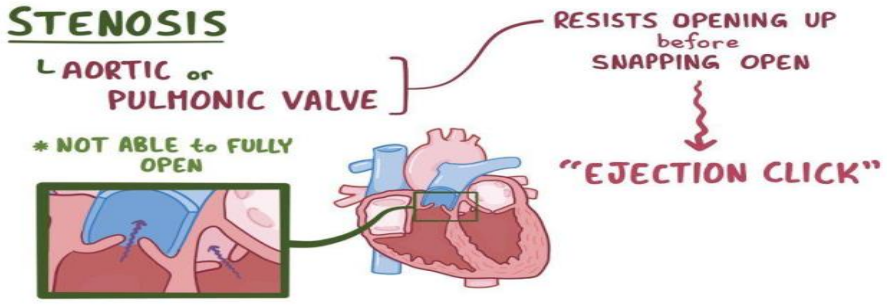
• Auscultation symptomatic may be very different: systolic clicks may be single or multiple; they may occur at any time in systole with or without a late systolic murmur.



Ejection click

• Sharp, High pitched early systolic sound coincides with Carotid Upstroke

• Clicks arise from: Movements of valve cusps and dilatation of ascending Aorta/Main Pulmonary artery

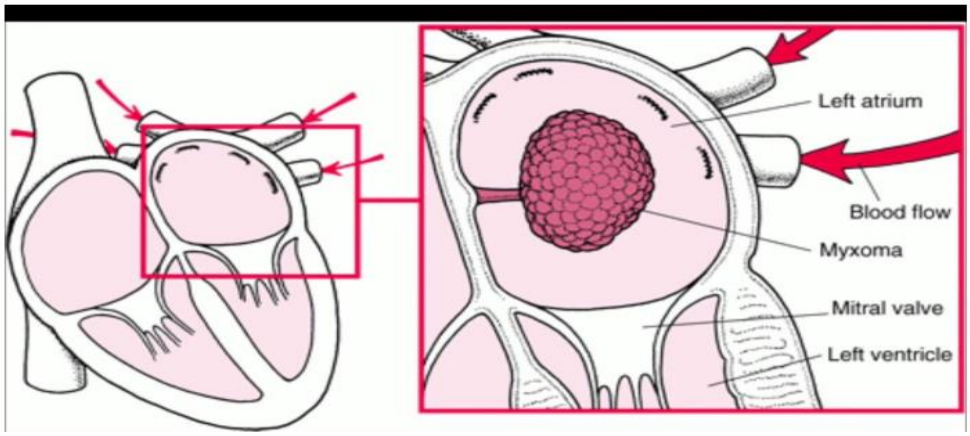


Pericardial Knock

• High-pitched sound occurs 0.01 – 0.06s after S2 in the patients with constrictive pericarditis due to vibration of the adherent pericardium in abrupt dilation of the ventricle at the beginning of diastole.

• Pericardial knock is better heard at the heart apex or medially toward to xiphoid.

Tumor Plop Sound



Heart murmurs

• Normal blood flow is laminar and therefore inaudible.

• Blood flow becomes audible when laminar flow breaks down into disturbed or turbulent flow.

• This may occur for one or both of two reasons:

– increased flow across a normal valve or structure i.e. a flow murmur

– normal flow across an abnormal structure.

Classification

1. Timing:

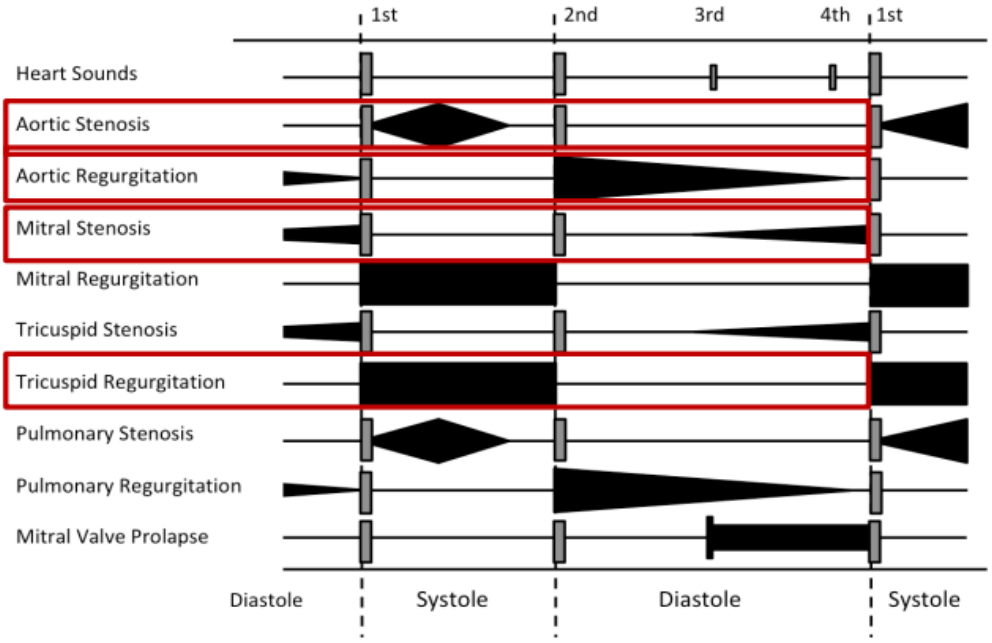
– This is best measured relative to the carotid or subclavian pulse, which should be palpated whilst auscultation is being performed.

– Note whether the murmur occurs during systole or diastole, whether it occurs early, late or fills the whole of the phase.

2. Phonological shape:

This refers to the intensity of the murmur over time;

– Crescendo (increasing) – Decrescendo (decreasing) – Crescendo-decrescendo (increasing then decreasing).



3. Location and radiation: Which valve area is the murmur heard loudest and which direction does it propagate? Murmurs radiate in the direction of the blood flow.

For example, aortic stenosis (AS) radiates towards the carotids and mitral regurge (MR) towards the axilla.

4. Intensity: This refers to the amplitude of the murmur. It is graded according to the Levine scale

I / VI	need quiet room and trained ear to hear. (difficult to hear even by expert listeners)
II / VI	audible to anyone who listens attentively (usually audible by all listeners)
III / VI	loud, but not palpable (easy to hear even by inexperienced listeners, but without a palpable thrill)
IV / VI	loud and palpable: it produces a precordial thrill
V / VI	audible with your stethoscope placed perpendicular to chest wall
VI / VI	audible without a stethoscope

5.Respiration: Does the murmur intensity vary ventilation? Right heart flow increases on inspiration and through the left heart on expiration. Murmur amplitude rises and falls accordingly. This can be used to deduce if the murmur arises from the left or the right heart.

6. Quality: Additional, defining components should be noted. Does the murmur sound: – Harsh – high- or low-pitched – Rumbling – Squeaky (Sharp) – blowing.

Common murmurs and timing

(1) Systolic murmur: harsh turbulent flow (from increase in turbulence)

a. Aortic Stenosis: ejection murmur because the valves are too tight.

b. Pulmonary Stenosis: ejection murmur + S2 splitting

c. Mitral/Tricuspid Regurgitation: not properly closed → holosystolic

d. Mitral valve prolapse (during mid or late systole)

e. VSD: ventricular septal defect

Associated with:

– high flow across normal valve or dilated great vessel

– flow across abnormal valve or narrowed ventricular tract (aortic stenosis)

– flow across incompetent AV valve (regurgitation)

– flow across interventricular septum

(a) Mid-systolic: most common type of heart murmur and is usually crescendo-decrescendo

Innocent: In children and young adults.

Physiological: Hyper dynamic States e.g. Anemia, Pregnancy, Fever.

Pathological: Aortic Stenosis, Hypertrophic Cardiomyopathy, and Pulmonary Stenosis.

(b) Pan-systolic murmur: begin with S1 → S2

(2) Diastolic murmur:

Softer, blowing, gurgle

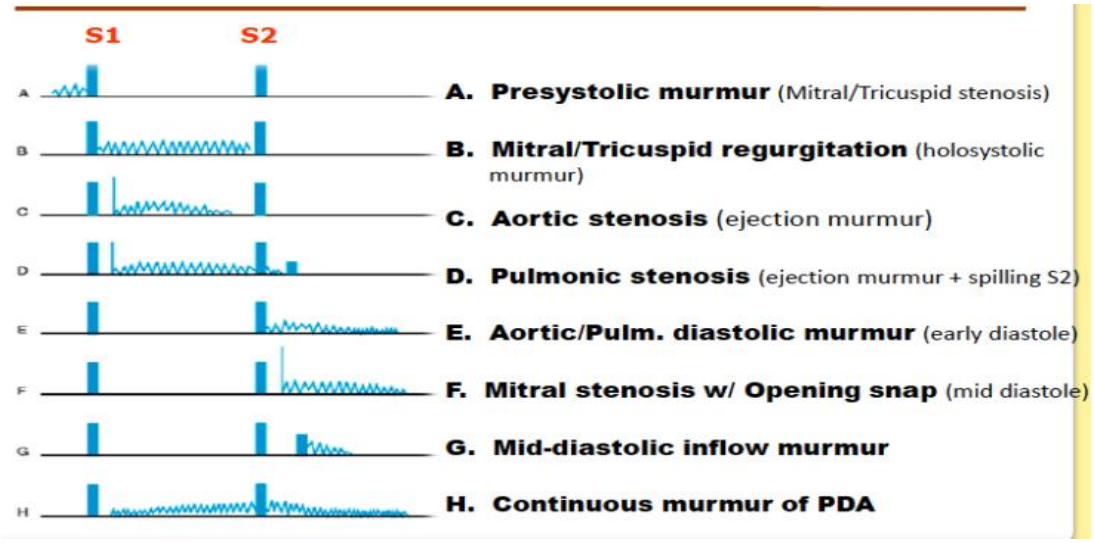
Aortic Regurgitation (during early diastole) Mitral Stenosis (during mid to late diastole) They almost always indicate heart diseases

Early Decrescendo diastolic murmur due to AR

Rumbling diastolic murmur (mid/late) AV valve stenosis

(3) Continuous murmur: a. Patent ductus arteriosus PDA b. Venous Hump

begin in systole and peak at S2 then continue throughout the cycle



Aortic stenosis: (Systolic murmur)

Causes obstruction in flow from left ventricle to ascending aorta between S1 and S2.

