RESPIRATORY SYSTEM EXAMINATION

Dr. Muhammad Sarfraz

Abstract: Expose the chest, baring chest and abdomen upto the umbilicus, Female patient should not be exposed except when it is necessary and then only by a female doctor or female student in privacy. Inspect the front from foot end and the back from behind of patient. Asymmetry and diaphragmatic excursion can be assessed by placing one hand posteriorly on each hemithorax near the level of the diaphragm, palms facing anteriorly with thumbs touching at the midline. When the patient inspires, each hand should rotate away from the midline equally. After superficial palpation, deeper examination of the lungs and air spaces can be accomplished via testing for vocal fremitus. Bronchial sounds are present over the large airways in the anterior chest near the second and third intercostal spaces; these sounds are more tubular and hollow-sounding than vesicular sounds, but not as harsh as tracheal breath sounds. Examine lymph nodes face, neck and axillary (Palpate scalene lymph nodes, these enlarged first in metastasis of lung carcinoma).

Key words: Bronchial Breathing, Vocal Fremitus, Vesicular Breathing, Wheezes.

APPROACH TO THE PATIENT

i. Greeting to examiner
ii. Right side approach to patient
iii. Introduce yourself (I'm your Doctor)
iv. Asalam-O-Alekum and consent of patient. (If patient not allow say to examiner Sir Patient didn't allow me for his/her examination)
v. If female patient, ask examiner I need a female attendand
vi. Privacy I need screen to attend patient in privacy & proper light
vii. Position of patient

- For front examination: Patient should be lying flat in supine position and hand side abducted
- For back examination: Patient should be in sitting position and arms crossing front of the chest and each hands on opposite shoulder
- First Complete the examination on front or back then change the position of the patient

viii. Exposure: Expose the chest, baring chest and abdomen upto the umbilicus, Female patient should not be exposed except when it is necessary and then only by a female doctor or female student in privacy
ix. Piece of cloth must be with you to cover un-necessary part during examination, if chest examination abdomen should be covered
x. Examination of Respiratory System includes:

Relevant General physical examination,

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Dr Muhammad Sarfraz, MBBS, FCPS
Associate Professor of Medicine
Independent Medical College, Faisalabad.

1. Dr Muhammad Sarfraz, MBBS, FCPS
Associate Professor of Medicine
Independent Medical College, Faisalabad.

inspection, palpation, percussion and auscultation.

GENERAL PHYSICAL EXAMINATION RELAVENT TO RESPIRATORY SYSTEM

General Appearance of patient: i. Young or old ii. healthy or ill look

Posture and attitude: Severe airway obstruction (COPD and Asthma) patient sit up, bending forward and supporting himself with his arms so that he can use his extra respiratory muscles

Listen:

- Patient carefully for hoarseness of voice (due to laryngeal nerve palsy in case of lung carcinoma)
- Ask patient to cough and then breathe deeply with mouth open, listen carefully for stridor

Inspect: the sputum for color, volume, blood and type (mucoid, purulent or mucopurulent) be alert during examination of pulmonary tuberculosis patient

Examine Hands:

(Nails, fingers and palm)

- Tar staining on the fingers and nails seen in chronic smokers
- Radial pulse
- Blood pressure
- Clubbing (bronchiectasis, lung abscess, empyema, carcinoma of lung and fibrosing alveolitis)
- Yellow nail syndrome associated with pleural effusion
- Peripheral cyanosis

Examine for flapping tremors (Astericxis):
Ask the patient extend his arms with the wrist dorsiflexed and finger extended (seen in COPD) with type 2 respiratory failure.

Examine face: Central cyanosis in lip and tongue.
Examine the eyes: for evidence of Horner's syndrome . May be seen with involvement of the sympathetic chain from apical lung cancer.

Examine the nose for: polyps (asthma) , engorged turbinates (allergic reaction) , and deviated septum.

Examine the mouth: for central cyanosis.
Examine the teeth: as may be a risk factor for aspiration pneumonia.

Examine the sinuses: for evidence of sinusitis.

