Physical Examination of the Chest

CRC 330
Cardiorespiratory Care
University of South Alabama
Examination of the Head and Neck

- **Head:**
  - Facial expression
    - fear, anxiety, pain, level of consciousness
  - Cyanosis, pursed-lip breathing, nasal flaring

- **Eyes**
  - Pupillary reflexes: cranial nerves II and III are intact
  - PERRLA
  - Dilated pupils: head trauma, tumors, CNS disease, death
  - Pinpoint pupils: opiates and parasympathetic stimulant
  - Ptosis: cranial nerve disease/NM disease
Examination of the Head and Neck

- Glasgow Coma Scale
  - Eye opening response
    - None, pain, verbal stimuli, spontaneous opening
  - Most appropriate verbal response
    - None, incoherent, inappropriate, confused, oriented
  - Most integrated motor response
    - None, extension, flexion, localizes, obeys
  - Normal consciousness: 14
Examination of the Head and Neck

**Neck**

- Observe for
  - tracheal deviation
  - Jugular vein pressure
  - Accessory muscle use
- Venous distension > 3-4 cm above sternal angle is abnormal
  - Fluid overload
Examination of the Head and Neck
## Lung topography

<table>
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<th>Imaginary Lines</th>
<th>Thoracic cage landmarks</th>
<th>Lung fissures</th>
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<tr>
<td>Midsternal</td>
<td>Suprasternal notch</td>
<td>Right: oblique and horizontal</td>
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<tr>
<td>Midclavicular</td>
<td>Angle of Louis C7, T1</td>
<td>Left: oblique</td>
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<tr>
<td>Anterior, mid,</td>
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<tr>
<td>and posterior</td>
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<td>axillary</td>
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<tr>
<td>Left and right</td>
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<td>midscapular</td>
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Chest Wall Landmarks
Location of Lung Lobes

Anterior Projection

Posterior Projection
Location of Lung Lobes

Right Lateral Projection

Left Lateral Projection
Techniques of Examination

- Observation:
  - looking at the patient

- Palpation:
  - Feeling the chest wall

- Percussion:
  - Tapping and listening for changes in resonance

- Auscultation:
  - Listening to the chest with a stethoscope
Observation

- Hands/toes
  - normal angle between skin and nail is 160 degrees
  - nailbed should be firm and pink
  - spongy, tender, edematous nailbed indicates clubbing
    - chronic, cyanotic, suppurative disease
    - cancer, CF, bronchiectasis, congenital cyanotic heart dz
  - bluish discoloration indicates peripheral cyanosis
Digital Clubbing

Cyanosis
Observation

- Face
  - Normal, Pale, cyanosed
  - Signs of anxiety
  - Nasal flaring

- Thoracic configuration
  - A-P is less than the transverse diameter
Abnormal Thoracic Configuration

- Increased A-P diameter
  - “barrel-chest”
  - COPD, asthma, due to air trapping
Pectus Carinatum

- Pigeon chest - pectus carinatum
Funnel Chest

- Funnel chest – pectus excavatum
Curvature of the Spine

- Scoliosis, kyphosis
- Kyphoscoliosis
- Lordosis
Breathing Pattern and Effort

- Normally little effort, slight abdominal protrusion during inspiration, 5% of VO₂
- Observe symmetry of chest movement by directing the patient to take a few deep breaths
  - Asymmetrical movement indicates underlying pathology
Abnormal chest movement: accessory muscles

- Inspiratory accessory muscles
  - Sternomastoids
  - Scalene
  - Pectoral
  - Intercostals
  - COPD, exercise, increases VO₂
Abnormal chest movement: accessory muscles

- Expiratory accessory muscles
  - Internal and external oblique
  - Transverse and rectus abdominus
  - Expiratory, coughing, sneezing, increased expiratory flow
Retractions

- Indentations between ribs, over and under the sternum, in supraclavicular fossae
- Occur in restrictive disease when Pintrathoracic is very negative, in thin persons
Abnormal Ventilatory Patterns