Time: mid systolic (ejection). Location: best heard at 2nd RT ICS, radiates to carotid artery.

Characteristics: harsh, loud and thrill in cases of murmur grade ≥ IV.

Causes: congenital bicuspid aortic valve, rheumatic heart disease and sclerosis in older patients.

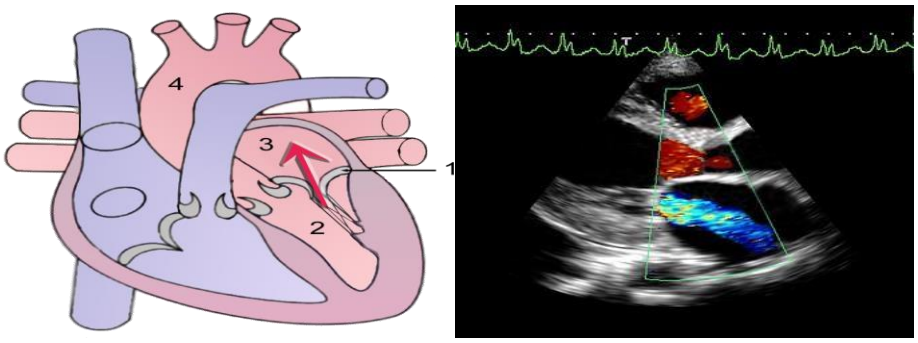
Mitral regurgitation (Systolic murmur)

Causes backflow of blood from LV to LA during systole (incompetent valve)

Time: holo systolic. Location: best heard at apex (5th ICS) and radiates to LT axilla

Characteristics: soft, high pitch and blowing.

Causes: rheumatic heart disease, MV myxematous degeneration, myocardial infarction, cardiomyopathy and endocarditis.

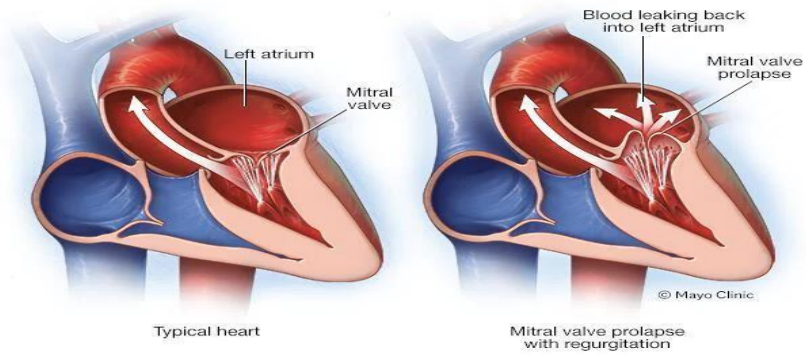


Mitral valve prolapse (Systolic murmur)

Its myxematous valve degeneration, causes leaflet bulging into LA, behind mitral valve annulus.

Time: mid to late systolic. Location: best heard at apex (5th ICS)

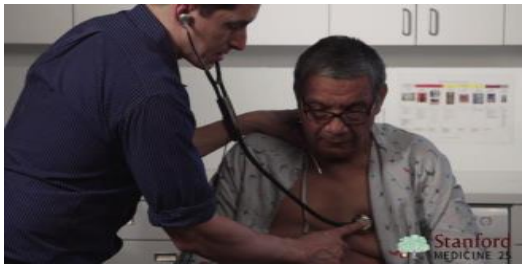
Characteristics: mid systolic ckick sound.



Aortic regurgitation (diastolic murmur)

The valve is incompetent. So, blood will back from aorta to LV.

Time: early diastolic murmur. Location: best heard at 2nd aortic area (LT 3rd ICS), while patient leaning forward. Characteristics: high pitch, blowing, decrescendo Causes: aortic root degeneration, rheumatic heart disease



Mitral stenosis (diastolic murmur)

The valve is stenotic. So, blood flow obstruction from LA to LV.

Time: mid or late (pre-systolic) diastolic murmur. Location: best heard at apex.

Characteristics: low pitch, rumbling, presystolic accentauation (in sinus rhythm) with opening snap heard with bell of stethoscope.

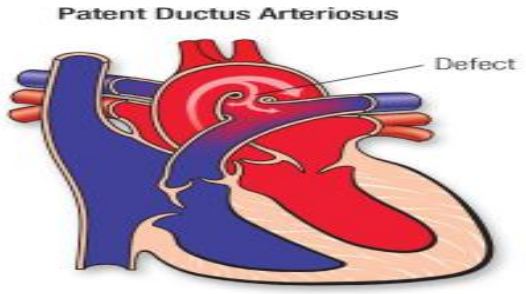
Causes: rheumatic heart disease

Patent ductus arteriosus (Continuous murmur)

Failure of duct between aorta and pulmonary artery to close, causing LT-to-RT shunt.

Time: Continuous murmur. Location: best heard at upper LT sternal border.

Characteristics: machine like. Causes: Congenital non cyanotic heart disease.



References

- Oxford American Handbook of Clinical Examination and Practical Skills
- Macleod`s clinical Examination 12th edition

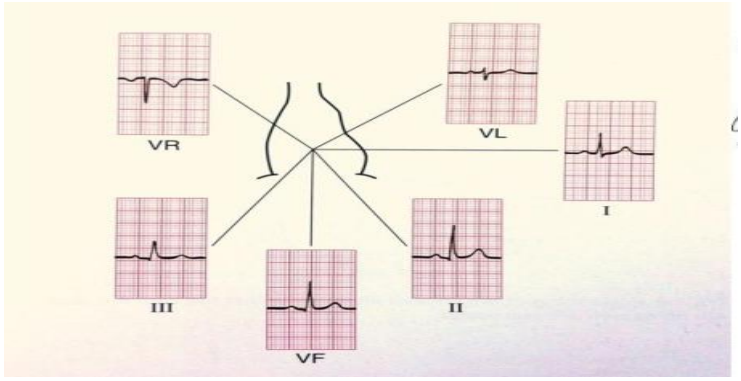
Lecture (6) Electrocardiography (ECG) interpretation

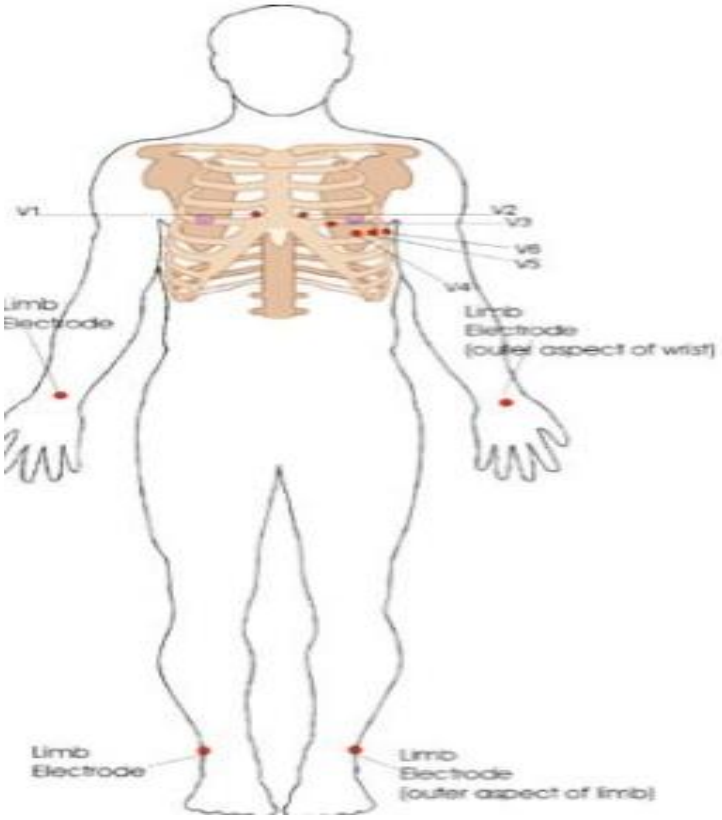
As with all investigations the most important things are your findings on history, examination and basic observations.

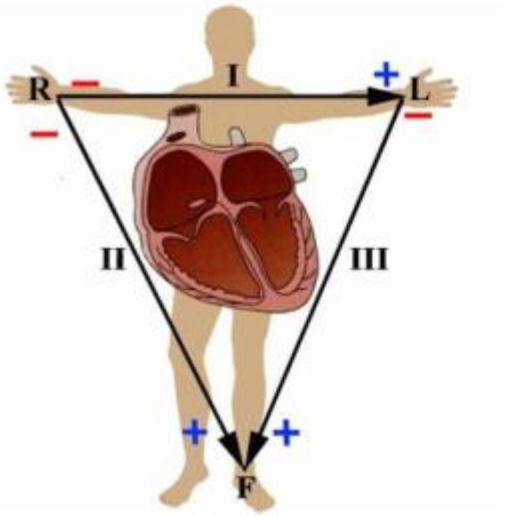
The 12 leads can be thought of as taking a picture of the heart's electrical activity from 12 different positions using information picked up by the 10 electrodes. These comprise 4 limb electrodes and 6 chest electrodes.

