

## **PULMONARY EXAMINATION**

### **Physical Examination of the Chest**

*The trouble with most doctors isn't so much that they don't know enough, as it is that they don't see enough.*

*Domanic Corrigan*

*No greater opportunity or obligation can fall the lot of a human being, than to be a physician. In case of the suffering he needs technical skill, scientific knowledge and human understanding. He who uses these with courage, humility and wisdom will provide a unique service for his fellow man and will build an enduring edifice of character within himself. The physician should ask of his destiny no more than this and he should be content with no less.*

*Tinsley Harrison*

*Let him, on meeting a fellow mortal, learn at a glance to distinguish the history of the man and the trade or profession to which he belongs. By a man's finger nails, by his coat sleeve, by his boot, by his trouser knees, by the callosities of his forefinger and thumb, by his expression by his shirt cuffs, by each of these things a man's calling is plainly revealed.*

*Sherlock Holmes.*

*A study in Scarlet*

*The examination does not await the removal of the shirt.*

*R. Waring*

***A thorough history and physical examination form the cornerstone of a high level of competence in medical practice.***

***Develop a thorough, systematic routine that is the same for each patient you see.***

## **I. THE PHYSICAL EXAMINATION IS FOCUSED BY THE HISTORY.**

The following six symptoms are of such specific importance in pulmonary disease diagnosis that they warrant special discussion:

1. Cough
2. Sputum production
3. Hemoptysis
4. Chest pain
5. Dyspnea
6. Wheezing

1. Coughs should be characterized: time of day, is it productive or non productive of sputum. Cough should be related to any exacerbating factors e.g. running in cold weather.
2. Sputum production should be described: e.g. 1 cup a day of foul smelling sputum.
3. Hemoptysis (coughing up blood) must be distinguished from hematemesis (vomiting blood).
4. Chest pain should be well characterized: pleuropulmonary, cardiovascular or neuromuscular.
5. Dyspnea requires quantifying. A patient who usually runs 5 miles a day who then notices dyspnea after running one mile a day may have new disease. A patient who usually can run up two flights of stairs who then notices dyspnea after walking up one flight of stairs may have new disease.
6. Wheezing. Know the importance of inspiratory stridor and unilateral wheezing. Inspiratory stridor should be recognized immediately since the obstruction is situated in the larynx or trachea and the relief of the obstruction may be a matter of great urgency. For unilateral wheezing, in most instances, the lesion will be bronchogenic carcinoma, although other tumors, foreign bodies or inflammatory stenosing lesions may occasionally be the cause of unilateral wheezing.

## **II. FOUR COMPONENTS OF THE EXAMINATION**

- A. Inspection
- B. Palpation
- C. Percussion
- D. Auscultation

## A. INSPECTION

1. FIRST AND MOST IMPORTANT IS THE RESPIRATORY RATE. TO BE ACCURATE RESPIRATORY RATE SHOULD BE COUNTED FOR 30 SECONDS. Is the respiratory rate increased or decreased? (NORMAL RATE VARIES BETWEEN 8 AND 14). What is the length of inspiration and expiration?

INSPIRATION LASTS TWICE TO THREE TIMES LONGER THAN EXPIRATION. Is the patient in respiratory distress?

2. CHEST WALL STRUCTURE

Contour

Symmetry

Hyperinflation

Sternal deformity: Pectus Carinatum  
Pectus Excavatum

Spinal deformity: Kyphosis  
Gibbus  
Lordosis  
Scoliosis

3. INSPECTION MEANS MORE THAN OBSERVING THE CHEST:

USE OF ACCESSORY RESPIRATORY MUSCLES such as sternocleidomastoid retraction – Signifies increased work of breathing and respiratory distress.

CLUBBING is associated with lung cancer, is commonly associated with diffuse fibrosis of the lung and is almost always seen in patients with cystic fibrosis. It is NOT a manifestation of asthma, chronic bronchitis or emphysema.

SKIN – cyanosis, rashes

## B. PALPATION

1. Examine for adenopathy

2. Examine the neck

Tracheal position – Should be in the midline. May deviate slightly to the right in older patients.