- **Abdominal paradox**
  - Accessory muscle use causing the diaphragm to be pulled in and up during inspiration
  - Occurs in COPD as the diaphragm fatigues
  - Impending ventilatory failure

- **Respiratory alternans**
  - Alternating chest wall breathing and diaphragmatic breathing

- **Obstructive, restrictive and decreased**
Palpation: Feeling

- Tracheal palpation
  - should be midline
  - deviates towards massive atelectasis
  - deviates away from tumor, massive pleural effusion, tension pneumothorax

- Spine
  - Helps define spinal abnormalities
Palpation of the Chest

- Vocal or tactile fremitus
- Blue moon
- Evaluate anterior, posterior and lateral aspects of the chest
- Increased fremitus: increased density
  - Consolidation, atelectasis
- Decreased fremitus: decreased density
  - Pneumothorax
- Absent or decreased if bronchus is obstructed
- Ronchial or tussive fremitus in retained secretions
Chest Wall Palpation
Palpation of Thoracic Expansion and the Chest Wall

- Place hands across anterior or posterior chest, draw thumbs together, direct patient to inhale deeply
  - thumbs should withdraw equally, 3-5 cm.
  - decreased movement indicates underlying pathology, nerve damage, CNS depression

- Skin and subcutaneous tissue
  - Subcutaneous emphysema
  - Indicates rupture of alveoli or the chest wall
Percussion

- Tapping the chest and listening for changes in resonance
- 5-7 cm below the skin surface
- Mediate or indirect percussion
- Percuss both sides of the chest, compare tones
- Avoid bones, breasts
- Normal/resonant chest
Abnormal Percussion

- Dull or flat percussion note
  - Increased density
  - Short, higher in pitch
  - Pneumonia, tumor, collapse

- Hyperresonant or tympanic
  - Decreased density
  - Long, lower in pitch
  - Pneumothorax, COPD
Percussion of Diaphragmatic Excursion

- Patient inhales fully, percuss to the point where resonant changes to dull
- Patient exhales fully, repeat
- Distance between these two points is the diaphragmatic excursion
- Normally 5-7 cm.
- Little excursion from full inspiration denotes air trapping
- Little change from expiration denotes nerve paralysis
Auscultation: the Stethoscope

- Four parts: bell, diaphragm, tubing, earpieces
- Diaphragm is pressed firmly onto the chest wall for auscultation
- Earpieces are placed into the ears, pointed forwards
- Tubing should be 25-35 cm long
- Keep earpieces free of dirt and wax with alcohol swabs
- Swab diaphragm between patients
Auscultation: Technique

- Inform the patient that you will be listening to his chest; eliminate ambient noise.
- Ideal to have patient sitting-up press diaphragm firmly onto the skin, avoid listening over clothing.
- Auscult from side to side, comparing sounds on one side to the same place on the other side.
- Get assistance with moving the patient so all aspects may be ausculted.
Auscultory Locations

Anterior Projection

Posterior Projection
Auscultation: Normal Breath Sounds

- Bronchial or tracheal
  - Loud and tubular
  - High pitched, equal I and E
  - Ausculted over the trachea and large airways, carina
  - May be heard over consolidated parenchyma
Auscultation: Normal Breath Sounds

- Bronchovesicular
  - Softer than bronchial
  - Ausculted over large airways overlaid by lung parenchyma
  - I=E
Auscultation: Normal Breath Sounds

- **Vesicular**
  - Normal parenchymal breath sounds
  - Lower in pitch and intensity
  - Long I, short E

- **Variations**
  - Diminished
  - Absent
Auscultation: Adventitious Sounds

- **Wheezeing**
  - Vibration of the wall of a narrowed or compressed airway
  - Diameter is decreased by bronchospasm, edema or foreign object
  - Pitch is directly related to the degree of airway compression
  - Continuous, usually high pitch, do not often clear with coughing, predominantly heard on expiration
  - Asthma, emphysema, chronic bronchitis, pneumonia
  - Low pitch wheeze may be associated with secretions, may clear with cough
  - May be mono or polyphonic
Mechanisms of Wheezing