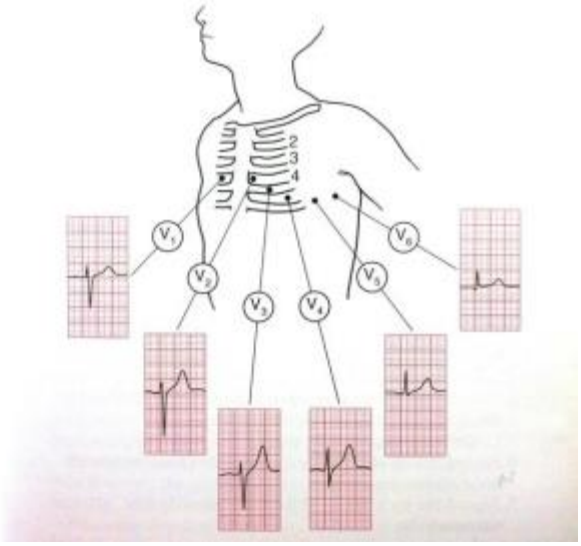
When electrical activity (or depolarization) travels towards a lead, the deflection is net positive.

When the activity travels away from the lead the deflection is net negative. If it is at 90 degrees then the complex is 'isoelectric' i.e. the R and S wave are the same size (Biphasic).



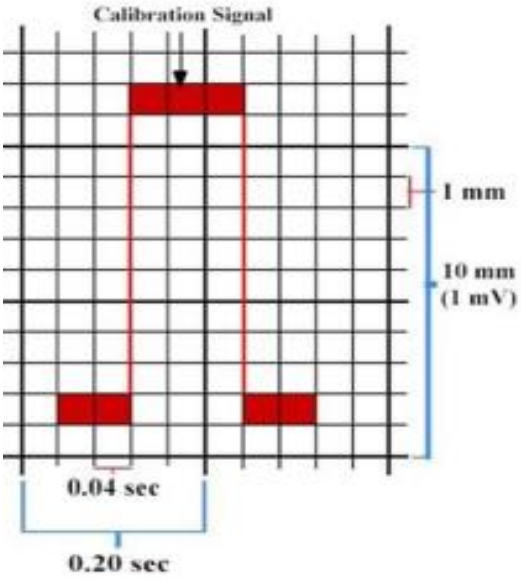


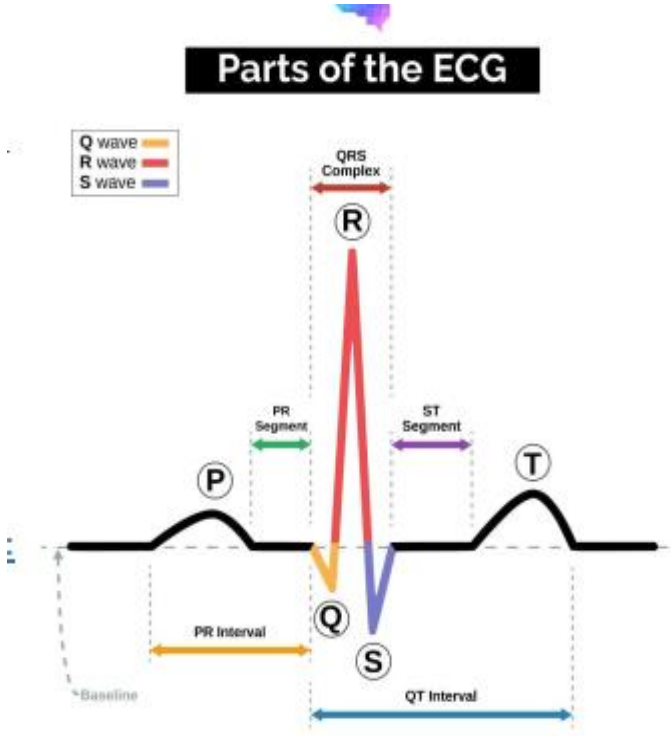




Calibration blotted on the ECG paper as 10 mm = 1 mv.

All boxes are based on the assumption that the **paper speed** is running at **25mm/sec**, therefore 1 large square is equivalent to 0.2 secs (200 msec) and a small square to 0.04 secs (40 msec).





What do the segments of the ECG represent?

P-wave: Atrial contraction

PR interval: Represents the time taken for excitation to spread from the Sino-Atrial (SA) node across the atrium and down to the ventricular muscle via the bundle of His.

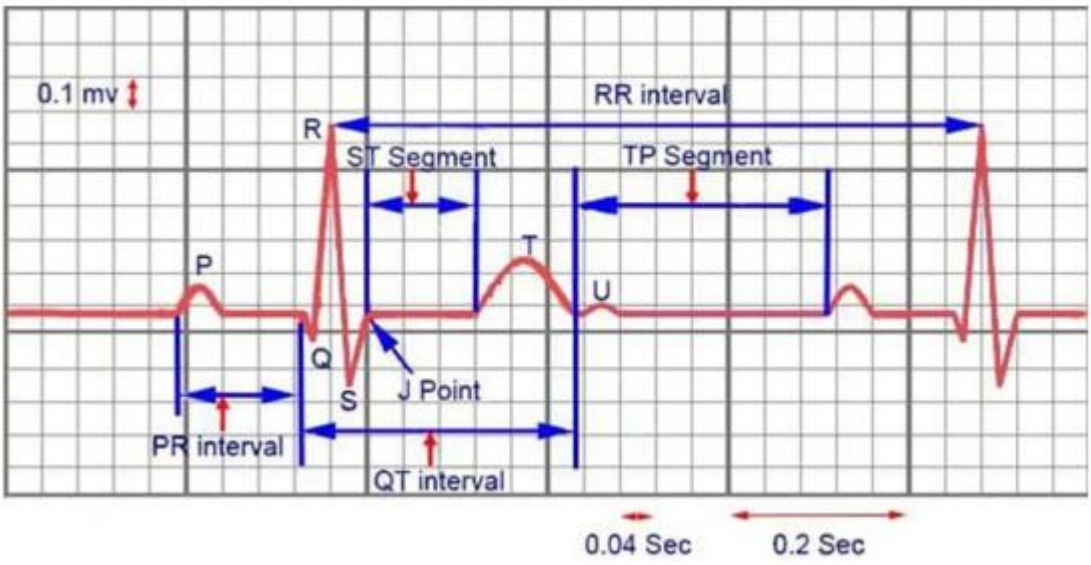
QRS: Ventricular contraction

ST segment: Ventricular relaxation **T-wave:** Ventricular repolarization

Normal duration of ECG segments:

PR interval: 0.12 – 0.2 secs (3-5 small squares)

QRS: < 0.12 secs (3 small squares) **QTc:** 0.380 – 0.439 MScs (< 440 msec)



How to read an ECG

To ensure you will never miss anything:

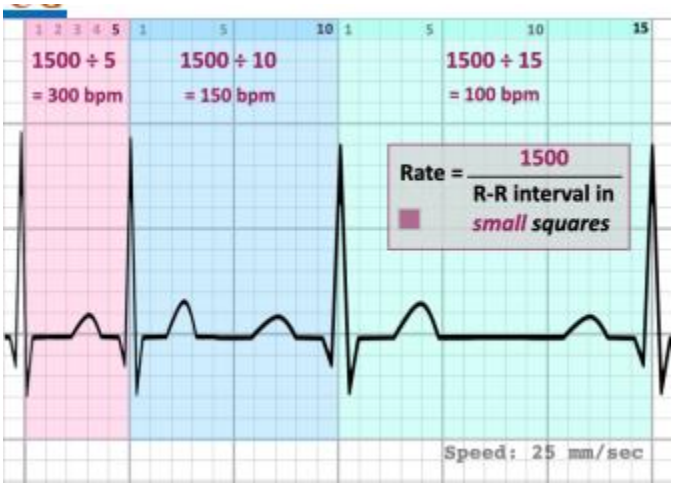
1. Patient details
2. Situation details
3. Rate
4. Rhythm
5. Axis
6. P-wave and P-R interval
7. Q-wave and QRS complex
8. ST segment
9. QT interval
10. T-wave

Measuring the rate on an ECG

Rate can be calculated in a number of ways:

1. Count the number of small squares between R waves and divide 1500 by this number (Regular Rhythm)

2. Count Number of R waves in 30 large squares (1 Large Square = 5 small Squares) multiplied by 10 [30 Large Squares = 6 second] or Number or R waves in 50 Large Squares multiplied by 6 [50 large Squares = 10 seconds].



