EXAMINATION OF RESPIRATORY SYSTEM
Anterior axillary line (from anterior axillary fold)
Midclavicular line (from midpoint of clavicle)
Midsternal line

Anterior axillary line
Midaxillary line (from apex of axilla)
Posterior axillary line (from posterior axillary fold)

Posterior axillary line (from posterior axillary fold)
Scapular line
Vertebral line

Imaginary landmarks of chest, (C) anterior, (D) right lateral, and (E) posterior
Anatomy

- Bronchopulmonary segment is a wedge of the lung supplied by a single bronchus and corresponding pulmonary artery and vein
- Rt Lung – 3 Lobes
- Lt Lung – 2 Lobes & Lingula
- Major Fissure (Oblique fissure)
  - A curved line from 2\textsuperscript{nd} thoracic spine in the back to the costocondral junction in the front
- Minor Fissure (Transverse Fissure)
  - A line from Sternum at the level of 4\textsuperscript{th} costal cartilage oblique fissure at the Midaxillary line
Broncho Pulmonary Segments

- **Rt Lung 3 Lobes**
  - Upper lobe
    - 1) Apical
    - 2) Anterior
    - 3) Posterior
  - Middle Lobe
    - 1) Lateral
    - 2) Medial
  - Lower Lobe
    - 1) Apical
    - 2) Ant basal
    - 3) Post basal
    - 4) Lateral basal
    - 5) Medial basal

- **Left Lung 2 Lobes**
  - Upper lobe
    - 1) Apical
    - 2) Anterior
    - 3) Posterior
  - Lower Lobe
    - 1) Apical
    - 2) Ant basal
    - 3) Post basal
    - 4) Lateral basal
SYMPTOMS

- Cough
- Wheeze
- Dyspnoea
- Stridor
- Hoarseness voice
- Chest pain
- Haemoptysis
Physical Finding

- Cyanosis
- Clubbing
- Anemia
- Edema
- Jugular Vein
Cyanosis is the bluish or violet discoloration of the mucous membrane due to excess amount of deoxygenated Haemoglobin (>5gm/dl) in the peripheral blood vessels associated with inadequate oxygenation of the skin tissue.

- Types - Peripheral & Central

Peripheral Cyanosis - is due to excessive extraction from the blood when the circulation is impaired
Central cyanosis

Due to oxygen undersaturation of the arterial blood, gaseous exchange in the lungs resulting from renal failure or pulmonary oedema or when there is R:

1) RDS
2) Foreign body
3) Tension Pneumothorax
4) Acute severe asthma
5) Pulmonary embolism
### Difference Between Central & Peripheral Cyanosis

<table>
<thead>
<tr>
<th>CENTRAL</th>
<th>PERIPHERAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visible in Warm areas &amp; skin</td>
<td>Skin</td>
</tr>
<tr>
<td>Venous admixture &amp; defective ventilation, perfusion/diffusion</td>
<td>Vasoconstriction, low output</td>
</tr>
<tr>
<td>Dec arterial oxy sat</td>
<td>Increased arteriovenous oxygen difference</td>
</tr>
<tr>
<td>Deoxy Hb &gt;5gm/dl</td>
<td>Normal</td>
</tr>
<tr>
<td>Clubbing present</td>
<td>Absent</td>
</tr>
</tbody>
</table>
Clubbing

Clubbing is bulbous enlargement of soft parts of the terminal phalanges with both transverse and longitudinal curving of the nails.

It is due to interstitial edema and dilation of the arterioles and capillaries.

**Grading**

1) Softening of nail bed
2) Obliteration of the angle of nail bed
3) Swelling of the subcutaneous tissue over the base of the finger
4) Swelling of fingers in all dimensions – hypertrophic pulmonary osteoarthropathy
CAUSES

- Bronchiectasis
- Lung abscess
- Empyema
- Intrathoracic tuberculosis
- AV fistula
• **Major Points**
  – Shape of the chest
  – Tracheal position
  – Apical position
  – Respiratory movement

• **Additional Points**
  – Spine
  – Shape & contour of chest
  – Pulsations
  – Veins
  – Respiratory sounds like cough, wheeze, etc.
Shape of Chest

Bilaterally symmetrical
Normal elliptical
Normal ratio 5:7

ABNORMAL SHAPE
1) Barrel Shape  Ant & Post diameter >Lateral diameter
2) Pectus excavatum -Depression in the Sternum
3) Pectus Carinatum –Prominence of the sternum
Changes of Shape of Chest with Age

- Term
- Fetus 7 mo
- 3½ years
- Adult
- 5 ft
Various types of Chest Shapes
Inspection – Contd..

TRACHEAL POSITION
- Noting the position - Shift of mediastinum can be

APICAL POSITION
- Can be shifted to same side (pull) shifted to opp (push)

RESPIRATORY MOVEMENT
Rate, Rhythm, Character, Equality, Accessory muscle, respiration, Intercostal retraction
Rate

<1 year - 60
1 – 4 - 35
4 – 8 - 25
8 – 12 - 20

Inspect movement whether bilaterally symmetrical.
The side moves less will be the abnormal side.