Thyroid gland – At the base of the neck

3. Chest wall tenderness

4. Precordium

PMI

Ventricular heave

Palpable P2

5. Chest wall expansion. Place hands at the base of the rib cage with thumbs equidistant from spinous processes. Ask patient to take slow, deep breaths and observe for any asymmetric motion of your hands.
6. Fremitus (palpable breath sounds): With the palmar aspect of the fingers or the ulnar aspect of the hand, appreciate tactile fremitus by asking the patient to say (“blue moon,” “99”, “one-two-three”).

Fremitus *n.pl.* (L.*fremere*, to murmur). A palpable vibration.

Fremitus is enhanced by consolidation and decreased by pleural fluid or trapped air (pneumothorax = air in the pleural space).

Palpation is the best method for evaluation of the degree and symmetry of expansion with respiration, as well as for appreciation of the transmitted vibrations of the spoken voice.

### C. PERCUSSION

A method of evaluating the consistency of tissues below the skin by the quality of reflected sound and palpable vibrations generated by tapping on the body surface. “A poor man’s ultrasound”.

Method – Place the volar surface of one middle finger firmly against the area to be examined (PLEXIMETER) and tap with the middle finger of the other hand (PLEXOR). Listen and feel the vibrations.

Sounds you might hear:

Resonance – the clear long low pitched sound elicited over the normal lung.

Hyperresonance – a more vibrant, lower pitched, louder and longer sound heard normally over the lungs during maximum inspiration.

Dullness – short, high pitched, soft and thudding sound which lacks the vibratory quality of a resonant sound. Dullness occurs when the air content of the underlying tissue is decreased and its solidity is increased.

Flatness – very short, and high pitched (absolute dullness). Flatness occurs when there is no air present in the underlying tissue. For example, flatness is found over the muscle of the arm or thigh.

Note: Variations in resonance may be perceived to a greater degree by the pleximeter finger than by the ear. SO AS YOU ARE LEARNING PERCUSSION LISTEN AND FEEL THE VIBRATIONS.

## D. AUSCULTATION

*Instruct the patient to breathe with his mouth open, a little deeper and faster. Demonstrate it to the patient yourself.*

### 1. Evaluation of breath sounds

INTENSITY

REGIONS – Listen over all lobes/ segments

QUALITY

Tracheal – Loud, harsh, turbulent sound heard over the sternal notch.

Bronchovesicular – Less harsh, easily, heard sounds of air flow heard in central airways under sternum.

Vesicular – Normal quiet “whishing noise of airflow through small airways.”

THE SOUNDS HEARD OVER NORMAL LUNG PARENCHYMA ARE CALLED VESICULAR BREATH SOUNDS.

Bronchial (Also called Tubular) – Similar to tracheal breath sounds but are abnormal because they are heard over the peripheral lung where only vesicular sound should be heard. BRONCHIAL OR TUBULAR SOUNDS ARE CLASSICALLY OBSERVED OVER THE CONSOLIDATED LOBE OF LOBAR PNEUMONIA.

Amphoric – Hollow, metallic sound heard over a large cavity.

ADVENTITIOUS SOUNDS (*L.Ad* to + *venire* to come) 1. accidental or acquired; not natural or hereditary: Adventitious sounds are vibrations always resulting from some pathologic process and are not heard over health lung tissue.

There are four major types of adventitious sounds.

1. **Crackles or Rales** – Crisp, crackling sounds heard primarily at lung bases. They indicate fibrosis of lung or fluid in alveoli and terminal airways. They occur during mid to late inspiration.
2. **Rhonchi** – Rattling, coarse sounds caused by turbulence around mucus in larger airways.
3. **Wheezes** – Diffuse or localized whistling sounds caused by airflow through narrowed distal airways or obstructed larger airways.
4. **Rub** – Harsh, scratching sound heard in either inspiration or expiration caused by inflamed pleural surfaces (visceral surface against parietal) sliding over each other.

MANEUVERS FOR AUSCULTATION OF THE CHEST. As there are maneuvers in the cardiovascular examination which aid the detection and definition of various murmurs there are maneuvers used in the auscultation of the chest which aid in the detection and definition of lung disease.