A. Smooth muscle cell contraction, airway edema
B. Mucus hypersecretion
C. Dynamic compression
Auscultation: Adventitious Sounds

- **Crackles**
  - Movement of excessive secretions; tend to be continuous
  - Coarse crackles are heard on I and E, clear with effective cough
  - End inspiratory crackles, sudden opening of small airways; diffuse, fine, more often heard in dependent regions: CHF, fibrosis, pneumonia, pulmonary edema; do not clear with cough
  - Early inspiratory crackles, sudden opening of proximal airways, common in COPD
Auscultation: Adventitious Sounds

- Stridor
  - Harsh, high pitched sound produced in the trachea around a foreign body or edema
  - Primarily during inspiration, also on expiration is severe
  - Croup, epiglottitis, laryngeal edema, postextubation edema
Auscultation: Adventitious sounds

- Therapy
  - Wheezing-bronchodilators, secretion removal, foreign body removal
  - Crackles
    - I and E, early inspiratory - secretion removal
    - late I – IS, diuretics, increase inotropic agents
  - Stridor - foreign body removal, racemic epinephrine for edema
  - Absent/diminished - determine cause - mechanical ventilation, chest tube if pneumothorax
Auscultation of Voice Sounds

- Bronchophony: increase intensity of voice sound
- Egophony: E to A change
- Whispered pectoriloquy: increased intensity of whispered sounds
- All indicate an increase in density
- All are abnormal
Examination of the Precordium

- Inspection and palpation
  - Apical impulse is identified at the midclavicular line at the 5th intercostal space
    - referred to as the point of maximal impulse (PMI)
    - reduced or not identifiable in emphysema due to increased AP diameter
    - may shift with the mediastinum in pneumothorax and atelectasis
    - may shift to the epigastric area when diaphragms are low and flat
Auscultation of Heart Sounds

- $S_1$: closure of the mitral and tricuspid valves during systole
- $S_2$: closure of the aortic and pulmonic valves at the end of systole
- $S_3$ may be heard during diastole, as a result of rapid ventricular distension
  - heard over the apex, and may be normal in children, but is a sign of heart disease in the elderly
Acute Lower Airways Obstruction

- Respiratory distress
- Pulsus paradoxus
- Wheezing
- Decreased fremitus
- Hyperresonance
- Asthma, COPD exacerbation, FB aspiration
Chronic Airway Obstruction

- Emphysema
- Decreased I:E, air trapping
- Retractions, DOE and at rest
- Decreased fremitus
- Hyperresonant
- Decreased BS
Chronic Airway Obstruction

- Chronic Bronchitis
- Decreased I:E, barrel chest
- Obese, central cyanosis
- Decreased fremitus
- Late inspiratory crackles
- Sputum
Pneumonia

- Tachypnea, febrile
- Yellow, brown or green sputum
- Increased fremitus
- Dull to percussion
- Crackles and wheezes
- Reduced expansion
- Bacterial or viral
Pneumothorax

- Tachypnea, occ. Cyanosis
- Decreased movement
- Hyperresonant
- Sharp pain
- Tracheal shift
- Diminished/absent BS
Pleural Effusion

- Tracheal shift
- Dull to percussion
- Diminished breath sounds
- Voice sounds
- Infection, CHF, trauma
Acute Bronchial Obstruction

- Mucus plug or clot in bronchus
- Distal collapse
- Tracheal shift
- Voice sounds
- Dull to percussion
- Fremitus and BS absent
Diffuse Interstitial Fibrosis

- DOE
- Restrictive pattern
- Fine, late inspiratory crackles
- Asbestosis, pneumoconioses
- Stiff, restricted lung
Acute Upper Airway Obstruction

- Stridor
- Victim may clutch neck
- BS may be absent
- Epiglottitis, croup, laryngospasm, foreign body
- Medical emergency