Examine JVP: Raised in chronic hypoxia in COPD due to cor pulmonale

Examine lymph nodes face, neck and axillary (Palpate scalene lymph nodes, these enlarged first in metastasis of lung carcinoma)

INSPECTION

Inspect the front from foot end and the back from behind of patient.

Normal respiratory rate: is 14-16/minutes
Shape and symmetry of the chest:

- Normal chest shape: should be symmetrical and elliptical in cross section, anterorposterior diameter should be less than lateral diameter.
- Barrel chest: increased AP diameter compared to lateral diameter. Seen in hyperinflation.
- Pigeon chest (pectus carinatum): outwards bowing of the sternum and costal cartilages. May be a sign of childhood respiratory disease. Also seen as an isolated anomaly or familial or with

Inspection	
From front note following	From back note following
• Respiratory rate (from side or foot end) • Type of respiration • Shape of chest (normal Elliptical) • Deformity • Chest movement • Inspect the position of trachea (Trail's sign) • Any pulsation or apex beat (from foot end or side) • Examine the Supraclavicular, infraclavicular, axillary and infraxillary • Dropping of shoulder • Fullness in supraclavicular region • Prominent veins, pulsations, scar	• Shape of chest (Symmetrical) • Deformity (Kyphosis and kyphoscoliosis) • Chest movement • Chest expansion and chest movement by standing behind the patient and look down the clavicles • Fullness in supraclavicular region • Examine the Suprascapular, infrascapular and interscapular • Prominent veins, pulsations, scar
Compare both sides of chest during examination and symmetry	

Noonan syndrome,Marfan syndrome.

- Funnel chest (pectus excavatum): localized depression of the lower end of the sternum. Causes similar to carinatum.
- Harrison's sulcus: linear depression of the lower ribs just above the costal margins at the site of the diaphragm attachment. May be seen in severe asthma in children and in Rickits.

Lesion of the chest wall:

- Subcutaneous emphysema: Seen as a diffuse swelling of one side of the chest and neck, seen in pneumothorax
- Look for previous lung or heart surgery scar mark or spots

Type of Respiration:

i. Normally:

- Thoracoabdominal - Females
- Abdominothoracic - Males and babies

ii. Abnormally:

- Thoracic - peritoneal irritation
- Abdominal - Pleural pain, ankylosing spndylitis and intercostals paralysis

Is there any specific pattern of respiration?

- Cheyne stokes pattern: hyperventilation intermittent with periods of apnea. It is secondary to a delay in the brain chemoreceptors to rapid changes in blood gases. Seen mainly in brain injury and high altitude.
- Kussmaul breathing: deep rapid respirations . associated with severe metabolic acidosis, particularly diabetic ketoacidosis (DKA)
- Hyperventilation
- Paradoxical respirations: abdomen sucks inwards with inspiration instead of normally protruding outwards.

Chest movements: Reduced due to

- Pleural effusion
- Pneumothorax
- Consolidation
- Collapse

- Fibrosis

Asymmetry and diaphragmatic excursion can be assessed by placing one hand posteriorly on each hemithorax near the level of the diaphragm, palms facing anteriorly with

Inspection	
Ask for any tenderness before going to palpate	
From front note following	From back note following
• Tenderness, crepitus • Position of trachea by one finger, two finger and three finger method • Tracheal tug • Locate apex beat position • Measure distance between suprasternal notch and cricoids cartilage • Movement of chest wall (on two places) • Chest expansion • Look for antero-posterior movements of hands • Tactile vocal fremitus • Palpable added sounds	• Tenderness, crepitus • Movement of chest wall (on 3 places) • Chest expansion • Palpation of supraclavicular fossa for lung apices • Look for antero-posterior movements of hands • Tactile vocal fremitus • Palpable added sounds
Local tenderness can indicate trauma or costochondritis.	

Thumbs touching at the midline. When the patient inspires, each hand should rotate away from the midline equally. Unequal movement, or a minute amount of movement, indicates asymmetry and poor diaphragmatic excursion, respectively.

Crepitus is the sensation of crackles under the fingertips during superficial palpation of the chest wall. This indicates the presence of subcutaneous air, which is often associated with a pneumothorax on the side of the abnormality.