Forced Expiratory Time (FET). Duration of time it takes a patient to blow out air as quickly as they are able, from a full breath (total lung capacity) until air flow stops. NORMALLY IT TAKES 3 SECONDS OR LESS. The prolongation of FET (LONGER THAN 4 SECONDS) correlates very well with the severity of obstruction as in chronic bronchitis or asthma. FET IS A VERY SENSITIVE MEASURE OF AIRWAY OBSTRUCTION.

Whispered Pectoriloquy – high pitched, intensified speech heard over area of consolidation when the patient is asked to whisper low pitched words.

Bronchophony – a change in the pitch of spoken word over an area of consolidation.

Egophony – The sound of a spoken “E” changes to “A” over an area of consolidation. The spoken “E” is heard as “A” when listening over the consolidation because the frequencies of the vibrations are altered by the consolidation. “E” to “A” changes may also occur in a small band like area just above a pleural effusion because of compression of lung tissue that occurs just above the effusion. This is called Skodiac resonance in honor of the physician Skoda who first described this to warn physicians not to confuse these “E” to “A” changes with that found in consolidation.

**PHYSICAL EXAMINATION FINDINGS OF  
COMMON PULMONARY CONDITIONS**

	PLEURAL EFFUSION	PNEUMONIA	ENDO- BRONCHIAL TUMOR	PNEUMO- THORAX
TRACHEAL POSITION	SHIFTED OR MIDLINE	MIDLINE	SHIFTED OR MIDLINE	SHIFTED OR MIDLINE
CHEST WALL MOVEMENT	REDUCED OR NORMAL	REDUCED OR NORMAL	REDUCED OR NORMAL	REDUCED
FREMITUS	DECREASED	INCREASED	NORMAL OR DECREASED	NONE
PRECUSSION	DULL	DULL	NORMAL OR DULL	HYPER- RESONANT
BREATH SOUNDS	DECREASED	INCREASED	NORMAL OR DECREASED	DECREASED/ ABSENT
CRACKLES	NONE	USUALLY	NONE	NONE
WHEEZE	NONE	NONE	POSSIBLE	NONE
EGOPHONY	BAND ABOVE EFFUSION (skodiac)	PRESENT	NONE	NONE

## **PRACTICE QUESTIONS FOR SELF ASSESSMENT**

### **TRUE OR FALSE**

1. Patients may confuse coughing up blood with vomiting blood.
2. The complaint of dyspnea after walking up a flight of stairs is never worrisome.
3. Respiratory rate can be accurately assessed by counting for 15 seconds and multiplying by four.
4. In a normal breath, the expiratory phase takes more time.
5. A normal respiratory rate is from 16-20 per minute.
6. An arterial blood gas is the only way to determine if a patient is in respiratory distress.
7. Clubbing is **not** a manifestation of asthma, chronic bronchitis or emphysema.
8. Inspiratory stridor is a common manifestation of asthma.
9. Unilateral wheezing is a common manifestation of asthma.
10. Fremitus is enhanced by consolidation.
11. Fremitus is decreased by pleural fluid.
12. Fremitus is decreased by pneumothorax.
13. Percussion is best assessed by simply listening.
14. Hyperresonance is used to describe the percussion note found in the normal lung.
15. Dullness occurs when the air content of the underlying lung tissue is increased.
16. The sounds heard over normal lung parenchyma are called bronchial breath sounds.
17. Crackles and rhonchi refer to the same type of adventitious sound.
18. A rub may be heard in airway obstruction.
19. When auscultating, the patient should be instructed to breath through his nose.
20. Bronchial breath sounds are heard on the side of the chest with the pneumothorax.

21. Forced expired time (FET) correlates very well with restrictive lung disease.
22. A normal FET is between 4 and 5 seconds.
23. Whispered pectoriloquy is best elicited by listening over the trachea.
24. Egophony is elicited by having the patient say "A".
25. Egophony is heard in the middle of a pleural effusion.