30 large squares

Rate = Multiply number of QRS complexes within 30 large squares by 10

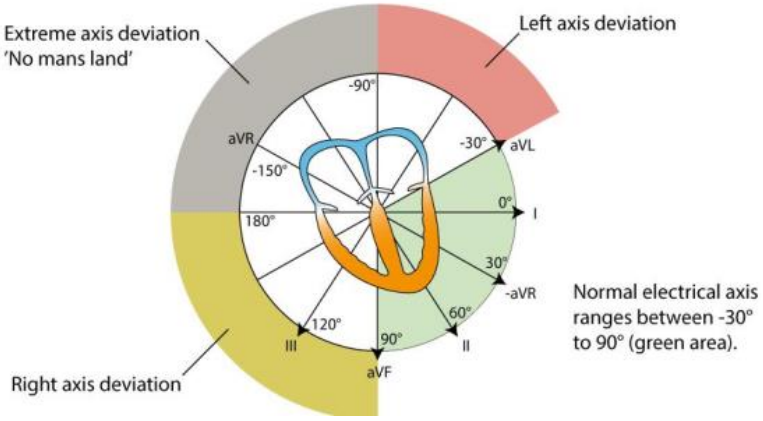
Assessing the rhythm on an ECG

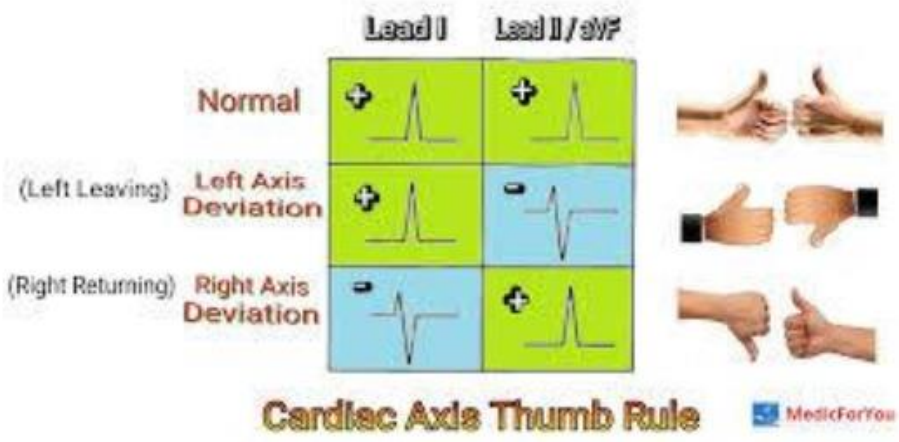
Is the rhythm regular or irregular? If it is irregular is it regularly or irregularly irregular? Rhythm can be difficult to assess especially in bradycardia or tachycardia. It may be helpful to use the 'paper test'. To do this place a piece of scrap paper over the ECG and mark a dot next to the top of a QRS complex, draw another dot next to the top of the next QRS then slide the paper along the ECG above R to R. If the rhythm is regular you should see that your two dots coincide to the tops of the R complexes throughout the ECG.

Assessing the axis on an ECG

Axis is the sum of all the electrical activity in the heart.

The contraction travels from the atria to the right and left ventricles. As the left ventricle is larger and more muscular normal axis lies to the left (at -30 degrees to 90 degrees).



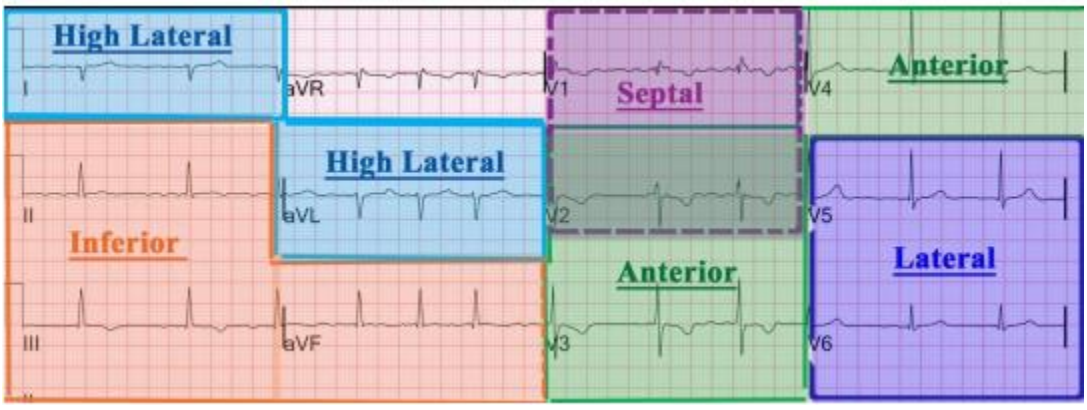


As a general rule if the net deflections in leads I and aVF are positive then the axis is normal.

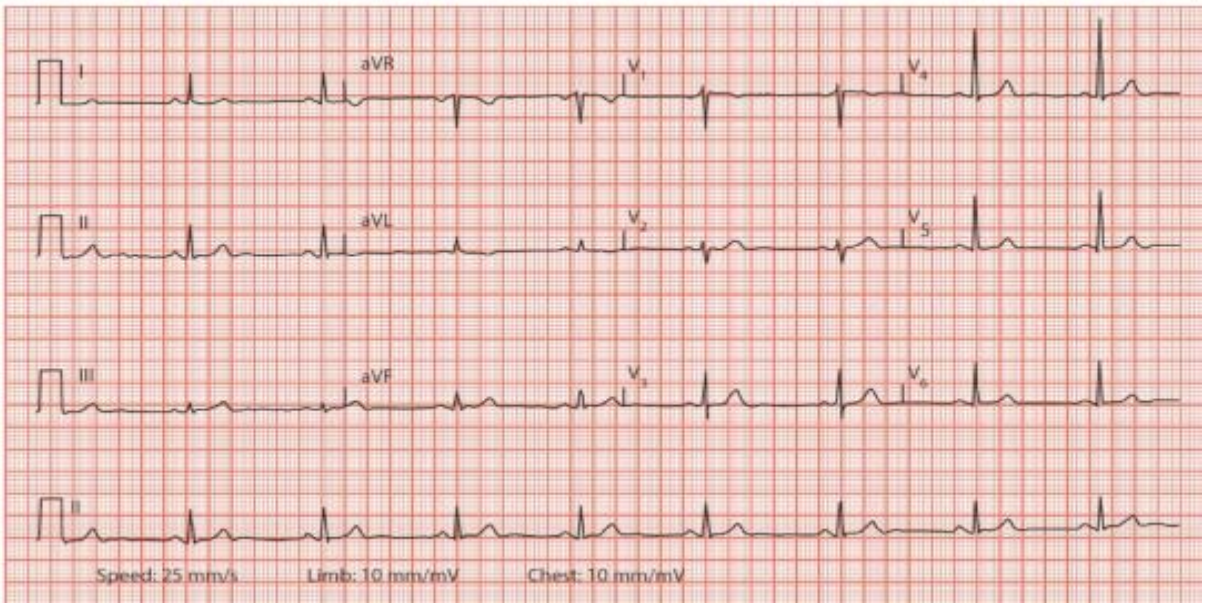
If lead I has a net negative deflection whilst aVF is positive then there is right axis deviation.

If lead I has a positive deflection and aVF has a negative deflection then there is left axis deviation

The areas represented on the ECG are summarized below:



ECG QUIZ



1- Rate:
2- Rhythm:
3- Axis:
4- P and PR interval
5- Pathological Q waves
6- QRS width, polarity and Amplitude
7- ST segment
8- QT interval
9- T-Wave (Polarity and amplitude)

Interpretation:
……
……
……

QUIZZES

1. **Breathlessness (Dyspnea) is a Specific Cardiac Symptom**

a. True

b. False

Answer: b

2. **Mr. M. 45 Years Old since 2 weeks he began to feel shortness of breath when climbing 2 flights of stairs (Previously he can climb up to four flights without feeling any discomfort). What the Severity of his dyspnea?**

a. NYHA Class I

b. NYHA Class II

c. NYHA Class III

d. NYHA Class IV

Answer: c

3. **Orthopnea is a symptom and sign of ---------- Heart Failure**

a. Mild

b. Moderate

c. Severe

Answer: c

4. **When you take a detailed history from Mr. M. he reported that he awaken from sleep every night after sleeping by about 2 – 3 hours by breathlessness which lasts for 30 minutes and associated with cough and wheezes. The cause of SOB most probably**

a. Cardiac “Heart Failure with PND”

b. Bronchial Asthma as there was Wheezes

c. Emotional Stress “Night mares”

Answer: a

5. **What is Dyspnea?**

a. Pain While Passing Urine

b. Difficulty with Swallowing

c. Sever Stomachache

d. Shortness of Breath

Answer: d

6. Orthopnea?

a. Increase in Heart Rate

b. Breathlessness while lying down

c. Breathlessness that appears with Activity

d. Breathlessness while standing

Answer: b

7. Paroxysmal nocturnal dyspnea usually occurs after a person falls asleep.

a. True

b. False

Answer: a

8. The breathlessness in patients with severe heart failure usually improves when the person lies flat in bed without a pillow

a. True

b. False

Answer: b

9. Dyspnea in asthma patients is often associated with wheezing.

a. True

b. False

Answer: a

10. Which of the following conditions is not associated with dyspnea?

a. Severe Anemia

b. Metabolic Acidosis

c. Bronchial Asthma

d. Hypertension

Answer: b

11. Normal Respiratory Rate in Adults

a. 12 – 20 Breaths / Minute

b. 16 – 30 breaths / second

c. 8 – 16 Breaths / Second

d. 8 – 16 Breaths / Minute

Answer: a

12. Aortic regurgitation is best heard at which location?

a. apex of heart

b. pulmonary area

c. 3rd left intercostal spaces

d. aortic area

Answer: c

13. S1 sound is soft at which condition?

a. bradycardia

b. tachycardia

Answer: b

14. This abnormal sound is usually heard in children:

a. S1

b. S2

c. S3

d. S4

Answer: c

15. Physiological splitting of S2 is heard at:

a. inspiration only

b. both inspiration and expiration

c. expiration only

Answer: a

16. Which of the following causes a mid-late systolic murmur?

a. aortic regurgitation

b. aortic stenosis

c. mitral regurgitation

d. mitral prolapse

Answer: d

17. **Aortic regurgitation is best heard at which location**?

