Lung & Thorax Exams

Charlie Goldberg, M.D.
Professor of Medicine, UCSD SOM

cggoldberg@ucsd.edu
Lung Exam

- Includes Vital Signs & Cardiac Exam
- 4 Elements (cardiac & abdominal too)
  - Observation
  - Palpation
  - Percussion
  - Auscultation
Pulmonary Review of Systems

• All organ **systems** have an ROS
• Questions to uncover problems in area
• Need to know right questions & what the responses might mean!
• An example:  
  [http://meded.ucsd.edu/clinicalmed/ros.htm](http://meded.ucsd.edu/clinicalmed/ros.htm)
Exposure Is Key – You Can’t Examine What You Can’t See!
Anatomy Of The Spine

Cervical: 7 Vertebrae
Thoracic: 12 Vertebrae
Lumbar: 5 Vertebrae
Sacrum: 5 Fused Vertebrae
Note gentle curve ea segment

Anatomic Images courtesy Orthospine.com
Spine Exam
As Relates to the Thorax

• W/patient **standing**, observe:
  – **shape of spine**.
  – Stand behind patient, **bend @ waist**
  – w/Scoliosis (curvature) one **shoulder** appears “higher”
Pathologic Changes In Shape Of Spine – Can Affect Lung Function

Scoliosis (curved to one side)

Thoracic Kyphosis (bent forward)
Observation

• ? Ambulates w/out breathing difficulty?
• Readily audible noises (e.g. wheezing)?
• Appearance → ? sitting up, leaning forward, inability to speak, pursed lips → significant compromise
• ? Use of accessory muscles of neck (sternocleidomastoids, scalenes), inter-costals → significant compromise

Accessory Muscles
American Massage Therapy Association
http://www.amtamassage.org/
Make Note of Chest Shape: Changes Can Give Insight into underlying Pathology

Barrel Chested (hyperinflation secondary to emphysema)
Examine Nails/Fingers: Sometimes Provides Clues to Pulmonary Disorders

Cyanosis

Nicotine Staining

Clubbing
Assorted other hand and arm abnormalities: Shape, color, deformity

Swelling

Deformity

Discoloration
Palpation

- Patient in **gown**→**chest accessible & exposed**
- **Explore** painful &/or abnormally appearing areas
- **Chest expansion** – position hands as below, have patient inhale deeply→hands lift out laterally
Palpation – Assessing Fremitus

- **Fremitus** = normal vibratory sensation with palpating hand when patient speaks
- Place **ulnar** aspect (pinky side) of hand firmly against chest wall
- Ask patient to say “Boy”
- You’ll feel transmitted **vibratory sensation** → fremitus!
- Assess **posteriorly** & **anteriorly** (i.e. lower & upper lobes)
- *Not Performed in the absence of abnormal findings*
Lung Pathology - Simplified

• **Lung** = sponge, **pleural cavity** = plastic **container**

• **Infiltrate** (e.g. pneumonia) = fluid within lung tissue

• **Effusion** = fluid in pleural space (outside of lung)
Fremitus - Pathophysiology

- **Fremitus:**
  - Increased with consolidation (e.g. pneumonia)
  - Decreased in absence of air filled lung tissue (e.g. effusion).
Percussion

• **Normal** lung filled w/air
• **Tapping** generates **drum-like** sound → **resonance**
• When **no** longer over **lung**, percussion → **dull** (decreased resonance)
• Work in “**alley**” between vertebral column & scapula.
Percussion - Technique

- Patient **crosses arms** in front, grasping opposite shoulder (pulls scapula out of way)
- Place **middle finger of flat** against **back**, other fingers off
- **Strike distal** interphalangeal **joint** w/middle finger of other hand - strike 2-3 times @ ea spot
Percussion (cont)

- Use **loose, floppy wrist** action – percussing finger = s hammer
- Start @ top of one side → then move across to same level, other side → R to L (as shown)
- @ **Bottom of lungs**, detect **diaphragmatic excursion** → difference between diaphragmatic level @ full inspiration v expiration (~5-6cm)
- **Percuss upper lobes** (anterior)
- **Cut nails** to limit bloodletting!

Ohio State University SOM:
Percussion Simulator: Scroll down and click on “Review diaphragmatic excursion”
http://familymedicine.osu.edu/products/physicalexam/exam/
Percussion (Cont)

• **Difficult** to master technique & detect tone changes - expect to be frustrated!