### **CHOOSE THE ONE BEST ANSWER**

26. Which of the following best characterizes the findings of pneumonia on physical examination?
  - A. Decreased fremitus, dullness to percussion and decreased breath sounds.
  - B. Normal fremitus, dullness to percussion and decreased breath sounds.
  - C. Decreased fremitus, hyperresonant to percussion and decreased breath sounds.
  - D. Increased fremitus, dullness to percussion, increased breath sounds and crackles.
27. Which of the following best characterizes the findings of pleural effusion on physical examination?
  - A. Decreased fremitus, dullness to percussion and decreased breath sounds.
  - B. Normal fremitus, dullness to percussion and decreased breath sounds.
  - C. Decreased fremitus, hyperresonant to percussion and decreased breath sounds.
  - D. Increased fremitus, dullness to percussion, increased breath sounds and crackles.
28. Which of the following best characterizes the findings of a pneumothorax (air in the pleural space)?
  - A. Increased fremitus, dullness to percussion and decreased breath sounds.
  - B. Normal fremitus, dullness to percussion and decreased breath sounds.
  - C. Absence of fremitus, hyperresonant to percussion and decreased or absent breath sounds.
  - D. Increased fremitus, dullness to percussion, increased breath sounds and crackles.

### **ANSWERS TO SELF ASSESSMENT**

1. TRUE. It is often difficult for the patient to distinguish hemoptysis from hematemesis and sometimes the physician must ask several questions to distinguish the two.
2. FALSE. A change in exercise tolerance before dyspnea if noticed may be very significant in a previously healthy adult. This is why dyspnea must be quantitated.
3. FALSE. Respiratory rate should be measured for 30 seconds to insure accuracy.
4. FALSE. Take a breath yourself. Inspiration is longer than expiration.
5. FALSE. A normal respiratory rate is from 8 to 14.

6. FALSE. You can determine if a patient is in respiratory distress by inspection. A rapid respiratory rate and the use of accessory muscles are examples of signs of respiratory distress.
7. TRUE. Clubbing is not a manifestation of asthma, chronic bronchitis or emphysema. Clubbing is associated with lung cancer, is commonly associated with diffuse fibrosis of the lung and is almost always seen in patients with cystic fibrosis.
8. FALSE. Inspiratory stridor is a manifestation of tracheal or laryngeal obstruction. Inspiratory and expiratory wheezing is a common manifestation of asthma.
9. FALSE. In asthma there is bilaterally wheezing.
10. TRUE. Fremitus is enhanced by consolidation.
11. TRUE. Fremitus is markedly decreased by pleural fluid.
12. TRUE. Fremitus is decreased by pneumothorax.
13. FALSE. Percussion is best assessed by listening and feeling the resonance detected with the finger used as the pleximeter.
14. FALSE. Hyperresonance is used to describe the percussion note found in overexpanded lungs and in pneumothorax.
15. FALSE. Dullness occurs when the air content of the underlying lung tissue is decreased.
16. FALSE. The sounds heard over normal lung parenchyma are called vesicular. Bronchial or tubular breath sounds are heard in areas of consolidation.
17. FALSE. Crackles are crisp sounds heard primarily at lung bases indicating fibrosis of the lung or fluid in alveoli and terminal airways. Rhonchi are rattling, coarse sounds caused by turbulence around mucus in larger airways.
18. FALSE. A rub is heard when the pleural surfaces rub against each other.
19. FALSE. When auscultating, the patient should be instructed to breathe through his mouth. Furthermore, the patient should be shown what to do during the examination by the physicians.
20. FALSE. Breath sounds are markedly decreased or absent on the side of a pneumothorax.
21. FALSE. FET correlates very well with degree of obstruction. FET is normal or decreased in restrictive lung disease.
22. FALSE. A normal FET is 3 seconds or less.

23. FALSE. Whispered pectoriloquy is appreciated in areas of consolidation.
24. FALSE. Egophony is elicited by having the patient say "E". Where there is consolidation, "E" changes to "A".
25. FALSE. Egophony is sometimes heard just above a pleural effusion. This is also called Skodiac resonance.
26. Answer is D. Increased fremitus, dullness to percussion, increased breath sounds and crackles are heard in consolidation (Pneumonia).
27. Answer is A. Decreased fremitus, dullness to percussion and decreased breath sounds are found with plural effusion.
28. Answer is C. Absence of fremitus, hyperresonant to percussion and decreased or absent breath sounds.