a. apex of heart

b. pulmonary area

c. 3rd left intercostal spaces

d. aortic area

Answer: c

18. **Closure of AV valves causes which sound?**

a. S3

b. S2

c. S4

d. S1

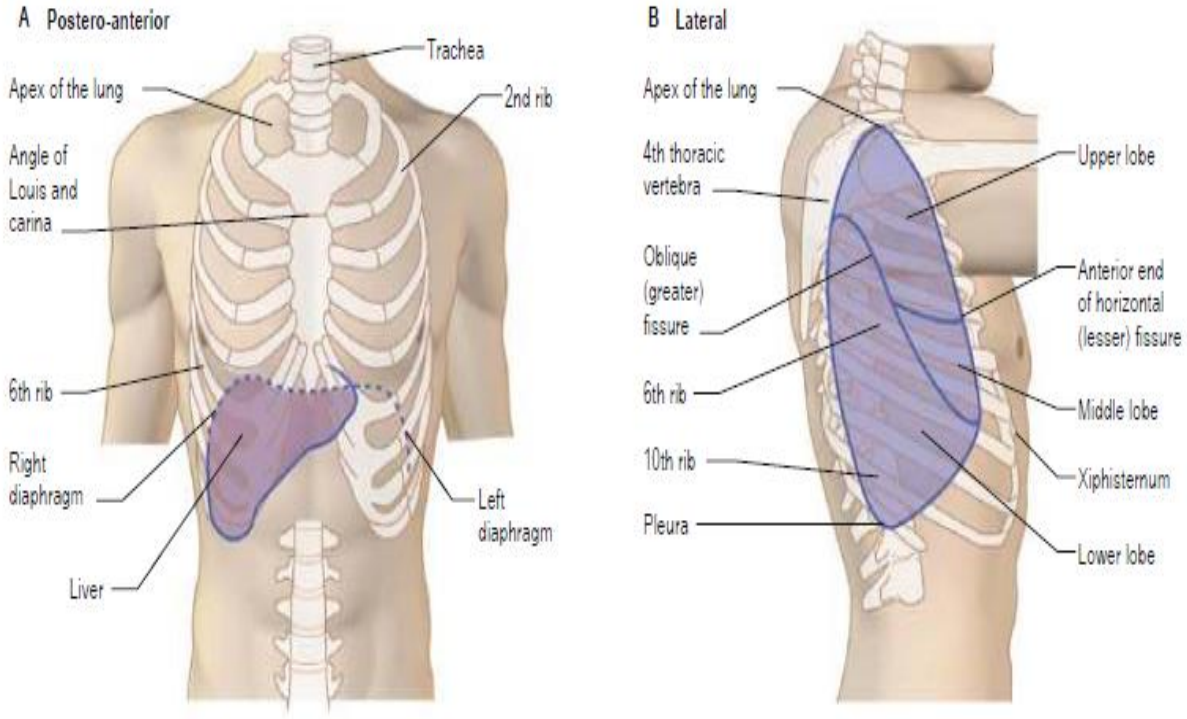
Answer: d

Part (2) Respiratory System

Introduction

The respiratory system is responsible for gas exchange, supplying oxygen to the blood and removing carbon dioxide. It includes airways, lungs, and respiratory muscles. Understanding its structure and function is essential for clinical practice.

Anatomy of respiratory system



Surface anatomy of the chest

Physiology of respiratory system:

Key functions of the respiratory system:

- Oxygen intake and carbon dioxide elimination
- Acid-base regulation
- Phonation (voice production)
- Immunological defense

Lung Volumes & Capacities in normal adults

Parameter	Definition	Normal Value
Tidal Volume (TV)	The air you breathe in and out during normal breathing	≈ 500 mL
Inspiratory Reserve Volume (IRV)	The extra air you can forcefully inhale	≈ 3000 mL
Expiratory Reserve Volume (ERV)	the extra air you can forcefully exhale	≈ 1100 mL
Residual Volume (RV)	air left in the lungs after forceful exhalation	≈ 1200 mL

Lecture (1) History Taking in Respiratory System

ILOs:

After this lecture, student should be able to:

- Identify the different types of complaints and their duration.
- Identify the structure of present history.
- Enumerate the common respiratory symptoms

Main components of respiratory history:

• Personal history and present illness history.

• Past history of respiratory or systemic illness.

• Family history and therapeutic history.

Personal history

✓ **Name:** For identification & to be familiar with patient.

✓ **Age:** Certain diseases are related to certain age groups. Bronchial asthma in children and bronchogenic carcinoma in old age.

✓ **Sex:** Some diseases are more common in males / females.

✓ **Residence:** Certain diseases are related to certain areas.

✓ **Occupation:** Some diseases are related to certain occupations.

✓ **Marital status:** For possible infertility

✓ **Special habits:** Smoking index= Number of cigarettes/days × Number of years.

✓ **Handedness**

✓ **In female, menstrual history**

Chief Complaint (C/O):

In patient's own words. Write the duration. Sort them in a chronological manner**.**

History Of Presenting Illness (HPI):

Analysis of complaint

8 as usual	3 for pain
Onset: sudden, acute, gradual	
Course: intermittent, stationary, decrescendo, crescendo	**Character**
Duration: minutes, days, months	**radiation**
Duration and Date of last attack	
What increase & what decrease	
Lines of treatment	

Respiratory Symptoms

Cough "Do you have cough or sputum?"

Definition: A sudden, protective forceful expulsion of air from the lungs through the glottis, intended to clear the airways of secretions, foreign particles, or irritants.

Classification:

• Acute cough (<3 weeks): Often due to viral infections, pneumonia, pulmonary embolism.

• Subacute cough (3–8 weeks): Post-infectious cough, pertussis.

• Chronic cough (>8 weeks): COPD, asthma, GERD, TB, bronchiectasis, lung cancer.

Important points:

• Dry cough – asthma, interstitial lung disease, ACE inhibitors.

• Productive cough – bronchitis, pneumonia, bronchiectasis.

• Nocturnal cough – asthma, left ventricular failure, GERD.

Symptom	Acute Causes	Chronic Causes	Special Notes
Cough	Acute bronchitis, pneumonia	COPD, TB, asthma, lung cancer	Dry vs productive; nocturnal cough suggests asthma

Sputum

Definition: Mucus or phlegm expectorated from the respiratory tract.

Types and characteristics:

• Mucoid – asthma, chronic bronchitis.

• Purulent – bacterial infections such as pneumonia.

• Rusty – pneumococcal pneumonia.

• Foul smelling – anaerobic infection or bronchiectasis.

• Pink frothy – pulmonary edema.

Hemoptysis "Any blood in the sputum (hemoptysis)?"

Definition: Expectoration of blood originating from the respiratory tract below the larynx.

Causes:

• Infections – TB, bronchiectasis, pneumonia.

• Malignancy – lung cancer.

• Vascular – pulmonary embolism, mitral stenosis.

• Autoimmune – Goodpasture's syndrome, vasculitis.

Dyspnea "Any shortness of breath on exertion, lying down, or at night or morning?"

Definition: Subjective sensation of difficult or uncomfortable breathing.

Types:

• Exertional dyspnea – occurs during activity

• Orthopnea – dyspnea when lying flat

• Paroxysmal nocturnal dyspnea – sudden dyspnea at night

• Trepopnea – dyspnea in one lateral position

• Platypnea – dyspnea on standing upright

Grades (NYHA classification for functional limitation):

• Grade I – Dyspnea on severe exertion.

• Grade II – Dyspnea on moderate exertion (e.g., climbing stairs).

• Grade III – Dyspnea on mild exertion (walking on level ground).

• Grade IV – Dyspnea at rest.

Wheeze "Do you have a wheeze or have frequent chest infections?

Definition: High-pitched, musical sound during breathing due to narrowed airways.

Common causes:

• Asthma – reversible airway obstruction.

• COPD – chronic obstruction.

• Foreign body aspiration.

Chest Pain

Chest pain of respiratory origin is often pleuritic, sharp, and localized.

Causes:

• Pleurisy – inflammation of pleura.

• Pulmonary embolism – sudden pleuritic chest pain with dyspnea.

• Pneumothorax – sudden sharp pain with breathlessness.

• Pneumonia – pleuritic pain with fever and cough.

Past history:

- Chronic diseases (HTN, DM, Asthma, TB, Hepatitis, HIV): When, Where & How diagnosed?

- Similar conditions.

- Previous hospital admissions.

- Previous surgical interventions.

- Previous blood transfusion.

Family history:

- Chronic Diseases (HTN, DM, Asthma, TB, Hepatitis, HIV).

- Similar conditions. - Inherited / Genetic Diseases.

- Consanguinity. - History of sudden death, cancers.

Drug & Allergies History:

- Long term medications.

- Short term medications.

- Allergy to certain food or medication

References:

Harrison's Pulmonary and Critical Care Medicine

Lecture (2) General Examination

ILO: by the end of this topic, the student is able to

- Identify different items and features of general examination
- Know how to measure respiratory vital signs

✓ **Appearance:** Looks Well/ill, consciousness, Alert, Orientation to time - palace - person.

✓ **Body Built:** Average, Thin, Obese (Depends On BMI).

✓ **Color:** Pale, Cyanosed, Erythematous.

✓ **Decubitus:** Patient's Sitting & Position.

✓ **Deformities:** Any Congenital Abnormality.

✓ **Distress:** Difficulty In Breathing (Dyspnic).

✓ **Environment:** Any Connections to Patient (IV Line, Catheter, O2 Mask, ECG, Wheelchair).

 # Signs of respiratory distress:

- Tachypnea.

- Tachycardia.

- Flaring Of Ala Nasi.

- Cyanosis.

- Using Of Accessory Muscles, Intercostal, Subcostal, Suprasternal Recession.

- Grunting.

- **Vital Signs:**

✓ Respiratory Rate (RR): Normally (12-20 Breaths/Min).

✓ O2 Saturation**:** Normally (> 95%).

- **Hands:** (Compare Both Hands Together)

✓ **Nails:**

- Clubbing.

Grades Of Clubbing:

- **1** > Fluctuation of the Nail Bed.

- **2** > Obliteration of the Lovibond Angle.

- **3** > Parrot Beak Appearance or Drumstick Appearance.

- **4** > Hypertrophic Osteo-Arthropathy (HOPA).

Definition: Painless thickening of the distal fingers and toes with loss of the normal nail angle.