• **Practice** – on friends, yourself (find your stomach, tap on your cheeks, etc)
  
  • Detect **fluid** level in **container**
  
  • Find **studs** in **wall**
Percussion: Normal, Dull/Decreased or Hyper/Increased Resonance

- **Causes of Dullness:**
  - Fluid outside of lung (effusion)
  - Fluid or soft tissue filling parenchyma (e.g. pneumonia, tumor)

- **Causes of hyper-resonance:**
  - COPD → air trapping
  - Pneumothorax (air filling pleural space)

![Diagram of lung with pleural effusion and pneumothorax]
Auscultation

• **Normal** breathing creates sound → appreciated via stethoscope over chest → “**vesicular breath sounds**”
• Note sounds w/both expiration & inspiration – inspiration typically more apparent
• Pay attention to:
  – quality
  – inspiration v expiration
  – location
  – intensity
Lobes Of Lung

Where you listen dictates what you’ll hear!

Posterior View

Anterior View
Lobes Of The Lung (cont)

Lateral Views
Right Lateral View

Left Lateral View

RUL
RLL
RML

Oblique Fissure

Horizontal Fissure

LUL
LLL

Oblique Fissure
Trachea
Auscultation (listening w/Stethoscope) - Technique

- **Stethoscope** - ear pieces directed *away* from you, **diaphragm** engaged
- Patient **crosses arms**, grasping opposite shoulders

**Areas To Auscult**

- **Posteriorly** (lower lobes) ~ 6-8 *places* - Alternate R → L as move down (comparison) - ask patient to take **deep breaths** thru mouth
- **Right middle lobe** – listen in ~ 2 spots – **lateral/anterior**
- **Anteriorly** - Upper lobes – listen ~ **3 spots** ea side
- Over **trachea**
Pathologic Lung Sounds

- **Crackles (Rales)**: “Scratchy” sounds associated with fluid in **alveoli & airways** (e.g. pulmonary edema, pneumonia); finer crackles with fibrosis.

- **Ronchi**: “Gurgling” type noise, caused by fluid in **large & medium sized airways** (e.g. bronchitis, pneumonia).

- **Wheezing**: **Whistling** type noise, loudest on expiration, caused by **air forced** thru narrowed **airways** (e.g. asthma) – expiratory phase prolonged (E>>>I).

- **Stridor**: **Inspiratory whistling** type sound due to tracheal narrowing → heard best over trachea.
Pathologic Lung Sounds (cont)

• **Bronchial Breath Sounds:** Heard normally when listening over the trachea. If **consolidation** (e.g. severe pneumonia) upper airway sounds transmitted to periphery & apparent upon auscultation over affected area.

• **Absence of Sound:** In chronic severe emphysema, often small tidal volumes & thus **little air movement**.
  – Also w/very severe asthma attack, effusions, pneumothorax
Pathologic Lung Sounds (cont)

- **Egophony**: in setting of suspected consolidation, ask patient to say “eee” while auscultating. Normally, sounds like “eee”.
- Listening over consolidated area generates a nasally “aaay” sound.
- Not a common finding (but interesting)
Lung Sound Simulation

Lung Sound Simulation Sites (for practice):

1. Ohio State University
   http://familymedicine.osu.edu/products/physicalexam/exam/

2. R.A.L.E. Repository
   http://www.rale.ca/Recordings.htm

Putting It All Together: Few findings pathognomonic → put ‘em together to paint best picture.

- **Effusion**
  - Auscultation → decreased/absent breath sounds
  - Percussion → dull
  - Fremitus → decreased
  - Egophony → absent

- **Consolidation**
  - Auscultation → bronchial breath sounds
  - Percussion → dull
  - Fremitus → increased
  - Egophony → present

Vs
Summary of Skills

- Wash hands, Gown & drape

**Observe & Inspect Hands**
- Nails, fingers, hands, arms
- Respiratory rate

**Lungs and Thorax**

**General observation & Inspection**
- Patient position, distress, accessory muscle use
- Spine and Chest shape

**Palpation**
- Chest excursion
- Fremitus

**Percussion**
- Alternating R & L lung fields posteriorly top → bottom
- R antero-lateral (RML), & Bilateral anteriorly (BUL)
- Determines diaphragmatic excursion

**Auscultation**
- R & L lung fields posteriorly, top → bottom, comparing side to side
- R middle lobe
- Anterior fields bilaterally
- Trachea

Time Target: < 10 minutes