RHYTHM

Normal respiration has regular rhythm with inspiration and expiration. Abnormal/irregular rhythm - Pathological.
Inspection – Contd..

- SPINE – Scoliosis, Kyphosis, Lordosis
- Chest wall - Bulging / Depression /Shoulder droop
- Pulsation - Visible & pulsating vessels – Anastomosis circulation
- Distended chest veins
Palpation

Major Points

• Tracheal position
• Position of Apex
• Vocal Fremitus
• Movements of Chest wall

Additional points

• Intercostal tenderness
• Pulsation
• Spine
• Palpable rhonchi
• Crepitations
• Subcutaneous emphysema
Tracheal Position

- Valuable information about position of mediastinum
- 4 to 5 cm is felt in the neck

- Sit or Stand
- Head in midline
- Neck slightly extended
- Fix the head in midline with Lt hand
- Tip of the rt index finger in the suprasternal notch
Apex

- Is the lower most and outermost point in the precordium where a definite cardiac impulse is felt
- Normally felt $\frac{1}{2}$ to 1 cm inside Lt midclavicular line
- Palm of the hand to feel the apex
- Localisation done with single digit
- APEX BEAT is obscured in 1) Obesity 2) Emphysema 3) Pericardial effusion 4) Apex come under rib
Vocal Fremitus

- Palpation of vibration of chest wall produced by patient to say one-one-one
- In small this can be done during crying
- Medial side of the hand is used
- Check either side
- Proceed systematically from upward
- Intensity of the fremitus tends to parallel breath sound intensity
- Intensity varies considerably from front (strong) to from apex (strong) to the lung base in normal people
Abnormal VF

- Increased - Consolidation
- Decreased - Pneumothorax, Pleural effusion, collapse, Fibrosis, Bronchial obstruction
Movement Of Chest Wall

- Comparative palpation of the two sides of the chest in an orderly manner from above downward is the best method for the evaluation of the degree and symmetry of expansion with respiration.
  - Infraclavicular & infra mammary from front
  - Supraclavicular, upper inter scapular lower scapular back
Additional Points

- Intercostal tenderness
  - Disease of Skin, subcutaneous tissue, muscle nerve, bone & causes

- Pulsation

- Spine

- Palpable rhonchi, rub, crepitations

- Subcutaneous emphysema
Percussion

Major points
- Lung field percussion
- Liver dullness
- Tidal percussion
- Cardiac dullness

Additional
- Shifting dullness
- S shaped curve
- Traubes area
- Splenic dullness
Percussion – Contd..

- To determine the state of underlying tissues
- To delineate or define the boundaries or borders
- Percussion involves striking one object against another, thus producing vibration and subsequent sound waves; these sound waves are heard as percussion (resonance)
- Types – Direct & Indirect
- Rules of percussion
  - Always percuss from the resonant area to the expected dull area
  - Keep the plexor parallel to the expected dull area
  - Compare the two sides
Types of Percussion Notes

• Normal percussion note of the chest is due to underlying lung tissue, containing a normal amount of air in the air vesicles, air sacs and air passages.

• Abnormal
  – Tympany: Over the stomach
  – Hyperresonant: Pneumothorax
  – Impaired note: Consolidation
  – Dull note: Consolidation
  – Stony dullness: Pleural effusion
Percussion – Contd..

- Start percussion anterior at mid clavicular line—downwards—lower 5th 8th 10th rib mid clavicular, mid axillary, scapular line—lower border resonance tends to be depressed
- Emphysema or pneumothorax and raised in lung fibrosis, collapse, pleural effusion
- **Liver dullness** usually at 5th 7th 9th inter costal space in midclavicular scapular line
- **Tidal percussion** - percussion on the upper border of the liver dullness height of deep inspiration & expiration - extent of diaphragmatic mobility
- Restricted in pulmonary fibrosis, empyema subdiaphragmatic abscess
- **Cardiac dullness** extends in a triangular fashion from the sternum to the junction of the midclavicular line in the 5th inter costal space
Additional Points

- **Shifting dullness**  In case hydronemothorax, in sitting position the hyperresonant – dullness below. On changing posture to supine, a change to resonant

- **Shaped cure of Ellis**  In moderate size effusion within pleural sac border of dullness, which is highest in the axilla and lowest at the side assume the shape of the letter “S. This is due to capillary action

- **Traubes area**  at the lower border of the left lung anteriorly, pulmonary is replaced by tympanic note over a semilunar area due to the presence of stomach

- **Splenetic Dullness**  A small area of dullness in the 8th inter space in line
Auscultation

- Provide important clues to the condition of the lung and heart.
- Breath sounds are produced by the flow of the air through the respiratory tree. They are characterised by PITCH, INTENSITY, QUALITY and the relative duration of their inspiratory and expiratory phase.
- Normal breath
  - VESICULAR
  - Bronchial – larynx, trachea, lower cervical spine
  - Bronchovesicular – over major bronchus
Auscultation – Contd.