Causes:

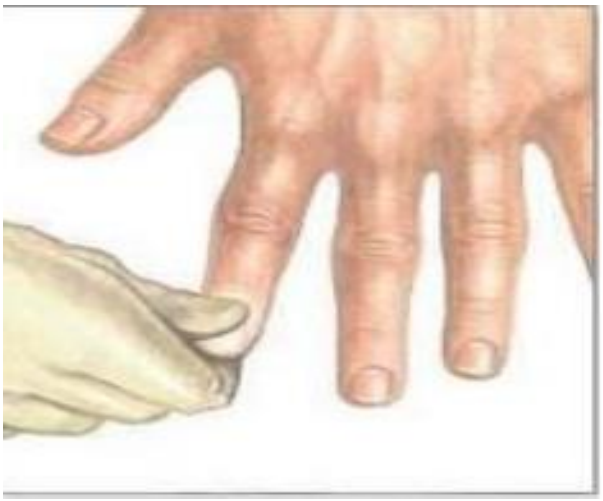
• Chronic suppurative lung disease (bronchiectasis, lung abscess).

• Lung cancer.

• Interstitial lung disease.

• Cyanotic congenital heart disease.

- Capillary Refill. - Peripheral Cyanosis. - Koilonychia. - Leukonychia.



✓ **Palm:**

- Muscle Wasting. - Palmar Erythema. - Pallor Which Seen in Palmar Creases.


✓ **Arm:**

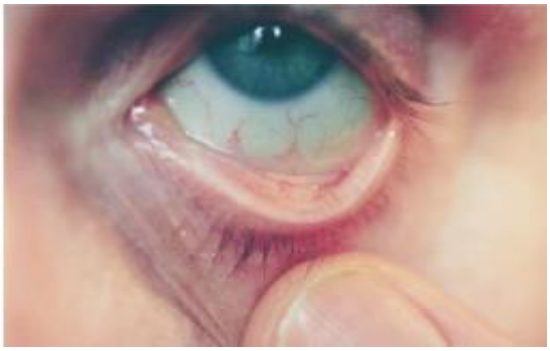
- Bruises, Scratch Marks, Ulcers, Scars, Pigmentation.
- Muscle Wasting.
- Spider Nevi (In Face - Neck - Upper Chest).

- Head & Neck:

✓ **Eye:**

- Jaundice: Look at Upper Bulbar Conjunctiva While Patient Is Looking Downward.

- Pallor: Look at Lower Palpebral Conjunctiva While Patient Is Looking Upward.



✓ **Mouth:**

- Cyanosis: Lips for Peripheral Cyanosis & Tongue for Central Cyanosis.

- Jaundice: In mucous membranes.

- Aphthus Ulcer & Candida, Glossitis, Mouth Hygiene, Odor of breath.

✓ **Neck:**

- Lymph Nodes. - Jugular Vein. - Carotid Artery.

- Lower Limbs:

- Skin Changes, Muscle Wasting, Loss of Hair

Brief overview of important conditions:

• **COPD** – chronic airflow limitation, usually progressive

• **Bronchial Asthma** – reversible airway obstruction with wheeze

• **Pneumonia** – infection causing fever, cough, consolidation

• **Pulmonary Tuberculosis** – chronic infection with cough, hemoptysis, weight loss

• **Interstitial Lung Disease** – restrictive pattern, progressive dyspnea

Clinical local chest Examination

A structured examination includes:

• Inspection – chest shape, movement, cyanosis

• Palpation – chest expansion, tracheal position

• Percussion – resonance vs dullness

• Auscultation – breath sounds, added sounds (wheeze, crackles)

References:

Harrison's Pulmonary and Critical Care Medicine

Lecture (3) Respiratory (chest)) Inspection 👀

ILOs:

After this lecture, student should be able to:

- Identify the items of chest inspection examination.
- Describe the technique of chest examination.

Inspection is the first step of respiratory system examination. It begins the moment the patient enters the room and continues throughout the encounter. It provides valuable clues about underlying respiratory disease.

General Inspection

During general inspection, observe the patient's:

- Overall appearance and comfort level.
- Presence of respiratory distress (use of accessory muscles, nasal flaring).
- Cyanosis – central (lips, tongue) or peripheral (fingers, toes).
- Clubbing of fingers.
- Edema or wasting (cachexia).

Points to be assessed on chest inspection include:

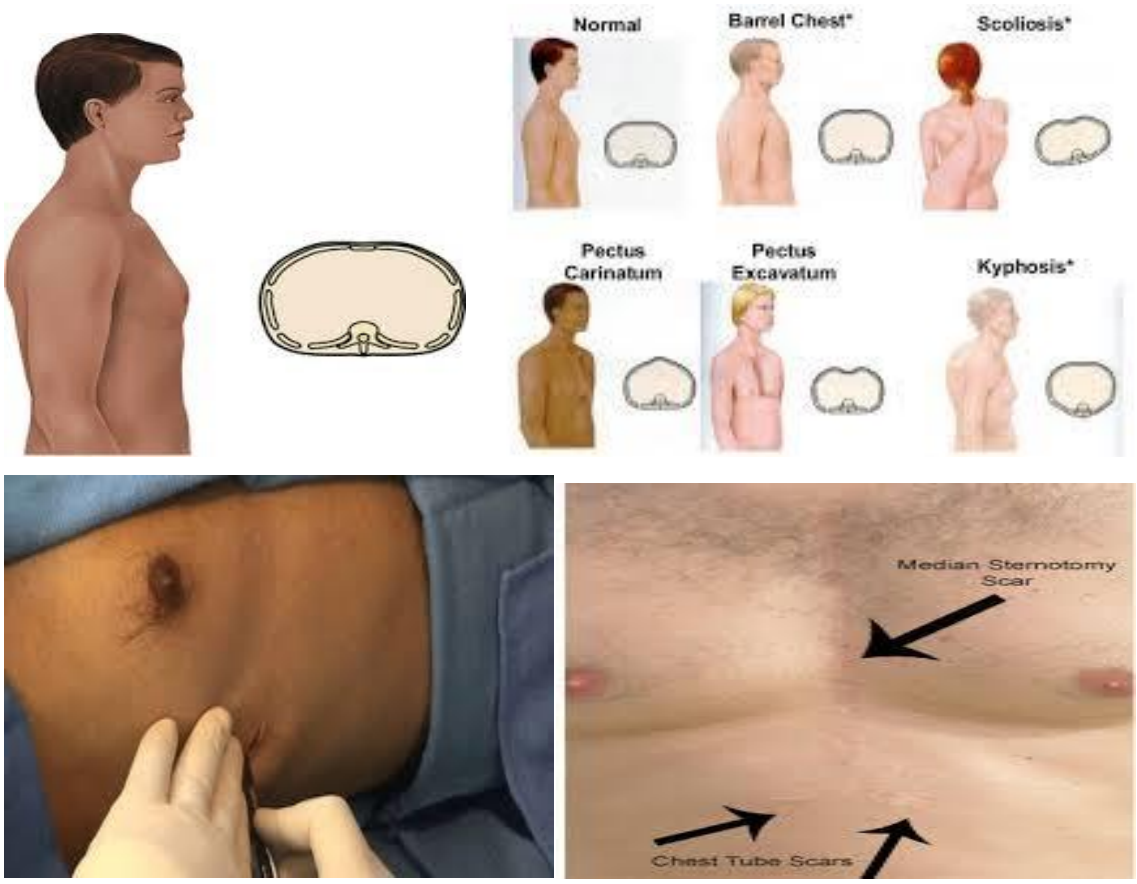
- Shape and symmetry of the chest.
- Movement of the chest wall during respiration.

Type of breathing:

✓ Abdomino-Thoracic: Males, changing indicates phrenic nerve injury, abdominal distention or peritonitis.

✓ Thoraco-Abdominal: Females, changing indicates intercostal paralysis, or chest pain.

- Any scars, deformities, or surgical marks.
- Presence of dilated veins on the chest wall.
- Localized bulging or retraction of intercostal spaces.



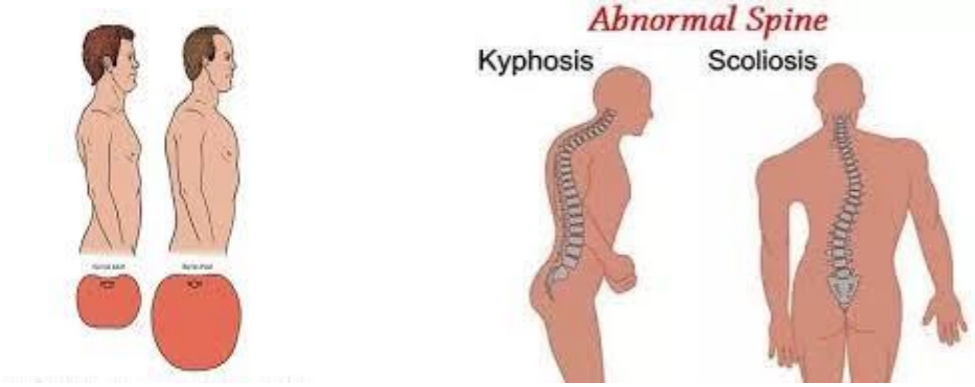
Chest Shape Abnormalities

• Barrel chest – increased anteroposterior diameter, seen in COPD.

• Pectus excavatum – sunken sternum (‘funnel chest’).

• Pectus carinatum – protrusion of sternum (‘pigeon chest’).

• Kyphoscoliosis – abnormal curvature of the spine, restricting lung expansion.



Chest Movement Abnormalities

Abnormal chest movements provide diagnostic clues:

• Reduced expansion – pneumonia, pleural effusion, fibrosis.

• Unilateral lag – lung collapse, pneumothorax.

• Paradoxical movement – flail chest.

• Intercostal retraction – airway obstruction, severe asthma.

Respiratory Rate and Pattern

Normal respiratory rate in adults: 12–20 breaths/min.

Abnormal patterns:

• Tachypnea – rapid shallow breathing, seen in fever, pneumonia.