After superficial palpation, deeper examination of the lungs and air spaces can be accomplished via testing for vocal fremitus. By placing the ulnar edge of the hand on the chest wall while ask the patient repeats a specific phrase, typically "ninety-nine" or "one, two, three." The strength of the vibrations felt indicates the attenuation of sounds transmitted through the lung tissues. Areas of increased vibration or fremitus correspond to areas of increased tissue density such as those caused by consolidation by pneumonia or malignancy. Overlying fatty tissue, increased airspace (such as in COPD), or fluid outside the lung space may decrease perceived fremitus.

Tracheal Position: Gently bend the head to relax the sternomastoids. By inserting finger between the trachea and sternomastoid, assess and compare the space on either side.

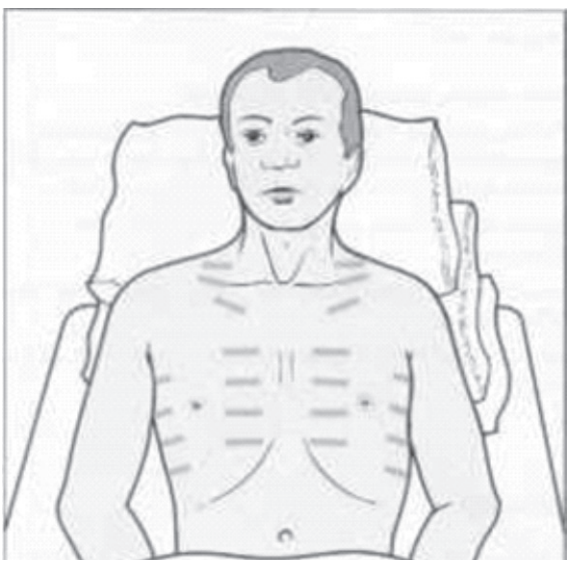
Trachea is slightly tilted to right. As a result, the clavicular insertion of right Sternomastoid is slightly more prominent and the space between trachea and sternomastoid is smaller compared to left.

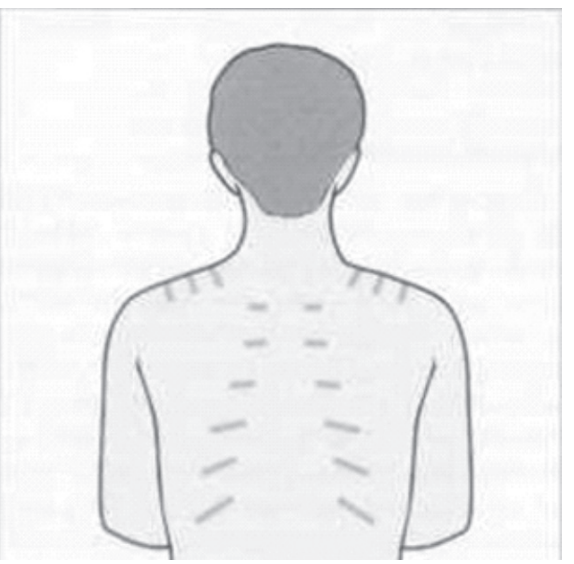
Normal lung produces resonant note

Normally liver is in 4th or 5th intercostals space

There should be cared normal cardiac dullness. Avoid auscultation within 3 cm of midline anteriorly or posterioly, as these areas transmit sounds directly from the

Percussion	
Percussion in intercostals spaces	
From front percuss following	From back percuss following
• Upper Border of liver (start percuss from 2nd intercostals space and move downward in mid clavicular line) • Percuss lung apices area anterior border of the trapezius muscle, overlapping the supraclavicular fossa • Percuss the clavicle directly over the medial third by 3 fingers of right hand without left hand placing here (laterally is dull due to muscle) • Anterior in mid clavicular line: Percuss 2nd to 6th to intercostals spaces • Anterior in lateral to mid claviular line: Percuss 4th to 7th intercostals spaces (with arm abducted of patient) • Percuss both sides alternately and compare the note.	• Ask the patient to fold his arms across the front of chest, percuss the anterior border of trapezius & upper part of back moving downward direction • Percuss above the spine of scapula • At a distance of 4-5cm below the spine of scapula down to the 11th rib • Don't Percuss near the midline, as solid structure of thoracic spine produce dull note and paravertebral musculature dull note • Tidal percussion
Local tenderness can indicate trauma or costochondritis.	