Major points
- Breath sound
  - Intensity
  - Quality
- Adventitious sounds
- Vocal resonance

Additional points
1) Pleural rub
2) Bronchophony
3) Whispering Phono.
4) Succussion sound
Breath Sounds

- **VESICULAR** sounds are low pitched, low intensity heard over the healthy lung tissue.
- This is characterised by active inspiration due to the air into bronchi and alveoli, followed by short expiration due to elastic recoil of the alveoli within between inspiration and expiration.
- **BRONCHIAL BREATH** The inspiration is low in pitch while the expiration is high pitched, loud and prolonged the duration of inspiration. There will be a pause between.
## Difference between Vesicular & Bronchial Breathing

<table>
<thead>
<tr>
<th>VESICULAR</th>
<th>BRONCHIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal breath sounds</td>
<td>Can be normal or abnormal</td>
</tr>
<tr>
<td>Heard all over the chest</td>
<td>Normally heard all over the larynx</td>
</tr>
<tr>
<td>except over larynx , trachea</td>
<td>, trachea</td>
</tr>
<tr>
<td>Rustling or breezy quality</td>
<td>Blowing quality</td>
</tr>
<tr>
<td>Low pitched</td>
<td>High pitched</td>
</tr>
<tr>
<td>Inspiration &gt; Expiration</td>
<td>Expiratory phase = &gt; inspiration</td>
</tr>
<tr>
<td>No pause</td>
<td>Definite pause</td>
</tr>
</tbody>
</table>
Bronchial Breathing - Types

- **Tubular**  High pitched, better heard with diaphragm, over consolidated area

- **Cavernous**  Low pitched, better heard with bell, heard over cavities in the lung.

- **Amphoric**  High pitched, metallic quality heard over hydropneumothorax and large pulmonary cavity with patent bronchus.
Adventitious Sounds

- Sounds which are unexpected in normal lung
- 2 TYPES
- Continuous: Last more than half of respiratory cycle - RHONCHI
- Discontinuous: Intermittent, they occur in relatively brief bursts, similar to popping of bubbles. They are called Rales – Crepititions – Crackles.
- The adventitious sounds vary in their Pitch – Intensity – quality and site of production.
Origin of Breath Sounds

1) Stidor (Laryngeal and Tracheal)
2) Death Rattle (Tracheal)
3) Course crepitation (Bronchi)
4) Rhonchi (Bronchi & Bronchioles)
5) Fine Crepitations (Alveoli)
6) Succussion Splash (Air & Fluid in the Pleura)
7) Plueral rub
Added Sounds

- **WHEEZE (Rhonchi)** Continuous, dry, musical sounds
  - Produced by the passage of air through an airway obstructed by thick secretions, muscular spasm, new growth, or external pressure

- **CREPITATIONS**
  - These are interrupted short sharp, non musical sounds heard more often during inspiration
  - They are caused by disruptive passage of air through the smaller airways
  - Types: Fine, Medium, Coarse
Added Sounds

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Crackles

Fine Crackles
- Short in duration, resembles rubbing of hairs between fingers
- Pneumonia 2) Pulmonary edema 3) Bronchiolitis 4) Bronchitis

Medium Crackles
- Between fine and coarse crackles.
- Pneumonic Consolidation, Bronchopneumonia

Coarse Crackles
- Is louder and longer, resemble cracking sound produced by fire
- Brochiectasis
Abnormal

Rhonchi
Coarse, low-pitched, may clear with cough

Wheeze
Whistling, high-pitched ronchus

Bronchial
Coarse, loud; heard with consolidation

Rub
Scarcely, high-pitched

Rales
Fine, cracking, high-pitched

Normal

Tracheal
Coarse, loud

Bronchovesicular
Combination bronchial and vesicular; normal in some areas (see text)

Vesicular
High-pitched, breezy
Mode of production of rhonchi
Sites of Production of Rhonchi
Vocal Resonance

- Auscultatory analog of the tactile fremitus is vocal resonance

- Sounds heard with stethoscope over various parts of the chest during the act phonation.
  
  - Increased  1) Consolidation  2) Superficial lung cavity
  
  - Decreased  1) Pleural effusion  2) Pneumothorax
    3) Thickened pleura   4) Emphysema
Additional Points

BRONCHOPHONY
- Increased vocal resonance where in spoken sounds appear loud and clear and close to ear – individual syllables remain indistinguishable
- CONSOLIDATION

Whispering Pectoriloquy
- If bronchophony is extreme, even a whisper can be heard, clearly through stethoscope as uttered directly into the examiner's ear
- Consolidation, Large cavity communicating with bronchus

Egophony - Nasal quality - upper level pleural effusion
Succussion splash - air and fluid large cavities within the lung
Pleural Rub

- Due to the rubbing of the two inflamed and roughened pleura
- Low pitched, heard both inspiration & Expiration
- Common site - lower part of axilla
- Superficial, scratchy sound
- Associated with pleural pain
- Intensified by pressing stethoscope over chest
- Does not alter with cough
Tips Of Auscultation

- The examiner should concentrate only one aspect of auscultation at a time.
- Air entry on same segmental areas, length of expiratory pause, adventitious sounds, their relation to inspiratory and expiratory phases and cardiac cycle and whether conducted or true sounds
Thank You