• Bradypnea – slow breathing, causes include raised intracranial pressure, drugs.

• Hyperpnea/Kussmaul breathing – deep labored breathing, seen in metabolic acidosis.

• Cheyne–Stokes respiration – periodic breathing with crescendo-decrescendo pattern, seen in heart failure and stroke.

• Biot's breathing – irregular breathing with apnea, seen in medullary lesions.

References:

Harrison's Pulmonary and Critical Care Medicine

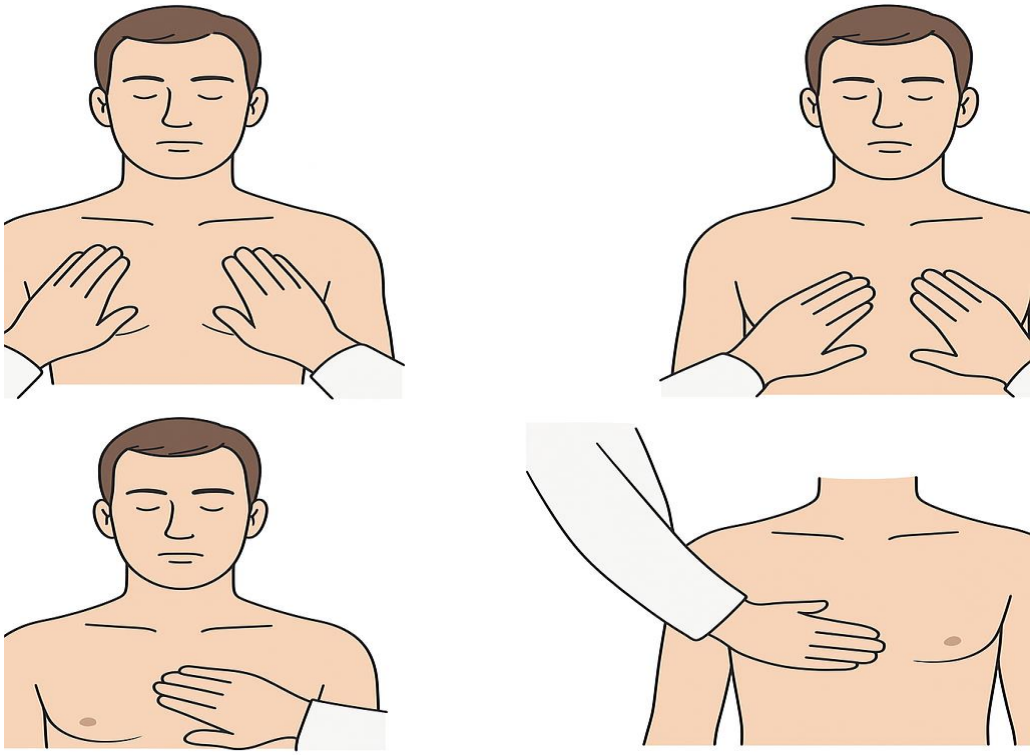
Lecture (4) Respiratory Palpation 🖐

ILOs

After this lecture, student should be able to:

- Identify the items of chest inspection examination.
- Describe the technique of chest examination.

Palpation follows inspection and is used to confirm findings, detect abnormalities, and assess chest expansion, tracheal position, and tactile fremitus.



Key Elements of Palpation

• Tracheal position – assessed by placing fingers in the suprasternal notch.

• Chest expansion – assessed by placing hands on the lower chest wall and observing symmetry during deep inspiration.

• Tactile vocal fremitus – vibration felt on the chest wall when the patient says 'ninety-nine'.

Palpation for tactile fremitus. (A) Technique using both hands. (B, C) Technique with ulnar aspect of both hands.

Findings

• Tracheal deviation – towards collapse/fibrosis, away from pleural effusion/pneumothorax.
• Reduced expansion – pneumonia, effusion, fibrosis, collapse.
• Increased fremitus – consolidation.
• Decreased fremitus – pleural effusion, pneumothorax.

A

B

References:

Harrison's Pulmonary and Critical Care Medicine

Lecture (5) Respiratory Percussion 👆

ILOs

After this lecture, student should be able to:

- Identify the items of chest inspection examination.
- Describe the technique of chest examination.

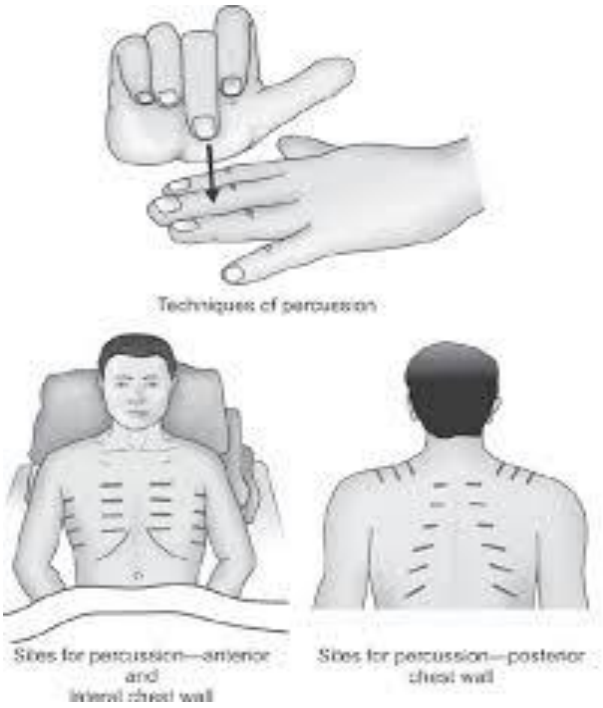
Percussion provides information about the underlying lung and pleural space. It helps distinguish between air-filled, fluid-filled, or solid structures.

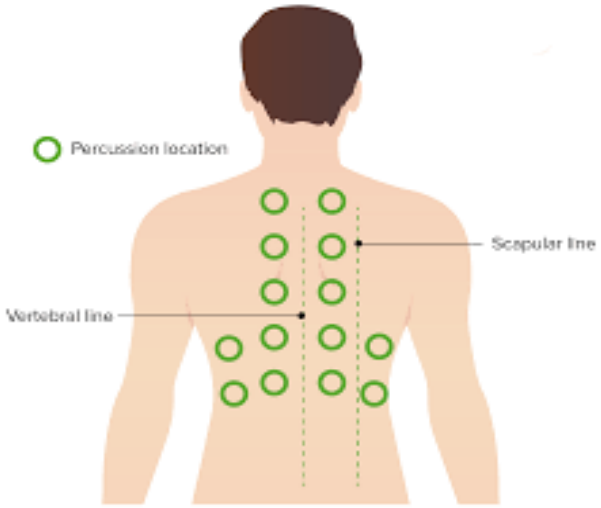
Percussion Notes

• Resonant – normal lung tissue.
• Hyperresonant – pneumothorax, emphysema.
• Dull – consolidation, pleural thickening, collapse.
• Stony dull – pleural effusion.

Technique

Place the middle finger of the non-dominant hand firmly on the chest wall and strike with the tip of the dominant hand's middle finger. Compare side to side.





Technique: " Light Percussion "

✓ Direct percussion on the clavicle.

✓ Separate your fingers from each other and press the middle finger in the ICS.

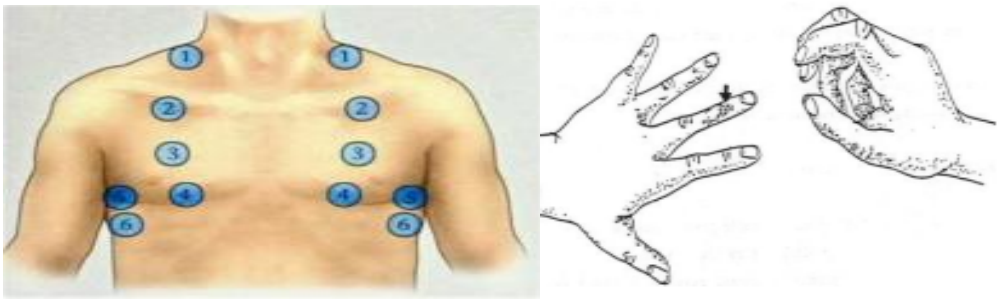
✓ Percuss by the middle finger over the middle finger of other hand.

✓ Comparative percussion (Right & Left).

✓ Start from supraclavicular area then downwards, with axillae.

Heavy Percussion (from back).

- Scapular line (paravertebral line). - Start from apex to 10th space



 # Findings:

- **Resonant:** Normal.

- **Hyper-Resonant:** Pneumothorax, Emphysema.

- **Dullness:** Consolidation, Pleural Effusion.

- Percussion of special areas:

A- Bare area of the heart:

- **Definition:** Area of heart not covered by lung tissue.

- **Site:** 4th & 5th ICS between mid-clavicular line and parasternal line.

- **Normally:** Dull by light percussion, if resonant: emphysema, pneumothorax.

B- Hepatic dullness:

- **Normally:** Upper border in 5th right ICS mid-clavicular line, if lower than that you have to suspect emphysema.

C- Splenic Dullness:

- Underlies 9th, 10th, 11th ribs between mid-axillary and scapular line.

D- Traub's Area:

- Definition: An area of tympanic resonance overlying air bubbles in fundus of stomach.

- Site: Area between LT 5th ICS To 8th costal cartilage mid-clavicular line & LT 9th ICS to 11th ICS mid-axillary line.