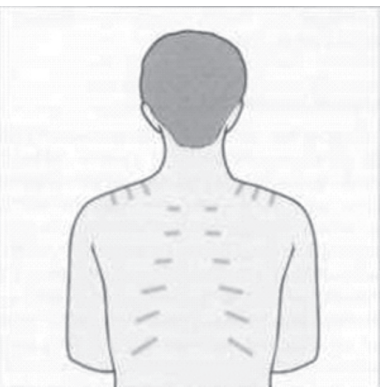
trachea or main bronchi

VESICULAR AND BRONCHIAL BREATH:

Bronchial sounds are present over the large airways in the anterior chest near the second and third intercostal spaces; these sounds are more tubular and hollow-sounding than vesicular sounds, but not as harsh as tracheal breath sounds. Bronchial sounds are loud and high in pitch with a short pause between inspiration and expiration; expiratory sounds last longer than inspiratory sounds.

Vesicular sounds are soft, blowing, or rustling sounds normally heard throughout most of the lung fields. Vesicular sounds are normally heard throughout inspiration, continue without pause through expiration.

NOTE PERCUSS NOTE	
Type	Detected
Resonant	Normal lung
Hyperresonant	• Pneumothorax • Emphysema
Dull	• Pulmonary consolidation • Pulmonary collapse • Severe pulmonary fibrosis
Stony dull	• Pleural effusion • Hemothorax • Empyema

AUSCULTATION	
Auscultate with bell of stethoscope and for one complete breath cycle	
From front Auscultate following	From back Auscultate following
• Mid clavicular line downward : From the above clavicle down to the 6th rib • Laterally: Axilla to the 8th rib	from the trapezius down to the 11th rib 

Note the following during auscultation
1. Breathing sounds intensity (increased or diminished) 2. Type of breathing (Vesicular or bronchial) 3. Added sounds (Ronchi, stridor, crepitations and pleural rub) 4. Vocal resonance

In a normal air-filled lung, vesicular sounds are heard over most of the lung fields, bronchial sounds are heard over the body of the sternum, and tracheal sounds are heard over the trachea.

Normal findings on auscultation include:

- Loud, high-pitched bronchial breath sounds over the trachea
- Soft, breezy, low-pitched vesicular breath sounds over most of the peripheral lung fields

ADDED SOUNDS:

Ronchi: these are continous whistling sounds produced by passage of air through narrowed airway. Like in Bronchial Asthma , Chronic bronchitis and Emphysema

Wheezes: which phase ? usually starts on expiration because airways usually dilates as the lung opens in inspiration, but if present on inspiration it signifies severe obstruction .Seen in significant airway narrowing. It is a poor guide to the severity of airway obstruction as it may be absent in severe obstruction . Localized wheezed may indicate a localized obstruction caused by compression e-g: Carcinoma

Crackles: probably secondary to loss of stability of the small airways which collapses on expiration . Early inspiratory crackles may indicate suggest disease of the smaller airways and indicate chronic obstructive lung disease. Late inspiratory crackles suggests disease of the alveoli . They may be fine like seen in pulmonary edema or harsh like seen in pulmonary fibrosis.

Pleural friction rub: usually caused by inflamed pleura rubbing against the lung, Indicated pleurisy.

Egophony : goat voice . The (e) appears like (a) . This is a sensitive sign for consolidation .

Whispering pectoriloquy: (Chest speaking): If patient talks while you are listening you hear the exact words. Second most sensitive sign after egophony.

Bronchophony: (bronchus sounds): Away from the big airways you can hear bronchial speaking sound but without identifying the exact words.

Auscultation for Vocal resonance : with consolidation you find increased vocal fremitus .

References:

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