- **Causes of dullness of this area:**

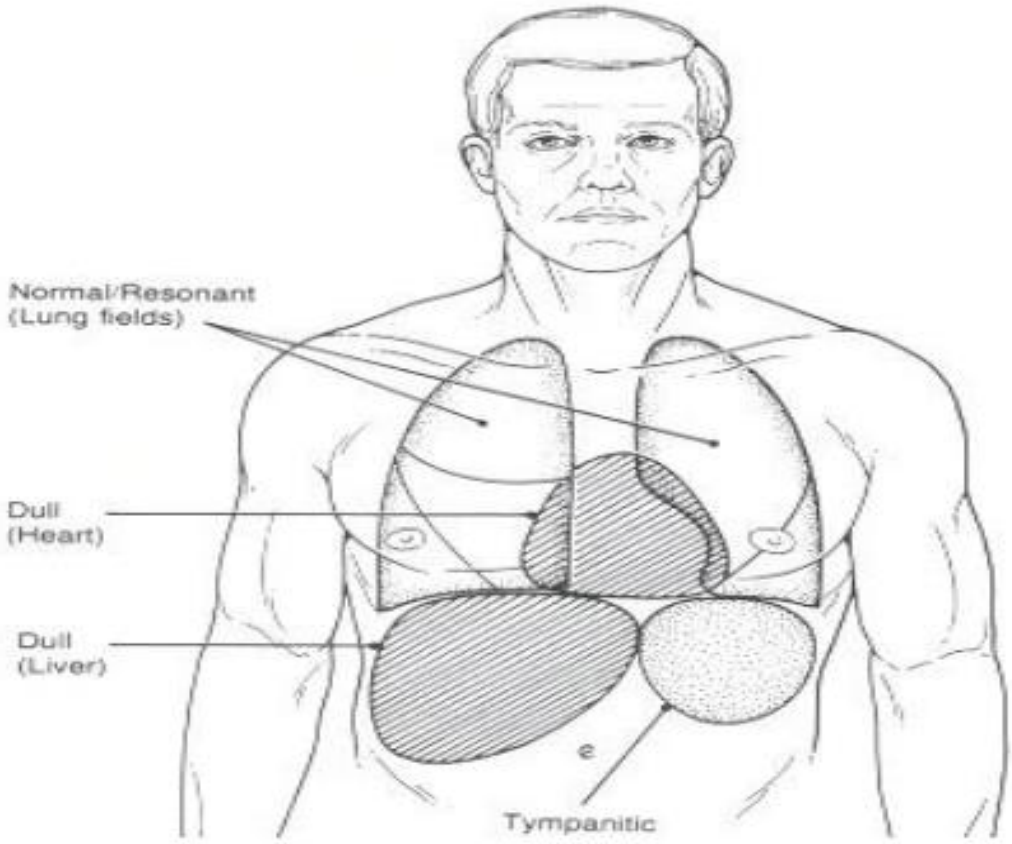
✓ **From above:** LT basal lung disease, LT pleural effusion, pericardial effusion.

✓ **From below:** Elevated diaphragm due to ascites, tumor, pregnancy.

✓ **From right:** Enlarged left hepatic lobe.

✓ **From left:** Splenomegaly.

✓ **Stomach fullness.**



Special test:

 # Tidal percussion:

- Differentiate between supra & infra-diaphragmatic dullness

- Technique:

While percussion for hepatic dullness, after getting the 1st dull space, ask patient take deep inspiration & percuss again:

✓ **If dullness persist:** Supra-diaphragmatic.

✓ **If dullness change to resonance:** Infra-diaphragmatic.

References:

Harrison's Pulmonary and Critical Care Medicine

Lecture (6) Respiratory Auscultation

ILOs

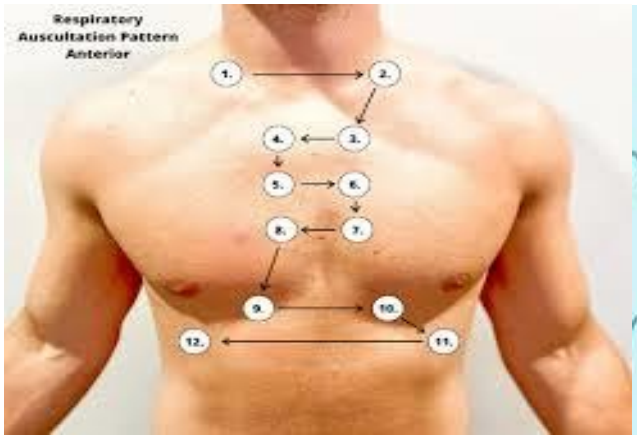
By the end of this lecture, the student can:

- Identify the different chest auscultatory areas.
- Identify the normal and abnormal respiratory sounds.

Auscultation assesses the quality of breath sounds, the presence of added sounds, and vocal resonance.

 # Technique:

- Auscultate the supra-clavicular area by the bell of stethoscope.
- Auscultate the same areas of percussion by the diaphragm of stethoscope.
- Comment on the air entry (equal, reduced).
- Comment on the type of breathing (vesicular, bronchial).
- Comment on added sounds (wheeze, crackles) & if it is inspiratory or expiratory.
- Comment on vocal resonance.



Normal Breath Sounds

• Vesicular – soft, low-pitched, heard over most of the lung fields.

• Bronchial – loud, high-pitched, normally heard over trachea. Pathological if heard in periphery (consolidation).

Vesicular breathing (alveolar breathing):

- Character:

✓ Flow of air in & out the normal lung alveoli.

✓ Vesicular.

✓ Inspiration is longer than expiration.

✓ No gap between inspiration & expiration.

✓ Heard all over the chest.

Bronchial breathing:

- Character:

✓ The expiratory sounds are longer than the inspiratory sounds.

✓ Gap in between inspiratory and expiratory.

✓ Bronchial breathing is normally heard over trachea & main bronchi (In The 2nd ICS).

✓ Abnormally heard over consolidation, collapse.

Added Sounds

• Crackles (rales) – discontinuous, heard in pneumonia, pulmonary edema, fibrosis.

• Wheeze – high-pitched musical sound, seen in asthma, COPD.

• Rhonchi – low-pitched, snoring quality, due to secretions in large airways.

• Pleural rub – grating sound, due to inflamed pleura.

• **Wheeze (Rhonchi):**

- **Definition:** Dry continuous musical sound.

- **Mechanism:** Passage of air in a narrowed bronchus.

- **Timing:** Relation to the respiratory cycle, tend to be louder on expiration due to spasm or edema.

- **Some causes of wheeze:** asthma, COPD, foreign Body.

• **Crepitations (Crackles):**

- **Definition:** Moist interrupted wet sound (non-musical sound).

- **Mechanism:** Passage of air through fluid in bronchi & alveoli.

- **Timing:** Usually occur in inspiration.

- **Types:**

✓ **Fine:** Due to passage of air through small amount of fluid in alveoli or small bronchioles, can be due to fibrosis, TB, pneumonia.

✓ **Coarse:** Due to air bubbling through big amount of fluid in alveoli or big bronchi, can be due to acute pulmonary oedema, bronchiectasis.

• **Pleural friction rub:**

- **Definition:** Localized superficial leathery friction sound.

- **Mechanism:** When thickened, roughened pleural surfaces rub together.

- **Timing:** Occur during both inspiration & expiration.

- **Some Causes:** Pleurisy, malignant involvement of the pleura.

Vocal Resonance

• Bronchophony – increased clarity of spoken voice (nine nine) in english or (four four) in arabic over consolidation.

• Egophony – 'E' heard as 'A', typical of consolidation.

• Whispering pectoriloquy – whispered sounds heard distinctly, seen in consolidation.

- To confirm bronchial breathing.

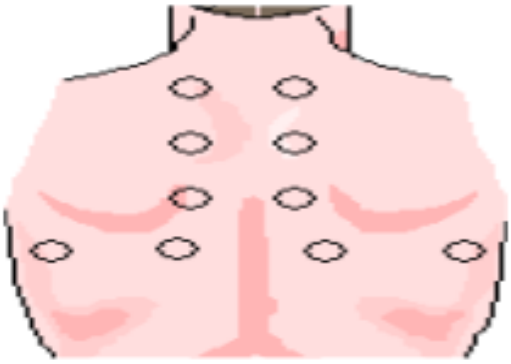
- Ask the patient to say "44" in arabic or "99" in English.

- The sound is muffled over a normal lung.

- The voice will be heard clearly with consolidation or fibrosis, and it will be very clear with COPD and decreased or absent if there is effusion or collapse.

Auscultation from back:

- At supra, infra-scapular area.
- At paravertebral area.
- Vocal resonance.



References:

Harrison's Pulmonary and Critical Care Medicine

Quizzes

Q1. Which symptom is defined as dyspnea occurring when lying flat, relieved by sitting upright?

A) Orthopnea
B) Trepopnea
C) Platypnea
D) PND

Answer: A
Explanation: Orthopnea is characteristic of left-sided heart failure.

Q2. Pink frothy sputum is a feature of:

A) Bronchial asthma
B) Pulmonary embolism
C) Pulmonary edema
D) Lung cancer

Answer: C
Explanation: Pulmonary edema classically presents with pink frothy sputum.

Q3. The most common cause of massive hemoptysis worldwide is:

A) Pulmonary embolism
B) Bronchiectasis
C) Tuberculosis
D) Lung cancer

Answer: C

Explanation: TB is the leading global cause of massive hemoptysis.

Q4. In which part of the respiratory system, gaseous exchange takes place?

(a) Alveoli
(b) Pharynx
(c) Larynx
(d) Trachea

Answer: (a)

Q5. Cigarette smoking causes:

(a) Acute bronchitis
(b) Asthma
(c) Emphysema
(d) IPF

Answer: (c)

Q6. pulmonary "FIBROSIS" may be caused by:

(a) Dust particles
(b) Pneumonia
(c) Bronchial asthma
(d) Acute infection

Answer: (a)

Q7. 33 years old male patient with chronic cough and normal chest X-ray, what's the probable diagnosis?

(a) Dust particles
(b) Pneumonia
(c) Bronchial asthma
(d) GERD

Answer: (d)